HARVARD FOREST

BULLETIN NO. 6

RICHARD T. FISHER, *Director*

A STATISTICAL FOREST SURVEY OF SEVEN TOWNS IN CENTRAL MASSACHUSETTS

BY

R. C. AVERILL, W. B. AVERILL
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HARVARD FOREST, PETERSHAM, MASS.

1923

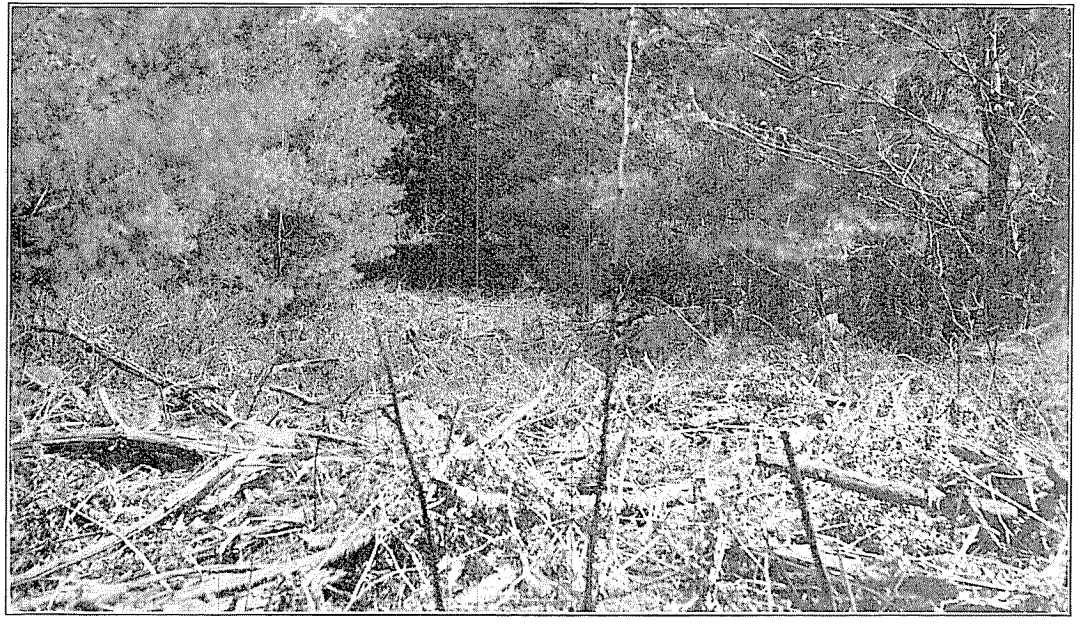

FIG. 1. Slash Piles 20 years old, with dense White Pine of equal age between the windrows

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PREFACE

THIS study, although mainly of local application, presents some of the facts upon which better forest policies must be based, and illustrates the working of a field method by which such facts may be obtained. The towns covered in the survey, in total area 145,884 acres, make up a locality where wood-working industries annually use not less than 50,000,000 feet of lumber; the annual increment is found to be 21,000,000. Of the pine woodlots, themselves the result of farm abandonment, 60 to 75 per cent revert when cut to hardwood, much of it worthless. On cut-over pine lands, 30 to 40 per cent of the area remains covered with slash piles for periods up to twenty years, and is not reproduced to useful species. Forestry must be based on the best use of the land, but until facts like these are quantitatively known and faced, the right use cannot be determined.

R. T. FISHER.

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A STATISTICAL FOREST SURVEY OF SEVEN TOWNS IN CENTRAL MASSACHUSETTS

PLAN AND EXECUTION OF THE SURVEY

In 1921 a committee of the New England Section of the Society of American Foresters reported on a method of extensive survey for obtaining data on forest conditions over large areas. The objects of such a survey, as stated in the report are as follows:

1. Areas,
   of unforested lands
   of forested lands, separated,
   by forest types,
   by age-classes,
   by density-classes,
   by site-classes.
2. Estimate of present stand
   separated by types, age-classes, density-classes, and sites.
3. Growth on entire area
   separated by types, and by sites;
   separated by age-classes, and by density-classes.

The present study was undertaken to test the practicability of the method, and to secure, in addition to the statistics outlined above, general information on the succession of forest types and the effect of slash upon reproduction.

Previously the basis for obtaining estimates of existing stands and predictions of yield has been either the compilation of opinions of persons familiar with the region, or by estimates made from road traverses. It is obvious that the former will result in only a guess, and that the latter can give but a very small part of the desired information. In order to get sufficient data, the individual stands must be traversed,

and a method for extensive areas, to be practical, must demand a minimum amount of field work.

It was proposed, by the New England Section, that evenly distributed parallel lines be run across the area, recording linear distances only, and classifying areas purely on a percentage basis. If a sufficient number of evenly distributed lines are run across a tract, recording the lineal distance through each type and site-, age-, and density-class, the percentage of total distance traversed in each will be proportionate to the percentage of the total area occurring in each of the different types and cases. In order to decide the direction in which the lines are to be run, a general knowledge of the topography of a region, and of the related settlements, is of primary importance. Lines should in all cases cross topography as nearly at right angles as possible, because of the fact that the long axes of types are usually parallel to the main divides. The interval between lines will depend wholly upon the size of the tract. On extensive work time cannot be given to running lines at one-eighth or one-quarter mile intervals, but lines half a mile or a mile apart should secure accurate percentage results for a county or larger subdivisions. This will be particularly true as the uniformity in topography and distribution of types increases.

This principle of obtaining areas was used by H. O. Cook in his survey of Worcester County and by James J. Morris in his survey of the forests of Plymouth County.

In the present survey, towns that would be representative of nearly all the conditions existing in north-central Massachusetts were selected. Northfield, Erving, Orange, and Warwick, in Franklin County, lie in an area of heavier, better soils; while Winchendon and Royalston, in Worcester County, are quite typical of the towns partly covered by sand plains. Petersham, also in Worcester County, falls in the class of the better soils. Time available permitted covering only these seven towns, but the results record a representative average of the region.

In all these towns the early settlements developed along the ridge-tops and most of the main roads follow these ridges. Here a large part of the farms of the area are found. Later, as manufacturing became one of the chief industries of the region, towns developed near the good water-powers, and railroads were extended up the river valleys. On the outskirts of the villages the good tillage lands have been utilized, until to-day the largest and best farms are found either along the rivers or on the ridges. Back from the villages and ploughing fields are located pastures in use at the present time. Back of the farms and pastures are the woodlots, composed of second growth that has come in either on abandoned land, or on areas where the original stand has been removed. In almost all cases former cuttings have been clean, and the resulting uneven-aged forest is made up of many even-aged stands. Where whole farms have been abandoned, they are usually found on roads poorly located, from an agricultural point of view, and on lands that were never suitable for any purpose other than a forest crop.

Since the banding of land classes and types is, for the most part, uniform over the entire area, and the major topography runs in a general northerly and southerly direction, the cruise lines were run east and west. These were run with a box compass, distances were found by pacing, and the lineal distance was recorded through each type, age-, and density-class. Types were recorded according to the classification as standardized by the New England Section of the Society of American Foresters.[1] Following are the types encountered.

White Pine Type

Eighty to one hundred per cent white pine, with varying percentages of hardwoods, hemlock, pitch-pine, red pine and red spruce.

Hemlock Type[1]

Hemlock with admixture of other softwoods and hardwoods.

[1] Journal of Forestry, vol. XX, No. 2, p. 122.

