Forestry Department Exhibit at Eastern States Exposition.

State of New Hampshire

BIENNIAL REPORT

OF THE

Forestry Commission

For the Two Fiscal Years

Ending June 30, 1924

CONCORD
December, 1924

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REPORT.

To His Excellency the Governor and the Honorable Council:

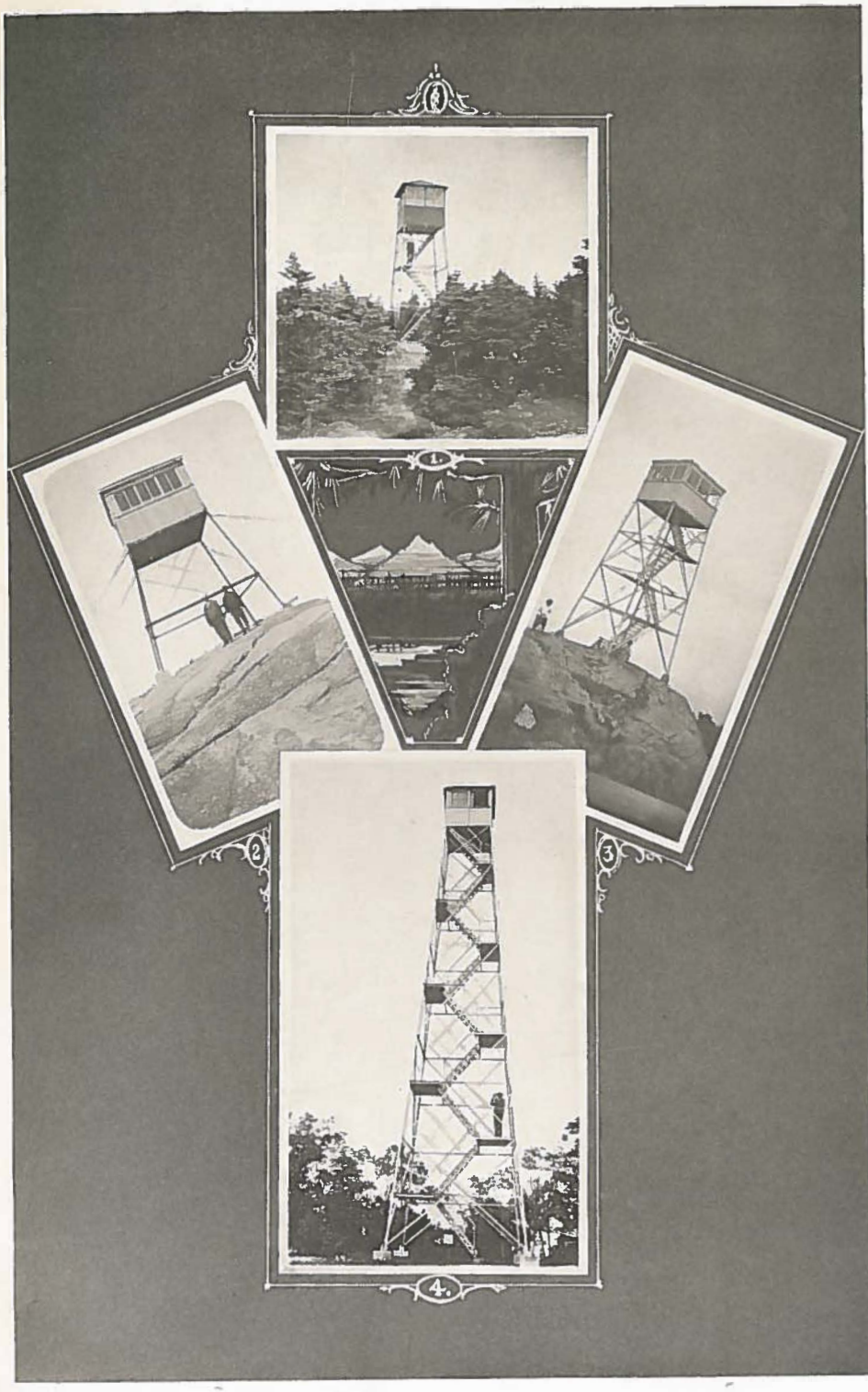
The Forestry Commission presents herewith its report for the two fiscal years ending June 30, 1924. The only change in the personnel of the Commission was the appointment of John M. Corliss of Manchester, May 1, 1923 to succeed H. W. Anderson of Exeter.

A final report of the investigation of forest resources of the state and of the consumption and production of timber which has been in progress for several years is attached herewith as the major part of the Commission's report. This material has been gathered and put in form for publication without special additional expense to the state. Perhaps the most important information is the relative amounts of timber consumed, produced and grown annually in the state. It is worth emphasizing that approximately 750,000,000 board feet represents the annual requirements of our industries, of which 450,000,000 feet is the amount produced within the state and 350,000,000 feet is the estimated yearly growth. We are therefore importing at excessive freight rates 300,000,000 feet each year and cutting from the forests within the state 100,000,000 feet annually more than they produce.

During the past two years the Forestry Department has continued to improve its fire organization and the service from its lookout stations, checking up and correcting hazardous conditions around mills and along highways and as far as possible placing responsibility for violations upon the guilty parties. Violations of the roadside slash, portable mill and brush burning laws have been reduced through better inspection work. Reports of pine operators are received before cutting begins and reports of changes of mill

locations from one town to another permit the department to keep in close touch with portable mill activities. Mills where spark arresters are unsatisfactory or which have bad fire hazards connected with them are speedily closed until conditions are corrected. The fire warden organization is being more closely tied up with village fire companies where these exist and towns have more and better equipment including chemical trucks available for forest fire service. Experience has shown that a relatively few men in an organization with proper equipment are better than a large number hastily summoned and without facilities for fighting fires. The five district fire chiefs throughout the fire period have kept in close touch with wardens and lookout watchmen in regard to all serious fires, questions of liability, settlement of expenses and violations. They are required to be present at all serious and costly fires and they have charge of the watchman and upkeep and improvement of the stations. More and more their duties require them to be employed through a longer period each year and full time should be allowed in justice to them. Walter H. Tripp of Epsom has become fire chief for the central district.

Many improvements in lookout stations and equipment have been made with federal cooperative funds. New steel towers to replace old wooden structures were built on Uncanoonuc, Kearsarge and Osceola and a new steel tower, telephone line and cabin placed on Mount Cardigan to be operated another season as a new station. Mount Israel has a new wooden tower and the construction of a new steel tower for Cabot Mountain is under way. The Mount Agassiz tower has been enclosed. It is becoming increasingly necessary to replace open towers with enclosed ones in order that watchmen can be protected from exposure in unfavorable weather. With the close of the present season the state has in active use 26 stations, including the new Cardigan station, 12 having steel enclosed towers, two having wooden enclosed towers, 8 having wooden towers with open top which must ultimately be replaced and of the



NEW LOOKOUT TOWERS

1. MT. OSCEOLA, WATERVILLE
2. MT. CARDIGAN, ORANGE
3. MT. KEARSARGE, WARNER
4. MT. UNCANOONUC, GOFFSTOWN

remaining four stations, three have cabins on bare summits and one has a cabin under the summit. Timbers suitable for enclosed wooden towers are difficult to secure and erect with the result that steel enclosed towers have come rapidly into use in other states as well as New Hampshire. Magalloway has been connected by an additional telephone line from supply camps in the Diamond territory, a new line has been built from Mount Carrigain to lumber camps in the Lincoln valley. A new line and cabin for the watchman have been built on the Monadnock reservation. Several of the cabins on other mountains have been either repaired or enlarged. Five improved sliding map stands have been made for the stations. With additional telephone lines built by the government from Woodstock to Mount Osceola and from Passaconaway to Chocorua the state now has five of its important stations with two separate means of communication to outside telephone exchanges. Altogether the state has rebuilt 17 miles of telephone line on five stations and at present 24 of the 26 stations have metallic or double wire service. The government is about to connect its ranger station in Kilkenny with the lookout station on Cabot. The steel for the Cardigan tower was cut from plans worked out in the office, this being the first tower not purchased from tower manufacturers. Funds for the maintenance of the Mount Croydon station were supplied jointly by the state and the Blue Mountain Park Association this season. Excellent cooperation with Massachusetts and Maine is being carried out for reporting fires to respective authorities on either side of the state lines. Little by little the mountain tops are being acquired where the lookout stations are operated. At the present time six stations are on state land, nine are on land of the timberland owners association, (two being partly on government land) two are wholly on government land, three are on land of other associations, while the remaining six are on other private land where the state has a lease or permission to maintain the stations. Nearly 54,000 visitors have regis-

tered at the various lookout stations during the biennial period.

Warden conferences have continued to bring the fire wardens together by regions for helpful intercourse and instruction. At many of these meetings railroad and telephone discussions and demonstrations are given with outside representatives present. At Gorham each spring a joint meeting of state wardens and National Forest rangers is held. Before the stations open in the spring as many as possible of the lookout watchmen are brought together at Concord and instructed in the use and repair of telephone equipment. In this work the telephone companies have given the services of their experts. A monthly news letter to wardens, watchmen and others helps to keep the organization informed and interested in the work. Two additional forest fire pumps have been placed with district chiefs so that a pump is now available for emergency use of towns in each of the five districts. A new type of metal fire sign has been carefully posted at intervals along all the main line highways.

Blister rust control work has made remarkable strides in two years. At the 1923 March town meetings 82 towns appropriated $28,765 for cooperating with the Forestry Department and 121 individuals paid $7,635 for work on their own lands. During the field season the state crews covered over 268,000 acres at an average cost of $.18 per acre. In 1924, the present season, 96 towns appropriated $38,975 and 39 individuals paid $2,637 for work on their own lands. The area covered by the state crews this season has been 319,588 acres which is the largest amount of work yet done in one season. The average cost has been $.16 per acre. While 30 towns have been entirely covered and only 23 pine towns have had no control work done in them, there still remain 50 towns where no town appropriations have yet been made. Through the county blister rust organization, maintained by the Federal Government under the Forestry Commission, 916 public meetings have been held during the

last 21 months at which blister rust control and improvement of farm woodlots have been discussed. Of these meetings 412 have actually been held in the woods. There have been 460 public exhibits of blister rust and the agents have interviewed 8,000 woodlot owners.

In acquiring state land the main object continues to be to extend state ownership of important mountains or ranges south of the White Mountain region and to acquire small demonstration forests for educational purposes. During the past two years 2,389 acres have been purchased at an average cost of $3.86. The only gifts to the state have been to enable the commission to acquire certain scenic features which otherwise would not have been purchased. One of these from Mr. Harold Murdock of Boston enabled the state to secure a 20 acre gorge bordering Welton Falls in Alexandria and not far from the main Cardigan mountain reservation. A second very important gift from Miss Caroline Fox of Hillsboro and Arlington, Mass. and her sister Mrs. Alice F. Cochran of New Haven, Conn., enabled the Commission to purchase the standing merchantable timber on a strip 200 feet wide from the highway to the so called Boulders and surrounding them on the new Pawtuckaway reservation, a total of about 20 acres on Pawtuckaway Mountain in Nottingham brings to the state for public uses the most important mountain area in south eastern New Hampshire. This consists of a number of separate parcels of land occupying the greater part of the three peaks, including the Boulders first described in Hitchcock's Geology but at present not well known except locally. This area is capable of becoming a great recreational center in the years to come. The Redstone area of 43 acres in Conway on the main East Side Highway will ultimately be used in part for purposes of a public camping ground. The Blair purchase of 108 acres in Campton is intended to be an addition to the Livermore Falls reservation although not as yet connected with it. The Pillsbury and Cardigan purchases are additions to these two largest reservations of the

state aside from Crawford Notch. The Pillsbury addition adjoins the Cherry Valley highway between Washington and Newport for a considerable distance while the Cardigan addition not only adds an area to the Cardigan reservation on the lower slopes of the range but includes 10 acres of excellent young spruce growth along which the main trail from Alexandria passes to the summit.

Since first established the state forest nursery has been handicapped by lack of water in sufficient quantities. An area west of the present nursery has never been available because the soil is too light for use without watering. When necessary the seed beds have been watered by hand but this has been an expensive process. Every year during very dry periods a great many small trees have died in the transplant beds and which might have been saved for planting if water had been at hand. To guard against such unnecessary losses and to increase the area of available land for nursery purposes, water in sufficient quantities to freely irrigate the beds and nursery rows has long been considered essential.

The Department has at last secured what will doubtless prove to be an adequate supply, by pumping from a large unfailing brook one-third mile north of the nursery on adjacent property to a 28,000 gallon tank placed on a knoll within the nursery. The project includes a pump and motor in a galvanized iron pump house at the brook connected with the tank by a three inch pipe. Water will be carried to the nursery beds by gravity.

With the promise of water irrigation, eight acres lying west of the present nursery are being put in condition for transplant beds. About one and one-half acres of this are now in use and fully four acres will be set out with transplants by the end of the fiscal year. The seed bed area has been greatly increased each of the past two years with the result that about four and one-half million trees are now growing in the nursery to be available for planting during the next four years. The department has thus taken steps

which will mean a 100 per cent larger production to help meet the demands of the public for planting stock, which are greater by far than even the present plans will provide.

The nursery has furnished during the past two years 178,700 trees for the state reservations and 20,500 for the so-called reforestation tracts and about 175,000 trees were sold.

The last legislature in a desire to offer some encouragement to the small woodlot owner anxious to grow trees on his land passed the so called Classification Law, Chapter 66, Laws of 1923, an act to provide for the taxation of growing timber on woodlots not exceeding 50 acres. This proposal enables any land owner to have classified and recorded an area not exceeding 50 acres provided further that the area promises to yield sometime a stand of 25,000 feet per acre on the average. When such area is classified and recorded the owner pays an annual bare land tax but pays no tax on the growth until he cuts it or the yield per acre reaches 25,000 feet when he must either reduce the yield or have the area taken from the classified list. The owner is thus encouraged to keep his lot in good growing condition cutting from time to time in order to keep the yield below 25,000 feet per acre and have the lot continuously classified. A tax is levied on the amount cut at the prevailing rate in the town for the year when cutting is done. This law was patterned after the 1922 classification law of Massachusetts which however, permits a land owner to classify as many acres regardless of location as meet the requirements of present value and future yield. It should be remembered that the classification law does not so much exempt values now existing as it helps to create new values for the future which are exempted. Our law has been in effect but one season and only 44 lots with a total of 1,651 acres have as yet been classified and recorded.

RECOMMENDATIONS.

Forest Fire Protection.

On account of the dangerous fire period in October and November of the present year during which there were about six weeks without appreciable rainfall, the towns have incurred expense for fire fighting which the Forestry Department will be able to meet only through the excellent cooperation of the Federal Government under the Weeks Law. This is the second time in four years that Federal funds have helped the state directly to meet its obligations to the towns in fire fighting expense. During this hazardous period all fire protection expenses were necessarily increased because the fire season continued at least a month longer than usual. It is cause for satisfaction that the state has actually passed through two very serious fire periods the present year, without suffering losses greatly beyond the average and without incurring expense which the department can not take care of with Federal aid. The only tangible service to the forest lands of the state in return for taxes paid is through our organization for fire protection which should therefore be well maintained.

The commission authorized by the last legislature to codify the laws has already given careful consideration to clarifying and bringing together the various acts relating to forestry and forest fire protection. No new legislation is recommended at this time. Chapter 39, Acts of 1923, authorizing the Governor and Council to close any and all sections of the woodlands to hunters, fishermen and such other persons as they may deem proper during periods of protracted drouth has during the present calendar year twice been wisely and fairly invoked in order to help prevent the starting and spread of forest fires, once in August and again in October. The general public has to a high degree respected and approved. The proclamations have

been well enforced with very few necessary prosecutions. The Fish and Game Commissioner however desires certain changes in the law which shall establish in fact the closing of any open season for hunting, fishing or trapping in territory covered by proclamation in order to avoid questions of doubt as to violation and make the closed conditions apply to all persons and locations equally. In this the Forestry Commission heartily approves. The present law in general is a distinct help to fire protection in time of great danger and should be continued. It is recommended that the various appropriation items for fire protection for each of the next two years be continued approximately as at present.

Blister Rust Control.

The Commission recognizes and wishes to emphasize that the future of white pine is in grave danger unless control work is continued with increased energy until all our pine towns have been made safe from the disease. Increased interest in reforestation and future returns from pine will avail little in sections where the disease is not controlled. Each year millions of additional young trees become infected. Safety and economy lie in completing control measures as rapidly as the work can be properly done. The state must expect to meet increased town appropriations in the future.

The last legislature was requested to appropriate $20,000 each year for the present biennium. The department received however $15,000 for last year and $17,000 for the present year, $8,000 less than the desired amount. Town appropriations for blister rust control were $28,765 last year and $38,975 the present year. These amounts were very close to estimates made two years ago by the department. The result is that by exercising the greatest economy in field supervision and office overhead expenses the department is unable to meet the town appropriations to be made next March until after the end of the fiscal year

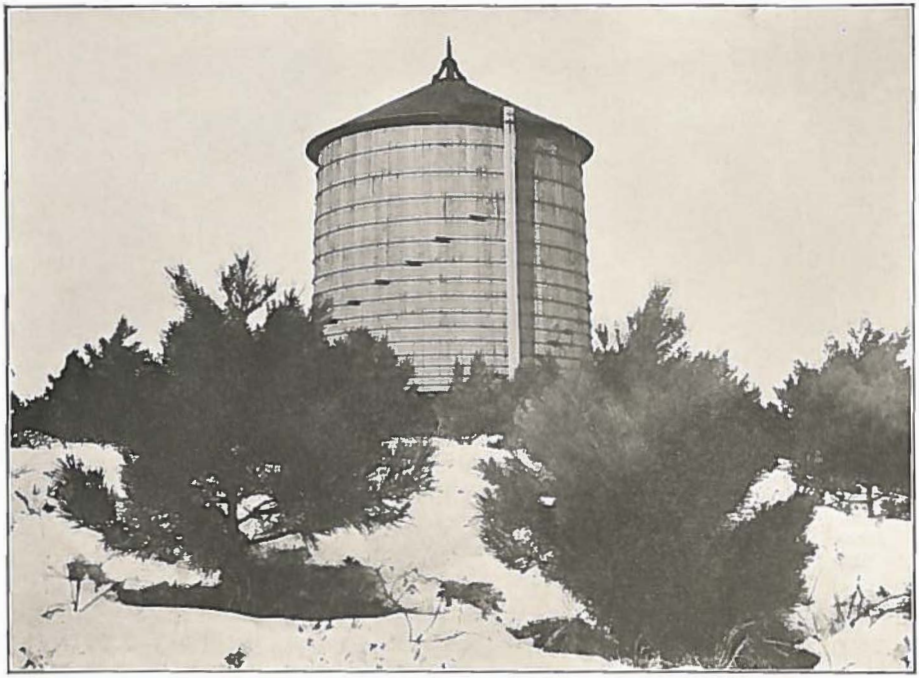
June 30. It is expected that the towns will appropriate $45,000 next March and that private individuals will raise $10,000 for control work. On the present basis of increasing town appropriations by 25 per cent of state funds and private appropriations by the use of crew foremen, equivalent to 20 per cent, there will be needed next fiscal year and for the spring months prior to the beginning of the fiscal year $16,950 for eradication work alone. The total appropriation for blister rust control next fiscal year should be $25,000 of which $4,500 should be made available by May 1st.

In 1926 it is expected that towns will raise $50,000 for control work and that an additional $10,000 will be raised by private individuals which will require $18,500 of state money to meet on the present basis. The total blister rust appropriation for the second year should be $29,000.

The differences between the amount needed to meet town and private funds and the total appropriation for each year must be used for inspection of field crews, printing and other publicity material, clerical expense and office overhead, equipment for field crews and traveling expenses of inspectors and crews from one locality to another. In view of the fact that this expenditure is to look after a large force of men and administer appropriations made by the towns, individuals and the state as well as to exercise general direction of the county blister rust organization of the federal government, it does not seem unreasonable to expect the full amounts asked for.

Purchase and Care of State Lands.

For many years this appropriation has been $5,000 yearly, about 90 per cent of which has been used for actual land purchase and for which the Commission believes far more than full value has always been obtained. In addition to the acreage purchased there have been from time to time considerable additions from gifts to the state. The Commission is not disposed to urge an increase in appro-



New Water Tank at State Forest Nursery

Four-Year Old White Pine Plantation on Boscawen Town Forest. Trees Average Three Feet in Height.

priation for purchase, desirable as this would be. Some eastern states like Massachusetts and New York have issued bonds to carry out extensive plans for state forest acquisition and are hereby building for the future and placing the cost on future generations who will benefit chiefly from the returns from state forests.

Under the present method of turning all receipts directly into the State Treasury, any improvement work must be paid from the general appropriation, thus reducing the amount available for purchase of new land. It is suggested that a revolving fund of $5,000 be authorized, and that all receipts from state lands be credited to this fund and that necessary work be paid therefrom. No appropriation is necessary to start this fund, other than the transfer of the revenue of the state lands for the last two years, which has been paid into the State Treasury. If the fund increases above $5,000, all excess shall be turned into the Treasury.