Pine and Hardwoods Type
Mixture of white pine and hardwoods, with occasional hemlock and spruce.

Transition Hardwoods Type
Red oak 22 per cent, white ash 15 per cent, red maple 15 per cent, basswood 9 per cent, yellow birch 8 per cent, poplar 7 per cent, paper birch 2 per cent, beech 2 per cent, miscellaneous 6 per cent.

Hardwood Swamp Type
Red maple is the chief species, with elm, black ash, yellow birch, a little sour gum, sycamore, and, toward the north, larch and spruce.

Gray Birch Type
Variable mixture composed chiefly of such inferior species as gray birch, red maple, poplar, and pin cherry, with a variety of better hardwood species.

Spruce Flat Type [1]
Spruce, fir, and paper birch are principal species, with spruce (red, black, and occasional white) forming 90 per cent of the stand. Largely red spruce, except where bordering on spruce swamp type. Ground cover is usually sphagnum.

Pitch Pine Type [1]
Pitch pine pure or with a small percentage of oak.

Age-classes were recorded in three periods of twenty years each. Density was judged by the percentage of ground space (present or potential) covered by the crowns. For instance, stands one to twenty years old were classified, not on the basis of the present crown-cover, but on that of future stocking when the crowns will be developed. An area with 300 well-distributed trees to the acre, in the first age-class, would have a low density, if judged by its present crown-cover, but based on the mature crown-cover, it will easily fall in the second density-class. Site-classes were determined in the field by topography, and by the height of the dominant trees as compared with heights in yield tables. An ocular estimate, checked by volume tables, was made of the stands per acre. Great care was taken to make the estimate representative of the total area of the type rather than of any particular plot in the type. Here there is a considerable

[1] This type was recorded in the field, but later was combined with the White Pine Type, in area and volume classification, because of its restricted occurrence and the similar uses of the crop.

chance for a slight error in each case; but if the estimator has had considerable experience, he should be able to estimate within 15 per cent. Such errors will in most cases be compensating. For extensive work of this kind the increased accuracy will not warrant the extra time consumed in making actual tallies. All timber estimates were based on round-edged lumber. Margolin's volume table for white pine in southern New Hampshire was used as a basis for ocular estimates of the softwoods, and the volume table for mixed oak, constructed by the State Forester of Massachusetts, was used for the better hardwoods. The Harvard Forest Red Maple volume table was used for cordwood estimates. In preparation for the field work a test line was cruised by each member of the crew. The same line was then covered by a chain and caliper strip survey. Comparison of results showed the ocular method to be accurate within 10 to 15 per cent.

The crew consisted of three men, each man taking one of three consecutive lines, starting at convenient points along the roads and finishing on the same road at night, so that a minimum length of time would be required in transporting the men to and from work. Since the whole area was cruised from the same headquarters, an automobile was used for transportation. A great deal of time could be saved by having the men live in the town upon which they are working.

In the field notes, types, site, age, and density were recorded by symbols, in order to conserve time and space. Following is a list of the symbols used:

TYPE DESIGNATIONS

P	White Pine.
PH	Pine and Hardwoods.
T	Transition Hardwoods.
G	Gray Birch.
HS	Hardwood Swamp.
H	Hemlock.
S	Spruce.
PP	Pitch Pine.
O	Open Land.

QUALITY OF SITE

I	Quality I site.
II	Quality II site.
III	Quality III site.

AGE-CLASSES

a	A stand twenty years old or under.
b	A stand twenty to forty years old.
c	A stand over forty years old.

DENSITY-CLASSES

1	A stand fully stocked.
2	A stand two-thirds stocked.
3	A stand one-third stocked.

Thus: P II a 1 would represent a stand of White Pine on a quality II site, twenty years old or under, and fully stocked. The field-notes were recorded in a specially prepared note-book, with a column for type, site, age, and density class, another for estimate of stand per acre of softwoods in board feet, hardwoods in board feet, and smaller and inferior hardwoods in cords. For cut-over land, a column was also given to the percentage of the ground covered by slash and one for the previous type. Data as to the history of the type or the silvicultural conditions and soil composition were recorded on the opposite page.

The total time consumed in field work was 48 man-days; 183 miles of line were run over a total area of 145,884 acres. This gives an average of 3039 acres per man per day. Under any ordinary conditions a man can travel over about a mile of line an hour, and take all necessary data; but on an average more than six miles a day cannot be covered. Subsequent office-work is estimated at 125 man-days.

DISCUSSION OF METHOD AND RESULTS

The tables (p. 22) record the data obtained from the survey. Those with odd numbers show the area classification for the different towns, and the tables with even numbers give the timber estimates. Although lines run a mile apart will not give accurate results for small areas, sufficiently accurate results are obtained on extensive areas. In this connection it is interesting to compare the results obtained in this survey with those of H. O. Cook in the survey of Worcester County, where lines were run half a mile apart. Petersham, Royalston, and Winchendon are the only towns covered by both surveys; but since the type classifications are different, only the percentages of forested area are comparable. By running lines half a mile apart, Petersham was found to have 69 per cent in forested area, Royalston 65, and Winchendon 68. When lines spaced one mile apart were used, the percentages were 68, 78.9, and 69.3, respectively. The total stand is apt to be most seriously affected by wide spacing of the lines, the silvical conditions being quite uniform over large areas. While the survey was intended to show conditions existing over the whole area, it was simpler to make the computations for each town separately, as the use of large numbers was thereby avoided. Although it is interesting to note the comparison between towns, the summary of results, given in tables No. XVII and XVIII, applying to the locality as a whole, is more accurate.

The method of obtaining the area of water in the different towns varied to some extent. When Petersham was cruised, it was possible to cross the ponds on the ice and their areas could be computed from the field-notes. In Winchendon, when the cruise lines were intercepted by ponds, they were extended on the United States Geographical Survey map and the water area figured by percentage of line distance. Only the part of Orange that lies north of Millers River was cruised, and in this town the area of water was obtained by

planimetering the ponds given on the United States Geological Survey topographic sheet. In Northfield only the part of the town lying east of the Connecticut River was cruised, and as there are no lakes or ponds lying in this part of the town, the very small area of water was wholly disregarded. In the remaining towns, namely, Warwick, Royalston, and Erving, the areas of water were taken from the Report of the Massachusetts Board of Harbor and Land Commissioners.

Petersham and Winchendon are the only towns in which it is possible to compare the results obtained in the field-work with known areas. The variation between the actual area of water and the area found by the percentage basis was very slight in Petersham but too large in Winchendon. This should not be considered a check on the accuracy of the method, for in a single town the area of water is relatively very small, and the method is assumed to be accurate for large areas only. In Winchendon one of the lines crossed the largest pond on its longest axis, and the area obtained would therefore be expected to be too large.

In obtaining areas of types the percentage of total length of line run in each town, and occurring in an individual type, was multiplied by the total area of the town in acres, as given in the Report of the Massachusetts Board of Harbor and Land Commissioners. These results, together with the stand per acre and the total stand in each particular type, were tabulated as they occurred. The areas were then transferred to type sheets with each age- and density-class kept separate, thus giving the total area falling in each type on a separate sheet. Upon completion of the field-work such a predominance of site-class II was found, that in the computations, site-classes I and III were merged with II. The total stand in each individual type was then transferred from the first sheet to another set of type sheets, with the board feet in pine and in hardwoods and the cordwood, in cords, kept separately under each age-class. Tables I to

XVI inclusive are a summary of these tabulations. Density-classes were kept in the summary of areas, in order to facilitate the figuring of increment; but they were omitted in the estimate, in order that the final tables might be less cumbersome.

SUCCESSION OF TYPES

Due to the variation in soil composition there is a marked contrast between the types found in the towns in the eastern and the western parts of the area cruised. In Northfield the Connecticut River runs through the westerly part of the town and forms the west boundary of Erving. From the bank of the river a broad, level flood plain extends back for a distance of more than a mile in some places. This is the best of tillage land and is occupied by large farms. Back from this flood plain a high ridge follows the river from New Hampshire south. The westerly slopes of this ridge are well wooded with transition hardwoods, the region as a whole being very typical of the more southern types which extend up the valley. There is also a considerable amount of pine, but it is typically a hardwood region. Farther up on the slopes, and on the extremely poor soils at the top, stunted chestnut oak is the predominating species. This is the most easterly place where more than an occasional tree is found. Farther east, over the main ridges, the soils are heavier, and support types composed largely of hardwoods. East of this point, through the towns of Royalston and Winchendon, the surface is broken by lower ridges, of which Mount Grace and Jacobs Hill are the largest. Between these ridges are found low, level stretches of sand plain. The composition of the soil over the whole of the towns includes clay, loams, sandy loams, sands, and gravels. On the sandy or gravelly soil pine occurs largely in pure stands, and in the competition for supremacy the pine, in most places, wins over the inferior hardwoods.

It is generally believed that either pine or inferior hardwoods follow fields and pasture-land. This is quite true, and due not to any soil quality, but to suitability of seed bed, and to the fact that these two species have light, winged seed, which will travel on the wind for long distances. They are about the only species that have extended their local distribution to any marked extent. The heavier-seeded trees are dependent upon rodents to transport the seed and bury it, and these animals confine their activities largely to the most protected ground in woodland, or close to the edges of the fields. Where gray birch seeds in, mixed with pine, the resulting mature stand, if not affected by human agencies, is governed by the composition of the soil. In Winchendon, on the very sandy soils, where pine and gray birch seed in on the same area, gray-birch seedlings are at no time a menace to the pine of the same age; while in Petersham, where the soils are heavier and better, the inferior hardwood species will invariably outgrow the softwoods. Where the previous type could be determined most of the gray-birch types were in the first age-class. This was partially due to the fact that it was hard to determine the previous crop after the new stand was more than twenty years old; but there was strong evidence of the older gray-birch stands deteriorating and giving place to the more permanent types. Where the gray-birch stands are in the second age-class, the stand per acre is usually large enough to be of some economic value to the owner. Although it may be far from the most profitable forest crop that could be grown on the land, it cannot be classed as waste land and a good yield of cordwood can be counted on every twenty years. On all gray-birch types the average stand per acre is 4.35 cords.

Table XVII gives a summary of succession of types according to a rough classification of soils, mainly physiographic. Lines run through sandy areas were tabulated separately from those traversing heavier soils. In 685 cases it was possible to determine the previous types, and they

fell at random over the entire area cruised. This is merely an attempt to see if types can be correlated broadly with soil-class. The results are reasonably significant. Abandoned fields, regardless of soil, come in to pine more often than to gray birch. On the better soil 64 per cent of the fields reverted to pine, and 16 per cent to gray birch, and on the lighter soils the percentages were 61 and 16 respectively.

Pine, after cutting, is followed by nearly pure hardwoods on 75 per cent of the heavier soils, while on the lighter soils only 46 per cent of the previous pine types are followed by pure hardwoods. Here it will be comparatively easy to perpetuate the pure pine or pine and hardwood types with little more silviculture than clear cutting in a seed-year.

Twenty-five per cent of the pine types on the good soils were found to be followed by gray birch, and 26 per cent under like conditions on the lighter soils. In the latter case they are nearly all in the first age-class, and the absence of the two older age-classes would indicate that there is a comparatively small percentage of gray birch that will persist on the lighter soils if there are any pine seedlings to compete with it. Just the opposite is true for the better soils, as has been shown by numerous experiments on the Harvard Forest.

In the pine and hardwood type 64 per cent of the logged areas come in to pure hardwoods on the heavier soils, and 57 per cent on the lighter soils. In nearly all cases where pine has been removed, it has been clear-cut. In the older operations of the pine and hardwood type, in many cases all the pine was cut and the hardwood left. Under these conditions, if the pine is cut in a seed-year, after the seed has had time to mature, a good stocking of pine will result, the hardwoods not being given the opportunity to sprout; and the pine seedlings compare very favorably in growth with the hardwood seedlings. Where maple, chestnut, and other hardwoods are cut along with the pine, the tendency is strong on the better soils to revert to the pine and hardwoods type

or to transition hardwoods. The pine that survives in this mixture produces long internodes, and the lumber commands the highest market price for native pine. The transition hardwoods have recently come to be of economic importance in this localty. This type almost always reproduces unchanged, only three cases being found where it came in to any other. These were on the edge of pure pine stands, where all conditions were favorable to seeding in from the side.

The hardwood swamp type, because of its ability to sprout readily and the site conditions peculiar to the type, perpetuates itself in nearly all cases unchanged. It produces mainly cordwood, and in mature stands a fair amount of saw timber, which, if accessible, finds a ready market in this locality. It is thus a profitable crop in itself, and it is better to improve it rather than to try to produce some other crop under the adverse conditions encountered on true maple swamp land.

THE EFFECT OF SLASH UPON REPRODUCTION

There are very few instances in this part of Massachusetts where slash has been burned or otherwise disposed of after logging. Pine being the most important timber tree, if not the most abundant, nearly all the cut-over areas are strewn with pine slash. The general practice is to pile the tops in windrows parallel to the direction in which the logs are to be hauled to the mill. The amount of ground space covered and the depth of the débris will vary to a considerable extent with the size of the tops, depending on the age and character of the stand.

Sample plots were taken on several lots, where over a million board feet of pine in each case have been cut within the last five years, representing average conditions for the region. All the plots were taken where the areas were clear cut, leaving only a very small number of hardwood trees, and with no idea of securing a future crop. On the plots where

the forest cover was removed in the fall or winter, following a seed-year, there is abundant reproduction between the rows of slash. On one lot, where nearly two million feet of pine were cut, the operation was carried on during the latter part of the summer and fall of 1920. A part of the area was cut before the cones had time to open, and on this there was very little evidence of reproduction. However, on another part of the same area, well isolated from any pine trees left standing, where the cut took place in the fall, there was an average of 8,000 thrifty, two-year-old seedlings to the acre between the slash piles. Strips were run across the area, at right angles to the windrows, to determine the proportion of the area covered by slash. This was found to be 40 per cent. These conditions are typical of the whole region, and from the observations made on the cruise lines over the whole area, one-third is an extremely conservative figure for the part of cut-over pine lands covered by slash. The length of time that slash will continue to exclude or hinder reproduction is not known, but instances were recorded where cuttings up to twenty years old showed no signs of reproduction where the slash piles were located. Figure 1 is an illustration of such an instance. Here pine was cut on light soil and the slash piled in windrows. A fully stocked stand, twenty years old covers the whole area except where the slash was piled. This is about 50 per cent of the area. The remains of the slash can be seen between the rows of pine saplings. The durability of slash can be expressed in only the broadest of terms, as each area has its different moisture conditions that greatly influence it. It is certain, however, that if pine reproduction is desired over the entire area, some means of disposal of slash is necessary.