One of the reasons for creating state reservations is to develop them on principles of good forestry as educational exhibits, but this requires financial resources which can be automatically met by a permanent revolving fund. If this plan is not followed a point will soon be reached where the appropriation for state lands must be materially increased or the further purchase of lands greatly restricted.

The State Nursery.

An appropriation of $5,500 was made for the state nursery each of the last two years. This included $2,000 each year to reimburse the nursery for money from the sale of trees returned to the general treasury under Chapter 162, Act of 1921. Formerly money from the sale of trees was placed in a nursery fund. During the two present fiscal years the nursery will actually have returned to the State Treasury $6,025, or $2,025 more than was advanced by the last legislature. This $2,025 should be reimbursed to the department for use the present fiscal year.

Sufficient planting of seed next spring and each year following should be provided for in order to maintain at least the present increased output.

The State Nursery has not lived up to its standard of requirements for several years, the output of trees having been less in recent years than before the war, while the demand has enormously increased. The people of the state have been led by the publicity work of the Forestry Department and the State University to appreciate the necessity of tree planting, and the nursery has had orders for trees each year which it was unable to fill. One prominent land owner last year endeavored to purchase more than double the whole annual output of the nursery.

The Commission have therefore felt it incumbent on them to take steps for increasing the output of the nursery. The prime necessity for this increase was a better water supply which would enable new land to be cultivated, and more trees to be brought into the market. This has been done and there are now four and a half million trees in the nursery beds all of which will be available within the next four years. This end has been attained by the diversion of funds, under the authority of the Governor and Council and some further diversion will be necessary to carry on the work of the nursery to the end of the present fiscal year. Appropriations of $10,000 and $11,500 are asked for to carry on the work the next two years but these amounts will be largely refunded to the State Treasury by the greatly increased sale of trees to the public. It is probable that the net cost of the nursery to the state will be decreased rather than increased during the next four years.

The former practice of allowing the nursery to retain money received from sale of trees, for its own use, would be a simpler method, but is not now allowed by law and large appropriations and payment of receipts to the treasury are necessary.

Reforestation.

An appropriation of $3,000 each year has been made for the past two years and smaller amounts before that time for reforestation which provides for the actual setting out of trees on idle portions of the state reservations and advice to private planters. This amount does not begin to keep up with the needed planting on newly acquired areas and the demands by private parties for advice in planting. State land planting should be continued during the next biennial period at an increased rate. Our plans call for planting 250,000 trees each of the next two years and the appropriation for the purpose should be increased from $3,000 to $4,000 for each year.

General.

The provisions of the so called Classification Law, Chapter 66, Laws of 1923, should be extended so as to permit any land owner to have 100 acres classified in any one town. There is some doubt at present whether the law limits the owner to 50 acres in the entire state or permits him to classify 50 acres in any one town. The Attorney General has ruled that the owner is limited to 50 acres in the State. The law should also be amended so as to provide that the value of land and young growth for purposes of classification shall be determined at the time of application and not by the value according to the town tax list the preceding year. Other suggestions are that the limitation of value to $25 per acre shall represent the value of young growth and not the land and young growth and further, that applications shall be made before the first of April instead of during the month of March.

The acts relating to the protection and preservation of ornamental and shade trees in the highways, should be entirely rewritten. Beginning with Chapter 85, Laws of 1895, later amendments are Chapter 98, Laws of 1901, Chapter 119, Laws of 1905, Chapter 138, Laws of 1915 and

Chapter 62, Laws of 1917. The main purpose of a new act should be to provide for town tree wardens to be appointed by the State Forester where there is a demand for them, and to make certain provisions for the proper planting and care of trees along the roadsides, especially where gifts of trees or land are made to the towns by abutting land owners.

The Seed Tree Law, Chapter 22, Law of 1921, became effective September 1, 1922. Since that time, a distinctly favorable attitude has been developed and there has been a general disposition on the part of pine operators to carry out the spirit of the law. A few flagrant violators, however, challenge the provisions and invite a test of constitutionality. In justice to those who are leaving seeding pines, and to relieve the Forestry Department of doubt as to how to handle extreme cases, it is recommended that the Supreme Court be requested to pass on the constitutionality of the law.

Respectfully submitted,

W. R. BROWN,
JOSEPH B. MURDOCK,
JOHN M. CORLISS,
Forestry Commission.

JOHN H. FOSTER,
State Forester.

HISTORICAL SKETCH.

At the time of the early settlements when all the land taken or acquired from the Indians belonged to the Crown, timber was an incumbrance to agricultural development and grants were made as rapidly as possible to town proprietors and settlers in order to have the land cleared and encourage agricultural development. From 1730 when settlements had reached northward about as far as Concord until the close of the French and Indian War in 1763, agriculture made rapid strides throughout southern New Hampshire but there was relatively little development farther north. The Treaty of Paris in 1763 insured peace and safety from the Indians and agriculture rapidly advanced northward. Between 1760 and 1775 most of the towns throughout central New Hampshire and surrounding the White Mountain region were settled and many of them were incorporated by the Crown. In addition, large grants of non-agricultural land including Cambridge, Kilkenny, Millsfield and Success were made, some being in the nature of compensation for services rendered during the Indian War. Following the Revolution there were still enormous areas unallotted and these were afterwards disposed of by the state. The clearing of land and the settlement of incorporated towns proceeded very rapidly until about 1850. This was also the great era in road building and the introduction of steam railways. Water power mills transformed chiefly the pine forests into lumber to meet the building demands. The forests in southern New Hampshire occupying agricultural lands were more nearly depleted than at any time in our history. There was little demand for spruce and being inaccessible our White Mountain and northern forests for the most part remained intact until steam mills came into use. Timber cutting, except for clearing land, was a matter of selection or culling of particular trees mostly pine to be

hauled to water mills. Nearly seven-eighths of Pittsburg and almost the whole of the White Mountains proper were old growth forests at a time when agriculture reached its maximum development about 1850. Records show that incorporated towns like Littleton, Lisbon, Warren, Wentworth, Bethlehem, Whitefield, Dalton, Jefferson and Shelburne contained from one-half to two-thirds of their areas in virgin forests as late as 1870.

New Hampshire began parting with its public lands prior to 1810 by special acts of the legislature. Dixville was sold in 1805 for about fifteen cents per acre. The second Dartmouth Grant was given in 1807 and the Atkinson and Gilmanton Academy and Dix's grants in 1809. The proceedings under which the State parted with its public lands in the White Mountain region began with the passage of a resolution by the legislature of 1831 authorizing the Governor with the advice and consent of the Council to appoint not more than two land commissioners who should have power to advertise and sell any land belonging to the state lying south of the 45th degree of north latitude (through the center of Clarksville) for such consideration as such commissioner or commissioners considered to be for the best interests of the state to require. The cost of surveying was to be paid by the purchaser and the commissioner was entitled to six per cent of the purchase price as his compensation. This resolution was approved June 22, 1831 and was soon followed by the sale of at least seven tracts aggregating 117,000 acres at an average price of ten cents per acre. These included Bean's Purchase of 33,000 acres for $1,023; the township of Odell containing over 23,000 acres for $1,863; Sargent's Purchase of 25,000 acres for $300 and Thompson and Meserve's Purchase of 12,000 acres, including the top of Mount Washington for $500. Pinkham's Grant was an act of the legislature of 1835. In 1867 the legislature passed a resolution requesting the Governor to investigate the condition of the public lands remaining in the state, mostly in Coos County, and authorizing

him with the advice of the Council to sell them, the proceeds to go for the purposes of education. On October 15, 1867, the Governor and Council voted to sell all the remaining public land in Grafton, Carroll and Coos counties for $25,000. Joseph B. Walker stated in 1894 that if this one sale had been withheld until this time, the value would have been at least $1,000,000. The total acreage in Pittsburg sold in 1867 by the state was said to be 300,000.

In the 70's people began to see that continued depletion of the forests must soon reach a point where reproduction would become extremely urgent in order to sustain forest industries dependent on them. Some thought the time had arrived for the state to take action before the mountain forests were depleted. The mountain region had already become a resort for tourist people and hotels were doing a considerable business. The lumber industry had then developed on a large scale in the White Mountain region as a result of the introduction of the steam saw mill. Clear cutting methods came into use in place of the earlier method of culling the larger trees. There was a sentimental desire to keep the mountains in their virgin grandeur and a belief that cutting of these forests would destroy the recreational value of the region, which has not since proved to be true. The forests bordering the Upper Ammonoosuc River between Twin Mountain and Crawford's to the base of Mount Washington near the center of the resort region were cut over and in 1888 the region was devastated by fire. The first wide spread public sentiment in favor of forest protection was aroused as a result of this catastrophe. Lumbering activities increased very rapidly from 1890 until they reached a maximum about 1907. In 1890 there were 831 saw mill establishments, an increase of 50 in 10 years. The old growth forests throughout the mountain region and northern New Hampshire were being operated and it was estimated that 700,000 acres still remained uncut. Lumber towns and logging railroads and commercial activity never before or since existing became evident

throughout the large forest sections of New Hampshire. Spruce had come in use for pulp as well as lumber although lumber was the principle product exported.

In the meantime agricultural decline which started prior to the Civil War caused a reduction of the farm land area from 2,367,000 acres in 1860, the maximum, to a little over 1,000,000 acres in 1890 and 700,000 acres in 1920. The sharpest decline was from 1880 to 1900. Outside of the mountain sections much land which had been cleared and abandoned was seeding in to second growth pine forests. With the decline of lumbering activities on a large scale the development of the portable saw mill began to bring this second growth pine into the market. A new lumber industry using pine grown on land once cleared became more and more important as the portable outfits became available to reach areas away from the water power mills already becoming fewer in number.

With the disappearance of the White Mountain spruce forests, the lumber towns and the logging railroads disappeared one after another and through more recent years pulpwood operations to supply the large northern paper mills have almost exclusively replaced the saw mills. The present generation is well acquainted with the second growth white pine industry, now reaching the stage where it is increasingly difficult to find easily available and sizeable stands to cut. However small in size or area white pine has found a ready market and stands of trees 60 years of age or over are reduced almost to the vanishing point. Inasmuch as great areas of land once farmed has now been cut over for pine the problem of growing pine forests on cut over land has come to be of extreme importance. With fire protection the northern and mountain forests are more certain to renew themeselves by natural means.