INCREMENT

The woodland of the region is broken up into small holdings, very few of which exceed 200 acres. It is held under differing interests, from the small woodlot owner to the

various wood-using industries. At the present time, some companies are planning to some extent on a sustained yield. It is impossible to assign any absolute rotation for the entire area, but the rotation that is generally followed for this region is 50 to 60 years. It is very doubtful if any of the stands will remain uncut beyond this age in the future. However, basing increment computations on a 60-year rotation will give a more conservative figure than if a shorter rotation were used, as the mean annual increment is greatest for pine at about 45 years and for the better hardwoods at about 50 years. Since there is a variation in the distribution of age- and density-classes, more accurate results are obtained by figuring each age-class separately. About 44 per cent of the area of the first age-class falls in density-class 2, and the remainder is nearly evenly divided between 1 and 3. For this reason, 50 per cent normal density was used to determine the actual increment in this age-class. In the other two age-classes, the ratio of the average actual volumes to normal volumes was the basis for finding the actual increment. Figuring increment on the two older age-classes by a comparison of volumes is a check on the consistency in estimating density and stand per acre. By comparing actual mean annual increment for pine over the whole area with the normal mean annual increment, it was found that the density was 49 per cent normal, while the density as recorded in the field was 33 to 66 per cent normal or second density-class.

The annual consumption of pine in Winchendon is estimated to be fifteen million board feet. The mean annual increment as found from this survey is 4,085,800 board feet. Most of the present consumption of the town is cut outside the town limits, but it is apparent that a good part of the demand for pine could be supplied within these limits, despite the fact that Winchendon is one of the large wood-using towns in this section of the state. Table XVIII gives a summary of increment for all towns cruised.

TABULAR SUMMARY OF FOREST STATISTICS

NORTHFIELD

TABLE I. AREAS ACCORDING TO TYPE, AGE, AND DENSITY

Area of land — portion cruised	17,356.1 acres	
Area of water		
Total area	17,356.1 "	
Total forested area	10,923.0 acres	63.0 per cent
Cut and not reproduced [1]	67.7 "	0.4 "
Agricultural and village	6,252.7 "	36.0 "
Waste — ledge, bog, etc.	112.7 "	0.6 "
Total	17,356.1 "	100.0 "

Age and density	Pine		Pine and Hardwood		Transition Hardwood		Hardwood Swamp		Gray Birch		Totals	
	Area in acres	Per cent	Area in acres	Per cent	Area in acres	Per cent	Area in acres	Per cent	Area in acres	Per cent		
a 1	....	..	13.5	0.8	302.2	7.2	31.6	7.8	282.4	10.2	629.7	
2	261.6	14.7	102.8	5.9	1,098.0	26.1	63.2	15.5	762.3	27.4	2,287.9	
3	350.0	19.7	278.7	15.9	96.5	2.3	....	....	202.1	7.3	927.3	3,844.9
b 1	51.4	2.9	36.1	2.1	117.3	2.8	....	....	130.8	4.7	335.6	
2	360.9	20.3	830.9	47.5	1,383.0	32.9	11.7	2.9	1,120.4	40.3	3,706.9	
3	201.2	11.3	81.2	4.6	447.5	10.6	99.2	24.4	28.9	1.0	858.0	4,900.5
c 1												
2	444.7	25.0	367.2	21.0	664.0	15.7	177.7	43.8	253.5	9.1	1,907.1	
3	109.0	6.1	37.9	2.2	101.0	2.4	22.6	5.6	....	....	270.5	2,177.6
Totals	1,778.8	100.0	1,748.3	100.0	4,209.5	100.0	406.0	100.0	2,780.4	100.0		10,923.0

[1] Recently cut, type not determinable.

TABLE II. STANDS ACCORDING TO TYPE, AGE, AND AREA

Type	Age	Area in acres	Per cent type	Per cent forested area	Total stand			Average stand per acre			Per cent of total stand	
					Pine, board feet	Hardwood, board feet	Cordwood, cords	Pine, board feet	Hardwood, bd. ft.	Cordwood, cords	Sawtimber	Cordwood
P.	a	611.6	34.4	5.6	45,100	....	465.5	74	....	0.76	0.2	0.7
	b	613.5	34.5	5.6	2,444,518	....	....	3,985	....	....	12.2	....
	c	553.7	31.1	5.0	6,414,490	278,750	1,030.3	11,585	503	1.86	33.3	1.5
Totals		1,778.8	100.0	16.2	8,904,108	278,750	1,495.8	5,006	157	0.84	45.7	2.2
P.H.	a	395.0	22.6	3.6	....	....	2,049.7	....	....	5.19	....	3.0
	b	948.2	54.2	8.6	3,983,840	645,910	8,115.6	4,201	681	8.56	23.0	11.9
	c	405.1	23.2	3.7	2,354,610	227,340	4,611.3	5,812	561	11.38	12.9	6.7
Totals		1,748.3	100.0	15.9	6,338,450	873,250	14,776.6	3,625	499	8.45	35.9	21.6
T	a	1,496.7	35.6	13.6	....	181,320	2,653.2	....	121	1.77	0.9	3.9
	b	1,947.8	46.3	17.7	44,384	1,807,072	22,202.8	23	928	11.40	9.2	32.4
	c	765.0	18.1	7.0	280,555	1,332,445	8,536.8	367	1,742	11.16	8.0	12.5
Totals		4,209.5	100.0	38.3	324,939	3,320,837	33,392.8	77	789	7.93	18.1	48.8
H.S.	a	94.8	23.3	0.9	31,575	....	947.2	333	....	9.99	0.2	1.4
	b	110.9	27.3	1.0	....	....	887.8	....	....	8.01	....	1.3
	c	200.3	49.4	1.8	....	....	2,337.8	....	....	11.67	....	3.4
Totals		406.0	100.0	3.7	31,575	....	4,172.8	78	....	10.28	0.2	6.1
G	a	1,246.8	44.9	11.3	22,105	....	2,479.2	18	....	1.99	0.1	3.6
	b	1,280.1	46.0	11.7	....	....	8,890.5	....	....	6.95	....	13.0
	c	253.5	9.1	2.3	....	....	3,193.6	....	....	12.60	....	4.7
Totals		2,780.4	100.0	25.3	22,105	....	14,563.3	8	....	5.24	0.1	21.3
Cut not rep.		67.7	....	0.6	....	....	....	....	....	....	....	....
Totals		10,990.7	....	100.0	15,621,177	4,472,837	68,401.3	1,421	407	6.22	100.0	100.0

TABLE III. AREAS ACCORDING TO TYPE, AGE, AND DENSITY

Area of land	8,985.4 acres	
Area of water	127.6 "	
Total area	9,113.0 "	
Total forested area	8,497.9 acres	94.6 per cent
Cut and not reproduced	....	....
Agricultural and village	396.6 "	4.4 "
Waste — ledge, bog, etc.	90.9 "	1.0 "
Total	8,985.4 "	100.0 "

Age and density	Pine		Pine and Hardwood		Transition Hardwood		Hardwood Swamp		Gray Birch		Totals	
	Area in acres	Per cent	Area in acres	Per cent	Area in acres	Per cent	Area in acres	Per cent	Area in acres	Per cent		
a 1	....	....	50.1	6.7	468.0	7.4	....	....	....	....	518.1	
2	30.2	9.3	129.2	17.1	1,279.5	20.1	....	....	169.0	25.1	1,607.9	
3	....	....	58.3	7.7	517.7	8.1	....	....	....	....	576.0	2,702.0
b 1	27.9	8.6	....	....	834.0	13.1	....	....	....	....	861.9	
2	....	....	448.5	59.4	2,485.1	39.0	222.4	58.6	404.5	60.0	3,560.5	
3	111.9	34.4	68.8	9.1	....	....	....	....	100.2	14.9	280.9	4,703.3
c 1	....	....	....	....	80.4	1.3	....	....	....	....	80.4	
2	60.6	18.6	....	....	616.1	9.7	98.9	26.1	....	....	775.6	
3	94.4	29.1	....	....	83.9	1.3	58.3	15.3	....	....	236.6	1,092.6
Totals	325.0	100.0	754.9	100.0	6,364.7	100.0	379.6	100.0	673.7	100.0		8,497.9

TABLE VI. STANDS ACCORDING TO TYPE, AGE AND AREA

Type	Age	Area in acres	Per cent type	Per cent forested area	Total stand			Average stand per acre			Per cent of total stand	
					Pine, board feet	Hardwood, board feet	Cordwood, cords	Pine, board feet	Hardwood, bd. ft.	Cordwood, cords	Sawtimber	Cordwood
P.	a	1,370.0	31.1	6.5	348,170	....	499.9	254	....	0.37	0.6	0.5
	b	1,898.0	43.1	9.0	16,665,383	....	108.8	8,780	....	0.06	30.5	0.1
	c	1,133.2	25.8	5.4	17,993,945	52,620	1,500.3	15,879	46	1.32	33.1	1.4
Totals		4,401.2	100.0	20.9	35,007,498	52,620	2,109.0	7,954	12	0.48	64.2	2.0
P.H.	a	1,038.7	31.7	4.9	....	....	3,407.2	....	....	3.28	....	3.1
	b	1,420.0	43.4	6.7	4,089,455	1,054,260	12,122.3	2,880	742	8.54	9.4	11.2
	c	817.4	24.9	3.9	2,785,420	2,898,810	2,763.0	6,466	3,546	3.38	15.0	2.5
Totals		3,276.1	100.0	15.5	9,374,875	3,953,070	18,292.5	2,868	1,207	5.58	24.4	16.8
T.	a	1,429.6	21.3	6.7	25,875	....	1,751.5	18	....	1.23	0.1	1.6
	b	2,948.6	44.1	14.0	117,090	700,800	22,325.3	40	24	7.57	1.5	20.6
	c	2,314.7	34.6	10.9	225,054	4,369,775	21,696.6	97	1,888	9.37	8.4	20.0
Totals		6,692.9	100.0	31.6	368,019	5,070,575	45,773.4	55	758	6.84	10.0	42.2
H.S.	a	307.9	14.8	1.5	....	....	....	....	....	....	....	....
	b	1,057.8	51.1	5.0	57,450	43,328	10,041.6	54	41	9.49	0.2	9.3
	c	704.3	34.1	3.3	55,260	221,040	8,736.6	78	314	12.40	0.5	8.0
Totals		2,070.0	100.0	9.8	112,710	264,368	18,778.2	54	128	9.07	0.7	17.3
G.	a	2,049.0	45.7	9.7	....	....	1,659.4	....	....	0.81	....	1.5
	b	1,829.6	40.9	8.7	230,660	....	16,643.7	126	....	9.10	0.4	15.3
	c	599.9	13.4	2.8	....	140,320	5,110.7	....	234	8.52	0.3	4.8
Totals		4,478.5	100.0	21.2	230,660	140,320	23,413.8	52	31	5.23	0.7	21.6
Cut not rep.		221.0	....	1.0	....	....	....	....	....	....	....	....
Totals		21,139.7	....	100.0	45,093,762	9,480,953	108,366.9	2,133	448	5.13	100.0	100.0

ORANGE

TABLE VII. AREAS ACCORDING TO TYPE, AGE AND DENSITY

Area of land — portion cruised	14,987.3 acres	
Area of water	128.0 "	
Total area	15,115.3 "	
Total forested area	11,316.8 acres	75.6 per cent
Cut and not reproduced	79.0 "	0.5 "
Agricultural and village	3,485.8 "	23.2 "
Waste — ledge, bog, etc.	105.7 "	0.7 "
Total	14,987.3 "	100.0 "

Age and density	Pine		Pine and Hardwood		Transition Hardwood		Hardwood Swamp		Gray Birch		Totals	
	Area in acres	Per cent	Area in acres	Per cent	Area in acres	Per cent	Area in acres	Per cent	Area in acres	Per cent		
a 1	470.3	7.7	53.4	3.3	225.3	9.2	....	....	267.7	31.6	1,016.7	
2	716.3	11.8	592.8	36.5	521.7	21.4	74.1	21.6	124.5	14.7	2,029.4	
3	1,123.4	18.5	341.9	21.0	150.2	6.2	31.6	9.2	91.9	10.9	1,739.0	4,785.1
b 1	486.1	8.0	19.8	1.2	123.5	5.1	....	....	....	....	629.4	
2	1,359.5	22.4	317.2	19.5	689.6	28.4	95.8	28.0	219.3	26.0	2,681.4	
3	1,447.4	23.8	93.9	5.8	....	....	47.4	13.8	96.8	11.5	1,685.5	4,996.3
c 1	71.1	1.2	....	....	....	....	....	....	....	....	71.1	
2	230.2	3.8	205.5	12.7	385.3	15.8	93.9	27.4	44.5	5.3	959.4	
3	167.0	2.8	....	....	337.9	13.9	....	....	....	....	504.9	1,535.4
Totals	6,071.3	100.0	1,624.5	100.0	2,433.5	100.0	342.8	100.0	844.7	100.0		11,316.8

TABLE VIII. STANDS ACCORDING TO TYPE, AGE AND AREA

Type	Age	Area in acres	Per cent type	Per cent forested area	Total stand			Average stand per acre			Per cent of total stand	
					Pine, board feet	Hardwood, board feet	Cordwood, cords	Pine, board feet	Hardwood, bd. ft.	Cordwood, cords	Sawtimber	Cordwood
P.	a	2,310.0	38.0	20.2	755,830	....	910.9	327	....	0.39	2.1	2.6
	b	3,293.0	54.2	28.9	24,119,440	....	1,464.2	7,324	....	0.44	68.4	4.3
	c	468.3	7.8	4.1	5,343,979	....	332.0	11,411	....	0.71	15.2	1.0
Totals		6,071.3	100.0	53.2	30,219,249	....	2,707.1	4,977	....	0.45	85.7	7.9
P.H.	a	988.1	60.8	8.7	....	....	1,122.4	....	....	1.14	....	3.2
	b	430.9	26.5	3.8	635,305	158,080	3,755.6	1,474	367	8.72	2.3	10.9
	c	205.5	12.7	1.8	2,257,660	1,205,400	2,556.0	10,986	5,866	12.44	9.8	7.4
Totals		1,624.5	100.0	14.3	2,892,965	1,363,480	7,434.0	1,781	839	4.58	12.1	21.5
T.	a	897.2	36.8	7.9	....	....	1,273.6	....	....	1.42	....	3.7
	b	813.1	33.5	7.1	....	....	10,942.3	....	....	13.46	....	31.8
	c	723.2	29.7	6.3	177,840	586,835	6,960.7	246	811	9.62	2.2	20.2
Totals		2,433.5	100.0	21.3	177,840	586,835	19,176.6	73	241	7.88	2.2	55.7
H.S.	a	105.7	30.8	0.9	....	....	433.7	....	....	4.10	....	1.3
	b	143.2	41.8	1.3	....	....	277.6	....	....	1.94	....	0.8
	c	93.9	27.4	0.8	....	....	1,284.4	....	....	13.68	....	3.7
Totals		342.8	100.0	3.0	....	....	1,995.7	....	....	5.82	....	5.8
G	a	484.1	57.2	4.3	....	....	281.6	....	....	0.58	....	0.8
	b	316.1	37.5	2.8	....	....	2,399.8	....	....	7.59	....	7.0
	c	44.5	5.3	0.4	....	....	444.6	....	....	9.99	....	1.3
Totals		844.7	100.0	7.5	....	....	3,126.0	....	....	3.70	....	9.1
Cut not rep.		79.0	....	0.7	....	....	....	....	....	....	....	....
Totals		11,395.8	....	100.0	33,290,054	1,950,315	34,439.4	2,921	171	3.02	100.0	100.0