In 1881 following the rapid cutting of the mountain forests and destructive forest fires, the New Hampshire legislature made provisions for the appointment of a commission to investigate the condition of the forests and the

effect of cutting on water supplies and to make suggestions for protection and improvement. The commission finally reported to the legislature of 1885. This was followed four years afterward in 1889 by a second commission which made a report to the legislature of 1891 suggesting legislation in the interests of our forests. Two bills embodying suggestions of the commission and relating to fire protection and the right of the public to take forest land by condemnation were referred to the judiciary committee and afterwards returned as inexpedient to legislate but with the recommendation that the commission be continued. Two years later the legislature of 1893 received a second report, and a bill providing for the establishment and maintenance of a permanent forestry commission was passed by the legislature and approved by the Governor on March 29, 1893. An effort of about ten years was required for the public to reach a point of establishing a permanent forestry commission. The first provision was also made to accept gifts of forest land in the name of the state with the power of condemnation given to the commission. In 1895 the legislature empowered the commission to pay one-half the cost together with the land owners for fighting fires in unincorporated places and passed stringent laws against setting fires.

The year 1903 marked the beginning of an agitation for a national forest reserve in the White Mountains and the legislature gave consent to any action to establish such a reserve by Congress. Not until 1911 however did Congress take favorable action for the purchase and establishment of National Forests in the East. The Society for Protection of New Hampshire Forests, organized about 1900, took a leading part in the success of this and later forestry activities. In 1903 the Forestry Commission obtained an appropriation of $5,000 for a forest examination of the White Mountain region which was made by the Federal Forest Service. This was the first exhaustive report of forest conditions and of the lumber and pulp industries of the state.

It was published in the 1903-04 report of the Commission. The first public land came to the state through the purchase and gift of the Cathedral and White Horse Ledges by people of Conway and vicinity. The first exercise of the right of condemnation came about through a gift of Joel H. Poole of Jaffrey and others for the purchase of 500 acres on the side of Mount Monadnock in the town of Jaffrey. In 1906 an additional study was made by the Federal Forest Service and the Commission of the southern half of the state to supplement the investigation of 1903. This included the preparation of tables on the growth of white pine giving the rotation and profits from planting and growing white pine as a possibility for successful investment. This report also showing the need of reform in forest legislation and with another report by the Forest Service on the forest taxation problem in 1908 coming before the legislature of 1909 resulted in a comprehensive forestry law, creating the present Forestry Department with a State Forester as an executive officer under the Forestry Commission. The system of fire protection was made state wide with the appointment of wardens by the State Forester and providing for the state to share with towns the expense of forest fire fighting. A state nursery was authorized and forestry as an established department of the state had its beginning.

Progress made by the State Forestry Department under the Forestry Commission since 1909 is a matter of more recent public knowledge and recorded in the biennial reports of the Commission. It may be said that progress in forestry within the state has been consistent if not rapid. A distinct achievement has been brought about in forest fire protection and during the past few years in controlling the white pine blister rust disease. In fire protection the entire state has been organized as a unit consisting of some 800 fire wardens and deputies appointed by the state forester with the state sharing with the towns half the expense of fire fighting. The present system of 26 mountain lookout

stations starting with one or two stations in 1910 operated by the timberland owners now permits intensive observation of at least 75 per cent of the land surface of the state. The stations are equipped with towers containing maps and a telephone communicating with a central telephone office and have cabins and facilities necessary for living on the mountains during the fire season. The watchmen report all fires to the wardens or deputies nearest to the fires and as this lookout system has developed wardens have come to depend on the watchmen for the reporting of fires. Annually the wardens and watchmen meet in conferences for the betterment of the service.

The state is divided into five districts each under a fire chief whose duty it is to improve the personnel and efficiency of the wardens and lookouts, take charge of construction and improvement work, settle difficulties relating to the payment of fire expenses and enforce the laws relating to forest protection. Many acts of helpful and necessary nature have been passed relating to regulation of brush burning by permit, disposal of slash adjacent to highways, railways and property lines, examination of portable steam mills as to spark arresters and surrounding slash and requiring mill operators to report their locations when moving from one town to another, leaving seeding trees in the operation of pine timber lots as well as cooperating with the railroads in their requirements to use spark arresters, clear their rights of way, patrol during dry periods and pay the cost of fighting fires caused by railroads.

In 1909, when the Forestry Department was organized, the fire losses for the year were well over $300,000. Before that year there were frequent periods of great fire loss dating back many years but unfortunately there are no means of determining the amounts. It is well known that fires in woodland areas away from farm buildings were allowed to run largely at will. Fires were known to run for weeks covering many square miles in the mountains and ultimately were brought under control only by rain or

lack of fuel to feed them. The fire losses were greatly reduced as the organization became more effective. While seasons vary greatly in hazard according to rainfall fluctuations, the total average loss since 1915 is $67,745.00, or less than one-tenth of one per cent of the present total forest land value. The cost of developing the present organization has been shared by the state, towns, federal government, railroads and the timberland owners association. The state has paid yearly on the average $26,817.00; the towns $6,852.00; the federal government $6,779.00; the railroads $38,702.00 and the timberland association by taxing themselves according to acreage for purposes of patrol $9,800.00. These various agencies have paid from $53,713.00 in 1911 to $105,330.00 in 1923, the railroads having spent nearly half and the state about one-third of the total each year. The average cost for the whole forest area of the state has increased from less than one and one-half cents to about two cents per acre annually. The fact should not be lost sight of that fire hazards have greatly increased during recent years on account of the much larger use of the forests for recreation, the present day habit of cigarette smoking and on account of the enormous distribution of lumber slash from pine and other operations of the last decade.

The blister rust disease of white pine first introduced in 1916 has called for an immense amount of work and expense on the part of the state, towns and the federal government. Since 1917 the removal of currant and gooseberry bushes, both wild and cultivated, has been accomplished on 1,360,312 acres of prospective pine woodlands in New Hampshire. This has been possible through cooperation with 167 towns and cities by which the state has paid less than one-fourth of the expense. In addition to this 464 private land owners have voluntarily paid for work on their own land.

Through an annual appropriation of about $5,000 for the purchase of state forests, with the help of gifts of land

to the state, there has been built up a system of forest reservations amounting to over 20,000 acres, one-fourth of which have been donated. The total purchase cost to the State, excluding the Crawford Notch reservation, which was a special act of the legislature of 1911, is about $43,000.00 or less than $5.00 per acre. The work of planting waste portions of the state lands has progressed as rapidly as trees and planting funds were available. About $15,000 have thus been spent making a total cost for these state lands of $60,000. The estimated value of lands given to the State is $68,000.00. While no accurate estimate of the present value of lands purchased is at hand, at $10.00 per acre, which is not above the present average value, these forest reservations, including gifts and excluding Crawford Notch, are worth $160,000 or three and one-half times the total cost ot the State and ultimately will be worth many times this amount.

A small state nursery was established at Gerrish, near Concord, on one and one-half acres of leased land in April, 1911. In 1914 the state purchased an adjoining farm of 142 acres of which only 16 acres were tillable land. From a small beginning the output of trees for planting purposes has been slowly increased with the average for 13 years about one-fourth million trees yearly. These have been used for planting on state land and for sale to farmers and others at the cost of growing them. Increased interest in reforestation by planting has long been evident. Orders for trees have for a number of years exceeded the available supply. It is certain that with better facilities and the rapidly growing interest in planting a much larger amount of reforestation work will be accomplished in the near future.

Interest in forestry has shown a slow but steady increase for more than 20 years. Beginning with a sentiment to save forests of scenic importance in the White Mountains, the real foundation for ultimate forestry practice lay in the important economic problem of providing for

our future timber needs. While foresters have attempted to show how European forestry came about as a result of forest destruction and future needs people were slow to believe there was any real shortage ahead in this country. Even those lumbermen who exhibited a keen sense of interest in the public welfare believed forestry to be a mere sentiment to save trees. Many changes have taken place in two decades. Increasingly high prices which indicate an approaching shortage have actually become a reality. New view points little by little changed old ideas. Far sighted corporations and individuals first began accumulating lands with timber not at the time merchantable or accessible. Then young growth decidedly unmerchantable assumed a new value. Land owners no longer cleared pine from their pastures but recognized its prospective value. More recently judicious cutting of hardwoods to improve growing pine has become a common practice by many farmers on their woodlots. Fire protection was recognized as an absolute necessity. The underlying principles of forestry are certain to be put into practice more and more as time goes on.

We are passing through a state between timber mining and growing timber as a crop. When timber ceases to be on the market at a speculative value either within the state or available from outside, we will have reached the beginning of general forestry practice because timber will then be worth the cost of growing it plus a reasonable profit. In the meantime there is likely to be a shortage with still higher prices and a much reduced output. Those people who for 10 or 20 years have been putting cut over or idle land to work growing trees have started an account which will yield them good returns in 20 to 30 years more. Although relatively little forest planting has been done as yet a great deal of natural reforestation has created interest and value for the state as well as to the land owners.

Education in forestry has undoubtedly helped to create a new public sentiment and understanding of the future

needs as well as the possibilities in timber growing. One of the main efforts since the first Forestry Commission started its work has been educational. The work of the Forestry Society has been consistently educational and with an added purposce to work for assistance from the National Government. The Weeks Law passed by Congress in 1911 has resulted in the establishment of the White Mountain National Forest of about 450,000 acres and financial aid in fire protection. The passage of the McNary-Clarke law by the present Congress commits the Government to a policy of further aid, not only in acquiring land and in fire protection but in direct aid to owners of small woodlands and reforestation of idle land. The State University in teaching forestry to its students and establishing a forestry department in the college and extension service in 1911 aided in no small degree to mould public opinion and create new ideals. Within the past few years the machinery of the Farm Bureau organization working with the Extension Service and the Forestry Commission has opened up an almost new field of activity tending to bring about improved farm woodlot conditions. By means of these organizations working with the Federal Bureau of Plant Industry in the control of the pine blister rust disease, each county Farm Bureau now has a federal forestry agent under the State Forester, the result of which is to bring the information of the State and Federal Government in disease control as well as farm woodlot management to the land owners directly. The need of contact between foresters and owners of farm forests on the ground has long been felt but only recently to be realized.

Public welfare calls for creating more incentive for small land owners who hold 68 per cent of our forest area, to put their idle lands at work. Increasing tax values applied to growing timberlands constitute a serious problem tending to destroy the incentive to grow new timber crops. Publicly owned forests including town forests should be greatly increased and unless forestry practice on privately

owned land becomes general, they are a public necessity. The European town or communal forest became an established local and remunerative institution generations ago and is capable of becoming so in this country. It is needless to say that New Hampshire was short sighted in disposing of its remaining wild land forests in 1831 and 1867, especially adjacent to the main public highways through the various notches and on some of the mountain ranges which have since become centers of recreational interest of great value and have either been taken back into public control or are in great danger of further exploitation and misuse.