ROYALSTON

TABLE IX. AREAS ACCORDING TO TYPE, AGE AND DENSITY

Area of land	26,871.3 acres	
Area of water	283.7 "	
Total area	27,155.0 "	
Total forested area	21,187.7 acres	78.9 per cent
Cut and not reproduced	275.9 "	1.0 "
Agricultural and village	4,273.4 "	15.9 "
Waste — ledge, bog, etc.	1,134.3 "	4.2 "
Total	26,871.3 "	100.0 "

Age and density	Pine		Pine and Hardwood		Transition Hardwood		Hardwood Swamp		Gray Birch		Totals	
	Area in acres	Per cent	Area in acres	Per cent	Area in acres	Per cent	Area in acres	Per cent	Area in acres	Per cent		
a 1	1,344.1	13.4	134.3	4.0	353.6	12.3	160.5	11.2	110.2	3.2	2,102.7	
2	1,944.2	19.3	434.4	12.7	642.1	22.4	58.8	4.1	926.5	27.1	4,006.0	
3	2,435.1	24.2	260.2	7.7	113.3	3.9	59.8	4.2	239.2	7.0	3,107.6	9,216.3
b 1	482.6	4.8	22.0	0.6	141.7	4.9	....	....	367.2	10.7	1,013.5	
2	1,339.9	13.3	1,398.6	41.2	861.4	30.0	257.1	18.0	955.8	28.0	4,812.8	
3	1,003.0	10.0	197.2	5.8	....	....	114.4	8.0	385.1	11.2	1,699.7	7,526.0
c 1	132.2	1.3	....	....	....	....	....	....	....	....	132.2	
2	607.5	6.0	795.3	23.4	571.8	19.9	644.2	45.2	387.1	11.3	3,005.9	
3	777.4	7.7	157.4	4.6	188.9	6.6	132.2	9.3	51.4	1.5	1,307.3	4,445.4
Totals ...	10,066.0	100.0	3,399.4	100.0	2,872.8	100.0	1,427.0	100.0	3,422.5	100.0		21,187.7

TABLE X. STANDS ACCORDING TO TYPE, AGE AND AREA

Type	Age	Area in acres	Per cent type	Per cent forested area	Total stand			Average stand per acre			Per cent of total stand	
					Pine, board feet	Hardwood, board feet	Cordwood, cords	Pine, board feet	Hardwood, bd. ft.	Cordwood, cords	Sawtimber	Cordwood
P.	a	5,723.4	56.9	26.7	5,464,880	....	4,480.2	955	....	0.78	8.6	5.8
	b	2,825.5	28.1	13.2	13,849,188	....	1,631.5	4,901	....	0.58	21.8	2.1
	c	1,517.1	15.0	7.1	14,517,800	....	852.0	9,569	....	0.56	22.8	1.1
Totals		10,066.0	100.0	47.0	33,831,868	....	6,963.7	3,361	....	0.69	53.2	9.0
P.H.	a	828.9	24.4	3.9	....	....	1,536.1	....	....	1.85	....	2.0
	b	1,617.8	47.6	7.5	14,616,250	1,016,670	10,761.5	9,035	628	6.65	24.6	13.9
	c	952.7	28.0	4.4	7,659,645	2,203,330	5,055.1	8,040	2,313	5.31	15.5	6.6
Totals		3,399.4	100.0	15.8	22,275,905	3,220,000	17,352.7	6,553	947	5.10	40.1	22.5
T.	a	1,109.0	38.6	5.2	....	....	3,838.0	....	....	3.46	....	5.0
	b	1,003.1	34.9	4.7	....	1,737,540	12,008.4	....	1,732	11.97	2.7	15.5
	c	760.7	26.5	3.5	107,020	2,402,730	7,424.3	141	3,159	9.76	4.0	9.6
Totals		2,872.8	100.0	13.4	107,020	4,140,270	23,270.7	37	1,441	8.10	6.7	30.1
H.S.	a	279.1	19.5	1.3	....	....	131.2	....	....	0.47	....	0.2
	b	371.5	26.0	1.7	....	....	2,871.7	....	....	7.73	....	3.7
	c	776.4	54.5	3.6	31,480	....	9,951.8	41	....	12.82	0.0	12.9
Totals		1,427.0	100.0	6.6	31,480	....	12,954.7	22	....	9.08	0.0	16.8
G.	a	1,275.9	37.3	5.9	....	....	1,388.2	....	....	1.09	....	1.8
	b	1,708.1	49.9	8.0	....	....	9,213.2	....	....	5.39	....	12.0
	c	438.5	12.8	2.0	....	....	6,038.3	....	....	13.77	....	7.8
Totals		3,422.5	100.0	15.9	....	....	16,639.7	....	....	4.86	....	21.6
Cut not rep.		275.9	....	1.3	....	....	....	....	....	....	....	....
Totals		21,463.6	....	100.0	56,246,273	7,360,270	77,181.5	2,621	343	3.60	100.0	100.0

WINCHENDON

TABLE XI. AREAS ACCORDING TO TYPE, AGE AND DENSITY

Area of land	26,642.0 acres	
Area of water	1,446.0 "	
Total area	28,088.0 "	
Total forested area	18,469.4 acres	69.3 per cent
Cut and not reproduced	339.2 "	1.3 "
Agricultural and village	7,167.8 "	26.9 "
Waste — ledge, bog, etc.	665.6 "	2.5 "
Total	26,642.0 "	100.0 "

Age and density	Pine		Pine and Hardwood		Transition Hardwood		Hardwood Swamp		Gray Birch		Totals	
	Area in acres	Per cent	Area in acres	Per cent	Area in acres	Per cent	Area in acres	Per cent	Area in acres	Per cent		
a 1	1,658.5	16.6	128.6	6.2	....	....	109.7	13.4	402.1	10.5	2,298.9	
2	1,324.7	13.2	398.6	19.3	120.5	7.0	148.0	18.1	496.0	12.9	2,487.8	
3	1,584.9	15.8	397.1	19.2	....	....	....	....	368.2	9.6	2,350.2	7,136.9
b 1	788.3	7.9	112.5	5.4	553.2	32.2	....	....	917.2	23.9	2,371.2	
2	2,145.5	21.4	532.0	25.8	824.1	48.0	199.3	24.3	1,268.7	33.1	4,969.6	
3	144.7	1.4	80.4	3.9	43.4	2.5	....	....	200.9	5.2	469.4	7,810.2
c 1	946.8	9.4	....	....	....	....	....	....	....	....	946.8	
2	1,433.9	14.3	418.0	20.2	....	....	281.4	34.4	184.8	4.8	2,318.1	
3	....	....	....	....	177.0	10.3	80.4	9.8	....	....	257.4	3,522.3
Totals	10,027.3	100.0	2,067.2	100.0	1,718.2	100.0	818.8	100.0	3,837.9	100.0		18,469.4

TABLE XII. STANDS ACCORDING TO TYPE, AGE AND AREA

Type	Age	Area in acres	Per cent type	Per cent crested area	Total stand			Average stand per acre			Per cent of total stand	
					Pine, board feet	Hardwood, board feet	Cordwood, cords	Pine, board feet	Hardwood, bd. ft.	Cordwood, cords	Sawtimber	Cordwood
P.	a	4,568.1	45.6	24.3	807,100	....	2,674.6	177	....	0.59	1.2	7.2
	b	3,078.5	30.7	16.4	13,475,250	....	1,050.4	4,377	....	0.34	18.5	2.8
	c	2,380.7	23.7	12.7	54,538,000	....	772.0	22,908	....	0.30	74.8	2.1
Totals		10,027.3	100.0	53.4	68,820,350	....	4,497.0	6,863	....	0.45	94.5	12.1
P.H.	a	924.3	44.7	4.9	....	....	1,787.4	....	....	1.83	....	4.8
	b	724.9	35.1	3.8	948,600	....	4,062.1	1,309	....	5.60	1.3	10.9
	c	418.0	20.2	2.2	2,636,700	450,000	1,848.9	6,308	1,077	4.42	4.2	4.9
Totals		2,067.2	100.0	10.9	3,585,300	450,000	7,698.4	1,734	218	3.72	5.5	20.6
T.	a	120.5	7.0	0.6	....	....	....	....	....	....	....	....
	b	1,420.7	82.7	7.5	....	....	10,756.8	....	....	7.57	....	28.8
	c	177.0	10.3	1.0	....	....	1,062.0	....	....	6.00	....	2.9
Totals		1,718.2	100.0	9.1	....	....	11,818.8	....	....	6.88	....	31.7
H.S.	a	257.7	31.5	1.4	....	....	....	....	....	....	....	....
	b	199.3	24.3	1.0	....	....	768.9	....	....	3.86	....	2.1
	c	361.8	44.2	1.9	....	....	3,183.8	....	....	8.80	....	8.5
Totals		818.8	100.0	4.3	....	....	3,952.7	....	....	4.83	....	10.6
G.	a	1,266.3	33.0	6.7	....	....	310.6	....	....	0.25	....	0.8
	b	2,386.8	62.2	12.6	....	....	7,983.3	....	....	3.34	....	21.4
	c	184.8	4.8	1.0	....	....	1,020.3	....	....	5.52	....	2.7
Totals		3,837.9	100.0	20.3	....	....	9,314.2	....	....	2.43	....	24.9
Cut not rep.		339.2		1.8								
Totals		18,808.6	....	100.0	72,405,650	450,000	37,281.1	3,850	24	1.98	100.0	100.0

PETERSHAM

TABLE XIII. AREAS ACCORDING TO TYPE, AGE AND DENSITY

Area of land	24,644.7 acres	
Area of water	324.3 "	
Total area	24,969.0 "	
Total forested area	16,760.9 acres	68.0 "
Cut and not reproduced	694.2 "	2.8 "
Agricultural and village	6,451.0 "	26.2 "
Waste — ledge, bog, etc.	738.6 "	3.0 "
Total	24,644.7 "	100.0 "

Age and density	Pine		Pine and Hardwood		Transition Hardwood		Hardwood Swamp		Gray Birch		Totals	
	Area in acres	Per cent	Area in acres	Per cent	Area in acres	Per cent	Area in acres	Per cent	Area in acres	Per cent		
a 1	445.7	6.7	296.3	12.6	613.1	15.8	81.1	4.6	243.4	11.6	1,679.6	
2	771.1	11.6	68.3	2.9	654.9	16.8	148.5	8.4	327.0	15.6	1,969.8	
3	1,127.1	16.9	153.7	6.5	128.1	3.3	85.4	4.9	237.4	11.3	1,731.7	5,381.1
b 1	731.8	11.0	93.1	4.0	472.2	12.1	128.9	7.3	365.5	17.4	1,791.5	
2	1,433.7	21.6	865.9	36.7	982.8	25.3	619.1	35.3	425.2	20.2	4,326.7	
3	753.1	11.3	132.3	5.6	....	....	85.4	4.9	183.6	8.7	1,154.4	7,272.6
c 1	213.5	3.2	....	....	255.3	6.6	....	....	....	....	468.8	
2	1,006.7	15.1	687.4	29.1	674.6	17.4	489.3	27.8	303.1	14.4	3,161.1	
3	174.2	2.6	62.3	2.6	105.0	2.7	118.7	6.8	17.1	0.8	477.3	4,107.2
Totals	6,656.9	100.0	2,359.3	100.0	3,886.0	100.0	1,756.4	100.0	2,102.3	100.0		16,760.9

TABLE XIV. STANDS ACCORDING TO TYPE, AGE AND AREA

Type	Age	Area in acres	Per cent type	Per cent forested area	Total stand			Average stand per acre			Per cent of total stand	
					Pine, board feet	Hardwood, board feet	Cordwood, cords	Pine, board feet	Hardwood, bd. ft.	Cordwood, cords	Sawtimber	Cordwood
P	a	2,343.9	35.2	13.4	1,589,910	64,900	1,543.8	678	28	0.66	2.8	2.2
	b	2,918.6	43.9	16.7	15,038,535	....	2,793.0	5,153	....	0.96	25.1	3.9
	c	1,394.4	20.9	8.0	28,171,600	186,160	1,999.8	20,203	134	1.43	47.4	2.8
Totals		6,656.9	100.0	38.1	44,800,045	251,060	6,336.6	6,730	38	0.95	75.3	8.9
P.H.	a	518.3	22.0	3.0	....	....	975.1	....	....	1.88	....	1.4
	b	1,091.3	46.3	6.2	2,800,425	76,860	8,214.3	2,566	70	7.53	4.8	11.6
	c	749.7	31.7	4.3	3,355,780	2,436,090	3,436.1	4,476	3,249	4.58	9.7	4.8
Totals		2,359.3	100.0	13.5	6,156,205	2,512,950	12,625.6	2,609	1,065	5.36	14.5	17.8
T.	a	1,396.1	35.9	8.0	19,640	....	1,435.3	14	....	1.03	0.0	2.0
	b	1,455.0	37.4	8.3	181,890	1,412,826	18,971.2	125	971	13.04	2.7	26.8
	c	1,034.9	26.7	6.0	508,050	3,474,350	6,871.1	491	3,357	6.64	6.6	9.7
Totals		3,886.0	100.0	22.3	709,580	4,887,176	27,277.6	183	1,258	7.02	9.3	38.5
H.S.	a	315.0	17.9	1.8	....	....	487.6	....	....	1.55	....	0.7
	b	833.4	47.5	4.8	102,460	....	9,492.4	123	....	11.39	0.2	13.4
	c	608.0	34.6	3.5	....	368,880	5,921.8	....	607	9.74	0.6	8.3
Totals		1,756.4	100.0	10.1	102,460	368,880	15,901.8	58	210	9.05	0.8	22.4
G.	a	807.8	38.5	4.6	....	....	1,131.4	....	....	1.40	....	1.6
	b	974.3	46.3	5.6	....	38,420	6,031.8	....	39	6.19	0.1	8.5
	c	320.2	15.2	1.8	....	....	1,639.5	....	....	5.12	....	2.3
Totals		2,102.3	100.0	12.0	....	38,420	8,802.7	....	18	4.19	0.1	12.4
Cut not rep.		694.2	....	4.0	....	....	....	....	....	....	....	....
Totals		17,455.1	....	100.0	51,768,290	8,058,486	70,944.3	2,966	462	4.06	100.0	100.0