We have failed to connect forestry with our agricultural needs and with relation to the public necessity of building up future timber supplies. Throughout our agricultural towns rough lands and good tillable lands are interspersed. As we study the history of these towns we are impressed with the fact that forests have always played an important part in the practical success of the farmer. Part of their income, oftentimes the greater part, has come from timber. As nearby supplies wane and prospects of lumber returns from the farms become remote, there is less chance of holding the back farms in use and farm abandonment is thus hastened. Loss of industries using wood is an added encouragement to farm abandonment. Reversely it seems apparent that rehabilitation of farms and of villages and the rebuilding of a prosperous rural life can only take place as forest restoration becomes a fact. The responsibilitiy for present agricultural conditions in rural sections was largely brought about by the development of farming in the West and by the building of railroads which brought Western products to the East. It is true however that there can be no incentive for rural rehabilitation unless there are productive forests and local industries to use them. The idea of small industrial wood using plants in and near sources of supply of wood and timber makes for favorable living conditions for limited numbers of people. With the

constant development of recreational interests, visitors and summer residents, there is a bright future for the rural sections provided that forest restoration can be assured to add part prosperity with agriculture and other sources of interest. The number of wood using industries is still on the decrease, in no small degree due to lack of raw material or high costs of it. One of the most important factors in public forests is the ability to promise future sources of raw material to small permanent wood using industries. This has already been shown in the vicinity of the White Mountain National Forest where there are beginning to be developed new industries dependent on this forest for their supply.

FOREST FIRE PROTECTION.

The fiscal year ending June 30, 1923, was not a hazardous year, as shown by the fact that the total areas burned, including all fires caused by the railroads, amounted to only 3252 acres with total damages of $37,426. While there were 564 fires that year, 365 of them were caused by the railroads and averaged but 2.5 acres per fire.

The year 1924 was hazardous from the beginning of April, although becoming much more precarious after the fiscal year ended June 30, from August to late fall. During the fiscal year the total area burned, including railroad fires, was 6,236 acres with a total damage of $100,271. Of this total the railroad fire damage was only about $17,000. The total number of fires was 657, of which 327 were railroad fires with an average of 2.7 acres per fire. In explanation of the 1924 record it is necessary to say that over $37,000 in cut wood, pulp and sawed lumber and $17,000, in buildings and improvements destroyed were chiefly responsible for the high total damage of $100,000 and would not ordinarily represent so high a value in one year. In fact, two fires on the Beebe River operations in Waterville caused a damage of $23,775, nearly one-fourth of the total for the state that year. These two fires occurred in July, 1923, and June, 1924, at extreme ends of the fiscal year.

As regards the causes of fires, the railroads were responsible, during the two fiscal years, for 56 per cent of the total number but only 19 per cent of the total area burned and of the total damages. On the other hand while lumbering was accredited with less than half of one per cent of the number of fires, it was responsible for one-third of the total area burned and over one-fifth of the total damage. The two Waterville fires mentioned, caused by lumbering, burned over 2,350 acres. Careless smokers, hunters, fishermen, berry pickers, campers and automo-

bilists were responsible for 23 per cent of all fires, 21 per cent of the area burned and 15 per cent of the damage. Fires caused by brush burning have been reduced from 10 per cent of the total number two years ago to five per cent for the last biennial period. The number of fires with causes unknown has likewise been reduced from 17 to 9 per cent.

Tables 1 to 6 give detailed information regarding the fire records of the last two fiscal years. While substantially the same group of tables has been shown in the biennial reports heretofore, the present group includes a table which combines the town and railroad record for number of fires, area burned and damage. Also the table of causes of fires is made to include percentages of area burned and damage as well as the percentage of total number of fires formerly shown in this table.

TABLE 1.

NUMBER OF FIRES BY MONTHS

(Exclusive of Railroad Fires)

Fiscal Year Ending June 30, 1923			Fiscal Year Ending June 30, 1924		
July	1922	6	July	1923	34
August	1922	5	August	1923	40
September	1922	4	September	1923	13
October	1922	26	October	1923	34
November	1922	18	November	1923	4
December	1922	4	December	1923	4
January	1923	0	January	1924	1
February	1923	0	February	1924	0
March	1923	0	March	1924	2
April	1923	39	April	1924	67
May	1923	49	May	1924	56
June	1923	48	June	1924	75
		199			330

TABLE 2.

FIRE RECORD FOR FISCAL YEARS 1923 AND 1924

Fires Handled by Town Organization

Name of County	Year	No. Fires	Total Acres Burned	Average Area Per Fire in Acres	Total Damage	Average Damage Per Fire	Total Cost for Fighting	Aver. cost Fighting per Fire
Belknap	1923	11	24	2.2	$ 157.50	$ 14.32	$ 116.46	$10.59
	1924	24	319	13.3	3,510.00	146.25	941.19	39.22
Carroll	1923	15	582	38.8	2,655.00	177.00	937.19	62.48
	1924	20	282	14.1	5,169.50	258.48	475.27	23.76
Cheshire	1923	23	484	21.0	2,247.50	97.72	689.21	29.97
	1924	27	460	17.0	6,654.00	246.44	1,649.36	61.08
Coos	1923	7	21	3.0	187.50	26.79	168.70	24.10
	1924	17	240	14.1	1,843.50	108.44	711.87	41.87
Grafton	1923	19	276	14.6	3,152.00	165.90	422.55	22.24
	1924	37	2,462	66.6	25,717.50	695.07	6,251.09	168.95
Hillsboro	1923	39	235	6.0	1,445.50	37.06	902.38	23.14
	1924	69	469	6.8	5,327.50	77.21	2,227.79	32.29
Merrimack	1923	35	358	10.2	5,523.50	157.81	1,445.66	41.30
	1924	38	445	11.7	3,267.00	85.97	1,259.39	33.14
Rockingham	1923	27	223	8.3	7,057.50	261.39	579.60	21.47
	1924	61	469	7.7	4,749.50	77.86	1,668.94	27.36
Strafford	1923	7	14	2.0	4,585.00	655.00	89.76	12.82
	1924	24	185	7.7	26,982.50	1,124.27	573.78	23.91
Sullivan	1923	16	116	7.3	775.50	48.47	564.06	35.25
	1924	13	20	1.5	126.50	9.73	562.52	43.27
Totals for State..	1923	199	2,333	11.7	$27,786.50	$ 139.63	$ 5,915.57	$29.73
	1924	330	5,351	16.2	83,347.50	252.57	16,321.20	49.46

TABLE 3.

RAILROAD FIRE RECORD FOR FISCAL YEARS 1923 AND 1924

Year	Number Fires	Total Area Burned	Average Area Burned	Total Damage	Average Damage Per Fire
1923	365	919 A.	2.5 A.	$ 9,640.00	$ 26.41
1924	327	885 A.	2.7 A.	16,924.00	51.76

TABLE 4.

TOTAL NUMBER OF FOREST FIRES, AREA AND DAMAGE, BY CAUSES

Two Years Ending June 30, 1924

CAUSES	% Total Number of Fires	% Total Area Burned	% Total Damage Caused
MECHANICAL CAUSES:			
Railroads	56.67	19.09	19.32
Portable Steam Mills	.66	.67	2.57
HUMAN CAUSES:			
Burning Brush, Grass and Rubbish	5.16	7.39	4.59
Campers, Hunters, Fishermen, Flower and Berry Pickers, Automobilists and Careless Smokers	23.67	21.29	15.22
Miscellaneous	2.21	4.03	1.48
Incendiary	.41	.69	4.48
Burning Buildings	1.31	.89	.21
Lumbering	.41	34.42	21.84
Unknown	9.17	11.59	30.22
NATURAL CAUSES:			
Lightning	.33	.03	.03
	100.00	100.00	100.00

TABLE 5.

COMBINED TOWN AND RAILROAD FIRE RECORD

Two Fiscal Years Ending June 30, 1924

	NUMBER OF FIRES.		
Year	Town	Railroad	Total
1923	199	365	564
1924	330	327	657
Totals	529	692	1,221
	AREA BURNED.		
Year	Town	Railroad	Total
1923	2,333	919	3,252
1924	5,351	885	6,236
Totals	7,684	1,804	9,488
	DAMAGE.		
Year	Town	Railroad	Total
1923	$27,786.50	$ 9,640.00	$ 37,426.50
1924	83,347.50	16,924.00	100,271.50
Totals	$111,134.00	$26,564.00	$137,698.00

TABLE 6.

FIRES REPORTED BY THE LOOKOUTS

Year	North District	East District	West District	Central District	South District	Totals
1923	27	32	54	43	89	245
1924	42	64	99	116	224	545

WHITE PINE BLISTER RUST CONTROL.

The first mention of white pine blister rust in New Hampshire official documents appeared in the biennial report of the Forestry Commission for the period of 1915-1916. At that time a note of warning was sounded and certain recommendations were made, which, in view of the then limited knowledge regarding the distribution and characteristics of the disease, appeared sufficient. That the rust had already, as early as 1915, secured a strong foot-hold upon the pines was not, at that time fully appreciated. More recent investigations, however, indicate that blister rust must have been widely distributed throughout the State even prior to 1915.

From the beginning of control measures the Commission, as well as representatives of the Federal Government, have held rigidly to the policy of only making statements regarding the disease as investigations prove them to be correct. None of the predictions as to the ultimate outcome of this serious menace, and none of the recommendations for its control have proved faulty. The present distribution of the rust, the damage caused by it, and the excellent progress made in its control, all combine to substantiate these statements and to commend the past and present policy which the Commission, in cooperation with the Federal Government, adopted for its control.

Control Measures Proven Practicable.

In view of the large volume of literature which has been published concerning the scientific side of white pine blister rust, and as previous reports of the Commission have discussed the matter in considerable detail, it does not appear necessary to present herewith any lengthy description of the life history of this disease. Sufficient to say, the rust spreads, with the aid of the wind, from infected to healthy pines *only* through the medium of currant and

gooseberry bushes, both wild and cultivated. Definite and irrevocable proof has been secured that the destruction of these plants, in and around pine growth will prevent further spread of the rust and thus bring about the desired protection and control. That the eradication of these carriers of blister rust can be successfully conducted is evidenced by a review of the control measures which have been carried on from 1917 to date.

Commencing with the Spring of 1918, and continuing until 1921, all State, town, and individual funds available for control work were matched on the dollar for dollar basis by the Bureau of Plant Industry, U. S. Department of Agriculture. During this period nearly 600,000 acres were put under control as a result of Federal assistance. From 1921 until the present writing the eradication of currant and gooseberry bushes has been financed wholly with State, town, and private funds.

At their annual meeting in March, 1923, 82 towns and cities appropriated $28,765 for control work in cooperation with the Forestry Department. During the summer season 121 individuals made available $7,635.45 for work on their own lands, state crew being employed. The combined cooperation of these three agencies brought about the removal of 3,521,512 currant and gooseberry bushes over areas aggregating 268,237 acres; the average cost for the entire area being but $0.18 per acre.

That the seriousness of the white pine blister rust and the necessity for control is steadily becoming more appreciated each year is evidenced by the results of town and city meetings during 1924. The sum of $38,975 was appropriated by 96 towns and $2,637.10 was contributed by 39 individuals and firms. The action taken by towns and cities during the present year was notable not only for the size of the combined appropriations, but on account of the unusual amounts voted by several towns and cities. The largest single appropriation, $2,000, yet made for blister rust control in the United States, was voted by the Town

MAP OF NEW HAMPSHIRE
SHOWING RESULTS OF
WHITE PINE BLISTER RUST CONTROL

TOWN AND PRIVATE CONTROL AREAS—1917 TO 1924, INC.

of Pittsfield, while the City of Franklin followed closely behind with $1,800, the City of Concord being third with $1,000. A notable example of foresight and public-spiritedness occurred in the Town of Richmond, when several property owners raised among themselves the sum of $400 in order that the remaining pine areas of the town might be protected from the rust.

The areas brought under control in 1924 aggregated more than in any year since the beginning of this work, there being 319,588 acres examined, and 3,972,458 currant and gooseberry bushes destroyed thereon. The average cost, for the whole State, amounted to but $0.162 per acre. The costs per town naturally varied, ranging from $0.10 to $1.00 per acre, depending upon the abundance and size of the wild currant and gooseberry bushes.

A review of all control work from 1917 to date indicates that 1,360,312 acres have been covered, and 16,258,443 currant and gooseberry bushes located and destroyed. Since 1918, 167 towns and cities, over 70 per cent of the pine producing towns of the State, have financially cooperated with the Forestry Department in blister rust control. Individuals, associations and firms in the number of 464 have paid $29,711 for control work on their own lands. (See map).

There are now 30 towns and cities which have appropriated funds so persistently that their entire land area has been covered for the first time. Inasmuch as it is not possible to locate and destroy all the small seedling currant or gooseberry bushes the first time over the ground, it will be necessary to re-examine the pine areas of these communities about five to eight years after the original working. This second inspection can be accomplished at a fraction of the original cost. Two towns, during 1924, of their own initiative, appropriated funds for this second examination. Table 7 shows the number of towns and cities, by counties, in which some kind of control work has been carried on.

TABLE 7.

Towns in Which Control Work Has Been Conducted.

COUNTY	Number which have appropriated	State or Private work only	No. Control work conducted	Insufficient pine to warrant appropriation	Total towns in each county	First Eradication work completed
Belknap	11	—	—	—	11	1
Carroll	13	3	1	1	18	1
Coos	2	2	4	13	21	1
Cheshire	20	3	—	—	23	4
Grafton	23	4	9	3	39	1
Hillsboro	24	5	2	—	31	8
Merrimack	21	3	3	—	27	2
Rockingham	30	4	3	—	37	8
Strafford	12	1	—	—	13	4
Sullivan	11	2	1	1	15	—
	167	27	23	18	235	30

According to the above table eradication of currant and gooseberry bushes has been conducted in 194 towns and cities, or 82½ per cent of the pine towns of the State by means of public and private funds. It should be mentioned, however, that considerable work is yet necessary in order to complete most of these towns. The table also indicates that there are 50 towns which have failed to make available funds for control work; in 27 of these, however, private and state funds have been instrumental in covering a portion of the pine areas. There are 18 towns in the white pine area, which, in the opinion of the Department, do not contain sufficient pine to warrant town action. These towns, however, do have scattered tracts of pine which their owners should protect from the rust.

Effectiveness of Control Work.

From the very outset of blister rust control an earnest endeavor was made to secure as nearly complete destruction of currant and gooseberry bushes as is humanly possible. The Federal Bureau of Plant Industry, in cooperation with all the States engaged in this work, conducted careful and painstaking investigations in order to determine the best

methods of eradication. In addition, extra assistance has been employed, during each field season, to carefully check over a certain per cent of the land covered by the crews so that definite figures might be secured as to the quality of the work performed. Thousands of checks made since the inception of control work indicate that with properly trained and supervised crews it is entirely possible to destroy better than 95 per cent of the wild bushes.

Present Distribution of the Rust on Pines.

Infected white pines have been found throughout 219 towns and cities, or in 93 per cent of the pine towns of the State. During the past two years hundreds of inspections have been made by the county blister rust agents, at the request of owners, and in nearly every lot examined infection has been found. In a large majority of such cases, while the situation is critical, the disease has not developed to a point beyond control. This statement, however, should not produce a false sense of security as the continued presence of currant or gooseberry bushes in white pine growth will bring about the ultimate destruction of the pines.

Many areas have been located throughout the state where the rust has secured a particularly strong foot-hold. Studies were made of these areas with the view of determining the development of the disease and the per cent of infection. Table 8 indicates the spread of the rust in a few of the tracts examined.

TABLE 8.

Spread of Blister Rust in Individual Tracts.

Location of area	Year Pines Were Healthy	Year of First Infection	Percent of Pines Infected that Year	Year of Latest Infection	Percent of Infection in Entire Area	Year Area Was Put Under Control
Acworth	1916	1917	5%	1921	70%	
Alexandria ...	1911	1913	6	1921	72	
Alexandria ...	1912	1914	16	1921	94	
Alexandria ...	1912	1914	14	1920	84	
Alton	1916	1917	1	1922	66.7	
Bartlett	1915	1917	22	1921	45.6	1921
Dover	1917	1918	10	1922	56	
Freedom	1915	1917	10	1921	42	
Hanover	1911	1915	6	1921	73	
Hooksett	1917	1918	5	1922	49	
Littleton	1909	1910	2	1918	38	1918
Lyme	1911	1912	8	1921	70	
Marlboro	1913	1917	35	1920	87.7	1920
Nelson	1915	1916	23	1921	92	
Nottingham ..	1916	1917	2	1920	49.4	
Pittsfield	1915	1916	9	1922	65.9	
Sunapee	1917	1918	41	1922	52	

The per cent of infection in all of these lots, with the exception of the Bartlett, Marlboro and Littleton areas, would upon a second examination show more infection than when originally inspected. This is owing to the fact that nearly two years is required for the rust to become evident on the pines after infection has taken place.

That currant and gooseberry bushes are the only means by which the rust is spread from pine to pine was again proved through a study of these areas. The above table shows that after the first year of infection the disease increased as follows: Littleton, 36% in 8 years; Marlboro, 52.7% in 3 years; and in Bartlett, 23.6% in 4 years. The removal of the currant and goosberry bushes was carried on in 1918, 1920 and 1921 respectively, and since these years *no new infections have devcloped.*

County Blister Rust Organization.

In the last biennial report of the Commission mention was made of the new county organization which became

effective in the late spring of 1922. At that time there was relatively little to report as to the benefits secured, although it was shown that a considerable volume of individual cooperation had been obtained by the agents during the season of 1922. Their real objective, namely, of giving county-wide publicity to blister rust, could not be put into effect on any scale until the following autumn and winter months. Table 9 indicates the amount of educational work which these men have accomplished during the past 21 months.

TABLE 9.

Educational Work by County Blister Rust Agents.

					Field Demonstrations of Blister Rust		
No. of Meetings	Attendance at Meetings	Number of B. R. Exhibits	Number Initial Interviews	Follow up calls	Number to Individuals	Group Meetings	Attendance at Group m't'gs
504	29,155	460	7,988	3,465	1,743	412	3,869

Total number of meetings of all classes, 916.
Total attendance at meetings, 33,024.
Total persons interviewed directly by calls or indirectly through meetings, 42,755.

From the foregoing table it will be apparent that about 9 per cent of the population of the state has been reached through the activities of the county blister rust agents. This does not, however, take into consideration the large number of persons who have become somewhat familiar with blister rust through exhibits placed in store windows and at fairs; through publications which have been distributed; by means of items published in newspapers and farm bureau bulletins and also through the distribution of posters and signs. Inasmuch as the bulk of the work performed by these men has been conducted in rural sections, and not in the cities, the number of persons as represented by the attendance at these meetings is actually much more than 9 per cent of the woodland owners of the state. Besides interviews with pine owners a total of 5,719 persons were called upon for the purpose of securing their moral support.

During the period covered by this report resolutions were passed by the State Farm Bureau Federation and by the State Grange in which the seriousness of blister rust was emphasized and approval of the methods used by the Forestry Commission was given. It should also be mentioned that in addition to the action taken by the state organizations cooperation has been accorded the blister rust agents by the county farm bureaus and subordinate granges throughout the state.

Another striking fact which has come up as a result of the field demonstrations is the statements made by individuals who have had an opportunity to decide for themselves as to the seriousness of this disease. Were it not for the limited space assigned to the blister rust report it would be well worth while to publish a few of these statements as they are very impressive, and indicate that many persons thoroughly agree as to the necessity for control work.

Continuance of Control Work Imperative.

It is apparent after a digest of this report that the situation throughout New Hampshire, which blister rust has caused, demands that the present methods of control be continued with greater zeal than ever before. From the cooperation received to date from so many towns, cities, individuals, and organizations it is quite evident that there is a widespread opinion which coincides with that held by the Forestry Department.

So much has been said and written during the past few years in reference to the value of the white pine crop that it does not seem necessary to bring it up again at this time. The average individual, however, is very apt to lose sight of the importance to his community of such a valuable asset as the white pine unless he is reminded of the fact. As an illustration mention might be made of the lumber cut in one New Hampshire town during the past ten years, which amounts to eleven million feet of white pine. This town is a small one so far as area is concerned and is not

considered a particularly good white pine section. Assuming an average value of $10 per thousand for stumpage the cut of white pine lumber in this town during the last decade has brought to the owners the sum of $110,000. This sum does not, of course, include wages earned by many of the local inhabitants through employment in the woods and portable mills which were necessary to produce this large amount of lumber. Irrespective of the taxation problem and other factors which at present time tend to lower the earning power of white pine growth, it is still an undisputable fact that this growth constitutes such a valuable asset to individuals, towns and the State that funds may well be spent for protecting the future white pine crops from this disease. The work of effecting the removal of currant and gooseberry bushes in and around pine growth should be continued on a scale greater than ever before.

PUBLIC FORESTS.

The principle of public owned forests is generally accepted as just and reasonable and making for general public welfare. One can believe in this principle and at the same time be opposed to most other forms of public ownership. Forest economists believe that one-third of all forest areas should be in one form or another of public ownership. Unquestionably we are face to face with the need for future supplies of wood and timber beyond that which is promised through the management of forests by private individuals. As time goes on it is more and more difficult to hold forest property on account of taxes and this perhaps is one of the strongest arguments in favor of the public forest. With the rapid decline of agriculture in sections where the soil is poor and markets are distant the public forest must be depended upon to stabilize forest industries and make it easier for persons living in these communities to find employment.