GRAND TOTAL OF ALL TOWNS

TABLE XV. AREAS ACCORDING TO TYPE, AGE, AND DENSITY

Area of land	143,285.8 acres	
Area of water	2,598.6 "	
Total area	145,884.4 "	
Total forested area	108,074.4 acres	75.4 per cent
Cut and not reproduced	1,677.0 "	1.2 "
Agricultural and village	30,291.9 "	21.1 "
Waste — ledge, bog, etc.	3,242.5 "	2.3 "
Total	143,285.8 "	100.0 "

Age and density	Pine		Pine and Hardwood		Transition Hardwood		Hardwood Swamp		Gray Birch		Totals	
	Area in acres	Per cent	Area in acres	Per cent	Area in acres	Per cent	Area in acres	Per cent	Area in acres	Per cent		
a 1	4,166.0	10.6	6,762	4.5	2,419.1	8.6	382.9	5.3	1,614.5	8.9	9,258.7	
2	5,490.1	14.0	2,612.0	17.1	4,576.3	16.2	758.4	10.5	3,806.2	21.0	17,243.0	
3	7,301.1	18.6	1,642.7	10.8	1,718.9	6.1	218.9	3.0	1,878.2	10.4	12,759.8	39,261.5
b 1	3,011.9	7.7	410.7	2.7	2,618.2	9.3	128.9	1.8	2,170.1	12.0	8,339.8	
2	7,571.8	19.3	5,442.1	35.7	9,365.9	33.3	2,108.8	29.3	5,342.9	29.4	29,831.5	
3	4,183.2	10.6	897.6	5.9	923.3	3.3	700.8	9.8	1,486.7	8.2	8,191.6	46,362.9
c 1	1,468.9	3.7	....	....	423.4	1.5	....	....	....	....	1,892.3	
2	4,452.8	11.3	3,027.7	19.9	4,639.7	16.4	2,332.7	32.4	1,709.8	9.4	16,162.7	
3	1,680.7	4.2	520.7	3.4	1,492.8	5.3	569.2	7.9	131.6	.7	4,395.0	22,450.0
Totals	39,326.5	100.0	15,229.7	100.0	28,177.6	100.0	7,200.6	100.0	18,140.0	100.0		108,074.4

TABLE XVI. STANDS ACCORDING TO TYPE, AGE AND AREA

Type	Age	Area in acres	Per cent type	Per cent forested area	Total stand			Average stand per acre			Per cent of total stand	
					Pine, board feet	Hardwood, board feet	Cordwood, cords	Pine, board feet	Hardwood, bd. ft.	Cordwood, cords	Sawtimber	Cordwood
P.	a	16,957.2	43.2	15.4	9,010,990	64,900	10,575.0	531	4	0.62	2.89	2.36
	b	14,766.9	37.6	13.5	85,854,714	....	7,047.9	5,814	....	0.48	27.38	1.58
	c	7,602.4	19.2	6.9	128,276,814	517,530	7,002.5	16,873	68	0.92	41.07	1.57
Totals		39,326.5	100.0	35.8	223,142,518	582,430	24,625.4	5,674	15	0.63	71.34	5.51
P.H.	a	4,930.9	32.4	4.5	....	....	12,017.0	....	....	2.44	....	2.68
	b	6,750.4	44.3	6.2	29,942,385	3,238,180	50,686.6	4,436	480	7.51	10.51	11.33
	c	3,548.4	23.3	3.2	23,549,815	9,420,970	20,270.5	6,637	2,655	5.71	10.58	4.54
Totals		15,229.7	100.0	13.9	53,492,200	12,659,150	82,974.1	3,512	831	5.45	21.09	18.55
T.	a	8,714.4	30.9	7.9	45,515	181,320	16,424.6	5	21	1.88	0.07	3.67
	b	12,907.4	45.9	11.8	343,364	6,810,638	127,509.7	27	528	9.88	2.28	28.52
	c	6,555.8	23.2	6.0	1,298,519	13,710,935	57,412.3	198	2,091	8.76	4.78	12.84
Totals		28,177.6	100.0	25.7	1,687,398	20,702,893	201,346.6	60	735	7.15	7.13	45.03
H.S.	a	1,360.2	18.8	1.2	31,575	....	1,999.7	23	....	1.47	0.01	0.45
	b	2,938.5	40.9	2.7	159,910	43,328	25,420.0	54	15	8.65	0.06	5.68
	c	2,901.9	40.3	2.7	86,740	589,920	31,986.4	30	203	11.02	0.23	7.15
Totals		7,200.6	100.0	6.6	278,225	633,248	59,406.1	39	88	8.25	0.30	13.28
G.	a	7,298.9	40.3	6.6	22,105	....	8,264.3	3	....	1.13	0.01	1.85
	b	8,999.7	49.6	8.2	230,660	38,420	53,138.3	26	4	5.90	0.09	11.88
	c	1,841.4	10.1	1.7	....	140,320	17,447.0	....	76	9.47	0.04	3.90
Totals		18,140.0	100.0	16.5	252,765	178,740	78,849.6	14	10	4.35	0.14	17.73
Cut not rep.		1,677.0	....	1.5	....	....	....	....	....	....	....	....
Totals		109,751.4	....	100.0	278,853,106	34,756,461	447,201.8	2,541	317	4.07	100.0	100.0

TABLE XVII. SUCCESSION OF TYPES AS RELATED TO SOIL FACTORS

Previous type	Soil	Present Cover Type													
		P.		P. H.		T.		H.S.		G.		S.		O.	
		No. of cases	Per cent	No. of cases	Per cent	No. of cases	Per cent	No. of cases	Per cent	No. of cases	Per cent	No. of cases	Per cent	No. of cases	Per cent
O	Heavier	108	64	13	8	10	6	11	6	27	16	..	..	..	..
	Lighter	77	61	15	12	7	5	8	6	20	16	..	..	..	..
T	Heavier	3	12	..	..	23	88	..	..	..	..	..	..	..	..
	Lighter	..	..	..	..	2	100	..	..	..	..	..	..	..	..
P.H.	Heavier	3	6	14	30	21	45	3	6	5	11	..	..	1	2
	Lighter	3	8	14	35	11	27	1	3	9	22	..	..	2	5
P	Heavier	28	19	8	6	65	44	5	4	36	25	..	..	3	2
	Lighter	44	34	13	10	20	16	3	2	34	26	8	6	7	6

TABLE XVIII

Mean Annual Increment, All Towns

Type	Board Feet	Cords	Increment per Acre	
			Board feet	Cords
Pine	15,149,627	....	385	....
Pine and Hardwoods	4,345,112	2,318	285	0.15
Transition	2,083,093	6,216	74	0.22
Hardwood Swamp	....	1,695	....	0.24
Gray Birch	....	4,866	....	0.27
Totals	21,577,832	15,095	196	0.14