The situation confronting the United States with reference to its future timber supply is not unlike that which faced the European countries generations ago. At one time Norway and Sweden were largely stripped of timber and their forest resources vanished. They have brought these forests back to productivity in no small degree through public ownership. In Norway today every sale of forest land must first be offered to the public. Public ownership of forest land does not mean that the public is engaged in private business enterprises. Industries remain in private ownership but stumpage is purchased from public lands. In our White Mountain National Forest the possibilities of a constant and fair means of securing wood and timber has encouraged private industries using wood to look forward to permanent and prosperous operation. The public merely manages its forests and sells wood and timber like any individual but unlike private ownership the public forest can best be managed on forestry principles.

White Mountain National Forest.

By IRA T. YARNALL, *Forest Supervisor*

Extent:

The present acquired area is approximately 417,744 acres in New Hampshire and 32,256 acres in Maine, equal to about half what may be called the main mass of the White Mountains—the region stretching from the southern base of the Sandwich Range on the south to the Ammonoosuc and Moose River Valleys on the north, and including the Presidential, Carter-Moriah, and Franconia Ranges. Ultimately the National Forest will reach a size of something like a million acres. This will carry the forest northward over mountains beyond the Ammonoosuc and Moose Rivers as far as and including the Pliny Range. A small portion of the land already bought lies in this northern extension of the White Mountain region.

Improvements:

The Federal Highway Act has made available two classes of funds for work on roads and trails. The Forest Highway Fund is for Forest roads of primary importance to the State, counties or communities within, adjoining or adjacent to the National Forests. The $35,294 available for use in New Hampshire for the fiscal years 1922-23 under this fund have been spent on the Pinkham Notch road under the supervision of the Bureau of Public Roads in cooperation with the New Hampshire Highway Department. At least $12,000 of Forest highway funds will be spent on this road under similar arrangements during the present fiscal year.

The Forest Development Fund according to the Act is provided for the construction and maintenance of roads and trails of primary importance for the protection, administration and utilization of the National Forest, or when

necessary for the use and development of the resources upon which communities within or adjacent to the National Forests are dependent. The Forest Service spends this money on maintaining a number of existing roads and in the gradual building of additional roads During the present fiscal year work was started on a new road from Bartlett to Passaconaway.

A Great Timber Reservoir:

The White Mountain National Forest as at present constituted contains one billion board feet of merchantable timber. The Forest is susceptible of operation on a sustained yield basis, producing 60 million board feet of forest products yearly. Under complete protection and proper management the condition of the forest would be steadily improved with this utilization in progress. One problem ahead is to bring about this degree of use. It can not be done at once but with a growing demand for forest products in the face of a demonstrated, increasing and permanent shortage of supply this National Forest must inevitably play a growing part in supplying the timber needs of New England without in any degree lessening the recreational and scenic values.

The present cutting plans provide for an annual cut of 20 million feet board measure. At least one-third of this possible cut will be marketed during the calendar year 1924. Each year this cut will increase until the above limitation is reached.

Under the terms of the Weeks' Act, 25 per cent of the gross revenue from the National Forest is paid to the State Treasurer to be distributed to the towns in which the National Forest land is located.

The Public Investment:

The people of the Nation have invested approximately $3,300,000 in the White Mountain National Forest—$7.50 per acre. The land value—without the merchantable tim-

ber but including young growth in various stages—is conservatively placed at $2.75 per acre and the merchantable timber is valued with equal conservatism at $9 per acre. Thus these major values readily convertible to terms of dollars and cents, indicate clearly that in acquiring this great property the public has bought to good advantage. To these values, however, in all fairness must be added the less tangible value of the protected watersheds and the tremendous value in free public recreation. It is also safe to venture a prediction that all of these values will steadily increase under adequate protection and wise utilization. In the operation of the property the receipts to date have approximately balanced the actual expense of protection and administration. Additional expenditures have been made each year to provide adequate systems of transportation and communication and various other permanent improvements which add to the value of the Forest as a public property. With increasing use it is confidently expected that revenues from the economic resources will soon equal and permanently exceed expense of operation and protection thus permitting a continuance of the present policy that recreational use of the Forest by the public shall be free, unrestricted and open to all.

Recreation:

No mountain region in the United States is so intensively used for public recreation as the White Mountain National Forest. And Forest Service policies and practices promote this use in every practicable way, recognizing public recreation as a major resource of the Forest to be so developed as to yield the maximum of benefit to the greatest possible number of people.

The National Forest is free to all. No commercialization of the scenic features under Forest Service control is permitted. No exclusive use permits for the occupancy of choice summer camp sites are issued, every such desirable site being held open for present or foreseen public

need. No clutter of cheap concessions is allowed to mar the beauty of the Forest drives. No entrance fee is exacted from the visitor.

The Forest Service has built over 300 miles of trail which together with the much greater trail mileage built and maintained by the Appalachian Mountain Club and kindred organizations form a network which opens to the hiker every important section and all of the higher peaks. Many of the mountain clubs have built and maintain huts and open shelters which play an important part in making the mountains enjoyable and safe for all. The Forest Service has improved six delightful public camp sites along the main highways, the most popular at present being the Dolly Copp camp six miles south of Gorham on the Peabody River, where 5,000 visitors made camp during the past summer. The Glen Ellis, Zealand, Gale River, White Ledge and Oliverian camps are growing steadily in popularity and the cordial reception of these facilities by the public has led the Forest Service to designate nine additional sites for similar development. At these camp grounds the visitor finds pure water, fire-places, fire-wood, and sanitary conveniences, adequate space for parking cars and in addition pleasant surroundings which contribute to the joy of camping. No charge is made for the simple facilities and conveniences provided. Forest Service appropriations for such improvements are extremely limited, however, and progress is necessarily slow.

The Forest Fire Menace:

Through the summer and often late into the fall the menace of forest fires is ever present in the White Mountains. Use of the Forest for vacation purposes each year by over 700,000 people naturally increase the fire hazard and makes it incumbent upon every visitor to do every thing possible to prevent such a disaster as a single fire might readily precipitate. As a precautionary measure all campers are required to secure a Camp Fire permit (free)

from the nearest ranger or the forest supervisor at Gorham before building a camp fire within the Forest. The Forest Service provides an efficient system of fire detection and suppression comprised of lookouts on certain peaks, patrolmen, guards, the district rangers and Forest headquarters, all in touch with each other by phone and so organized as to get promptly into action whenever fire is seen or reported. Fire tool caches are conveniently placed along main routes of access to the timber bodies and advance arrangements permit the quick mobilization of crews of fire fighters among local people and visitors. New England may justly be proud of the fact that in spite of the intensive public use of the Forest but very few fires have occurred in recent years, but the need for constant care and watchfulness never ceases for a single cigarette stub carelessly tossed into the duff is always a potential conflagration which would destroy for generations the beauty of the region and entail tremendous economic loss.

Forest Organization:

In addition to the Forest supervisor's office at Gorham, where one district ranger is also stationed, district rangers are located at Twin Mountain, Bartlett, and Woodstock. In case of fire report should be promptly made to any of these officers. Any of the above offices will gladly furnish information regarding the Forest on request.

Map and booklets of the White Mountain Area showing the location of the Forest and other features are available through application to the Forest Supervisor at Gorham.

State Forests and Reservations.

The total acreage of state forests and reservations given in the last biennial report was 17,905 acres. Corrections have been made in the survey figures of the Merriman reservation which changes the acreage from 417 to 530 and in the Cathedral and White Horse Ledges from 40 to 118

acres. Certain fractional rights in the Common Lands of Conway should be increased from 692 to 769 acres, the Fox reservation changed from 370 to 328 acres; the Mast Yard tract from 396 to 400 acres; the Glover tract of 7 acres in Pembroke coming to state through lack of will or heir and omitted from the last report, thus making the corrected acreage two years ago 18,141 acres. This amount added to the acquisitions during the last two years, 2,397 acres, gives 20,538 acres as the present total.

Table 10 gives the name, date of transfer, location, acreage, condition, purchase cost and cost per acre of each tract acquired during the past two years; while table 11 gives the name, location and acreage of all the state forests and reservations to date.

TABLE 10.

State Forests and Reservations Acquired in 1923 and 1924.

NAME	Date of Transfer	Location	Area	Condition of Tract	Purchase Cost	Purchase Cost Per Acre
Cardigan Mt. additions	Jan. 1923 April 1924	Alexandria	500	Mostly cut over with valuable growing spruce	$2,700	$5.40
Welton Falls	Jan.- July 1923	Alexandria	90	Part of growth reserved	500 and gift	5.55
Annett addition	Dec. 1923	Rindge	202	Young pine and hardwoods	1,000	4.99
Pawtuckaway	July 1923	Nottingham	60	Hardwoods and scattering pine. Most of growth reserved	600	10.00
Blair	May 1924	Campton	108	Cut over young pine.....	800	7.40
Red Stone	June 1924	Conway	43	Cut over young pine.....	250	5.81
Pillsbury addition	June 1924	Washington	690	Cut over young growth.....	576	.83
Pawtuckaway additions	March- June 1924	Nottingham	704	Part of growth reserved.....	2,800	3.98
			2397		$9,226	$3.86

TABLE 11.

State Forests and Reservations.

NO.	NAME	LOCATION	ACRES	NO.	NAME	LOCATION	ACRES	
1	Miller Park	Peterboro	3	Gift 27	Stoddard	Stoddard	71	
2	Cathedral & White Horse Ledge	Conway	118	28	Dodge Brook	Lempster	62	
3	Monadnock	Jaffrey	493	Gift 29	Black Mountain	Haverhill	343	
4	Haven	Jaffrey	95	Gift 30	Scribner-Fellows	Ashland	140	Gift
5	Harriman-Chandler	Warner	405	Gift 31	Contoocook	Hopkinton	30	
6	Crawford Notch	Hart's Location	5925	Gift 32	Nottingham	Nottingham	16	
7	Merriman	Bartlett	530	33	Ponemah	Amherst	63	
8	State Nursery	Boscawen	142	Gift 34	Craney Hill	Henniker	31	
9	Huckins	Ossipee	100	35	Taylor	Concord	7	Gift
10	Everett	Dunbarton	56	Gift 36	Pillsbury	Washington	2395	Gift
11	Walker	Concord	47		Pillsbury	Washington	690	
12	Davisville	Warner	32	Gift 37	Marshall	New Ipswich	20	Gift
13	Alton Bay	Alton	209	38	Conway Common Lands	Conway	300	Gift
14	Mast Yard	Hopkinton & Concord	400		Conway Common Lands	Conway	469	
15	Sentinel Mountain	Piermont	143	39	Beech	Keene	21	Gift
16	Livermore Falls	Campton	134	40	Fox	Hillsboro	328	Gift
17	Blue Job	Farmington	99	41	Annett	Sharon & Rindge	190	Gift
18	Mascoma	Canaan	174		Annett	Rindge	902	
19	Litchfield	Litchfield	122	42	Green Mountain	Effingham	15	
20	Salmon Falls	Rochester	20	43	Glover	Pembroke	7	Gift
21	Bear Brook	Allenstown	413	44	Welton Falls	Alexandria	3	Gift
22	Sugar Hill	Bristol	57		Welton Falls	Alexandria	87	
23	Kearsarge	Wilmot	839	Gift 45	Pawtuckaway	Nottingham	764	
24	Jeremy Hill	Pelham	63	46	Blair	Campton	108	
25	Cardigan Mountain	Orange & Alexandria	2350	47	Red Stone	Conway	43	
26	Honey Brook	Marlow & Acworth	464			Total	20538	

Description of Tracts Acquired in 1923 and 1924.

Cardigan Mountain Addition:

Early in 1923 the State purchased 170 acres on the easterly slopes of Mt. Cardigan in the town of Alexandria. Most of this area was cut over several years ago with the exception of about 10 acres of spruce whose small size did not appeal to the operators. The trail from Alexandria to the summit leads through this stand of spruce which is tall and dense. During July of the same year three one hundred acre lots were purchased to obtain some valuable spruce growth and areas suitable for planting. In April, 1924, about 30 acres of cut over land were bought to straighten out certain boundary lines. The above additions include much valuable young growth and form essentially a protection forest. The trail from Alexandria to the summit is now being kept in excellent condition by the Merrimack Chapter of the Appalachian Mountain Club. The total acreage of this reservation is now 2,350.

Welton Falls:

During the fall of 1922 the attention of the Department was called to an attractive waterfall known as Welton Falls under the slopes of the Cardigan Reservation. To protect and keep the falls and a part of the beautiful gorge the State purchased 20 acres of land with the help of Mr. Harold Murdock of Boston, Mass., brother of the present Forest Commissioner, and Mr. Chester S. Patten of Melrose, Mass., who furnished the funds. During July, 1923, about 70 acres of land were bought to further protect this attractive location. It is proposed to cut a trail from the road nearby past the waterfall and on to the reservation a few miles away.

Annett Addition:

Two lots in Rindge of 142 and 60 acres respectively were purchased later in 1923 by the department for addi-

tions to the Annett reservation. These lots were formerly owned by the Diamond Match Company and were cut by this company several years ago. Mr. Albert Annett who has been interested in the department for some time assisted in the transfer of these lots. Valuable areas of young pine growth besides much hardwood, are included.

Pawtuckaway Reservation:

During the year 1915 a forest fire lookout tower was erected by the State on South Pawtuckaway Mountain in Nottingham. This mountain was then part of the George W. Goodrich farm and together with the other two peaks was considered ideal for a state reservation. It was not until July, 1923, that the State made a beginning by purchasing about 60 acres on Middle Pawtuckaway. The widow of George W. Goodrich was willing to sell her interest in the old farm which had been held in the family for 125 years; but the wording of Mr. Goodrich's will was so difficult to interpret that it was decided she should petition the Court for the appointment of a trustee. Mr. Amos Rundlett, Clerk of Rockingham County Superior Court, was appointed trustee and could sell the farm to the state and represent her interests. In March, 1924, the Goodrich Farm of 100 acres on South Pawtuckaway and old buildings were transferred to the State. The trustee in June deeded to the state the Chase Farm of about 450 acres, including the famous Nottingham Boulders, which also belonged to Mrs. Goodrich. The growth on the Chase farm had been owned by Mr. Isaac Randall of Hampstead, N. H., since 1910. To protect the boulders and to secure for all time this attractive spot, Mr. Randall was asked to sell to the State the stumpage of pine, hemlock and tall hardwoods. Because of lack of funds within the Department, Miss Caroline A. Fox of Hillsboro and her sister Mrs. Alice F. Cochran of New Haven, Conn., generously made possible the purchase of the growth about the boulders. Later 154 acres on the Deerfield-Nottingham

town line, including the Devil's Den and other attractive scenic features, were purchased by the Department. The present area of the reservation is about 760 acres and is the only large tract owned by the State in Rockingham County. Mr. Joseph S. Matthews, Assistant Attorney General, greatly assisted in the transfer of these pieces of property. Many improvements are to be made such as the opening of new trails to the boulders and the placing of signs giving proper direction. This reservation has many possibilities and will be much visited by lovers of nature.

Professor J. W. Goldthwait, Geologist at Dartmouth College, makes the following statement after a recent visit to the Pawtuckaway reservation:

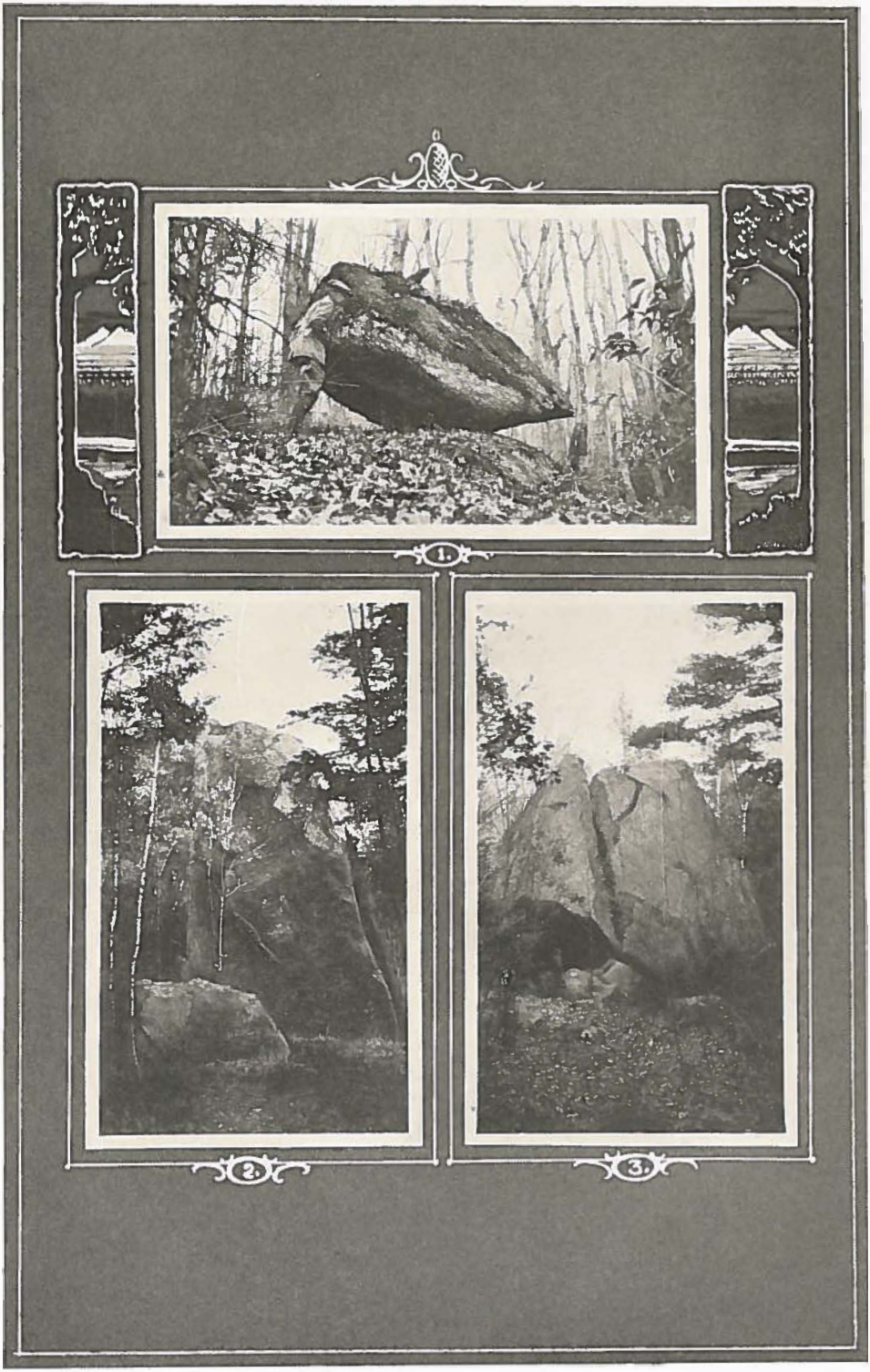
"Hidden away in the forest on Mount Pawtuckaway in Nottingham is probably the most remarkable group of boulders in all New England. Although known since 1878 when Charles Hitchcock, the State Geologist, visited them in company with Governor Prescott and Erastus Chase, then owner of the tract, they seemed to have been seldom visited or mentioned in later years. Midway between Exeter and Manchester and hardly 75 miles by automobile from Boston, they are almost as little known as the dilapidated farmhouses, old family burying grounds and deserted roads on the mountain. If the plans of the New Hampshire Forestry Department for the development of the Pawtuckaway reservation are carried out these giant boulders and the associated cliffs and caverns on North Pawtuckaway are sure to find a prominent place among the popular natural wonders of New Hampshire.

"Mount Pawtuckaway is a large mass of syenite which rises several hundred feet above the uplands of Rockingham County. From the watch tower on the southern of its three peaks almost 1,000 feet above sea level the forest fire watchman can look down over the whole of the southeastern corner of New Hampshire, from the hills of Gilmanton and Strafford to the border towns of Massachusetts and from the Merrimack at Concord to the Isles of Shoals.

Syenite is a course grained rock resembling granite but darker in color. On exposure to the weather the rock crumbles into a dark rusty sand. So fast has it degenerated since the close of the glacial period that all rock surfaces on the mountain have lost whatever grooves and scratches they once bore as marks of the passing of the ice sheet. That the great ice sheet once covered and scraped the top of Mount Pawtuckaway is nevertheless hardly to be doubted. On other hills around Mount Pawtuckaway glacial grooves are clearly indicated and fragments of the Pawtuckaway syenite are scattered south as far as Great Boar's Head in Hampton.

There is indeed no other adequate explanation for the presence of the huge boulders in the valley southeast of North Pawtuckaway. Each block is a piece of syenite as large as a house, appearing to have been carried from some common source to the present resting places. Following up the brook from one big boulder to the next one travels for a fourth of a mile or more through a splendid growth of tall hardwoods, pine and hemlock. One reaches at length a more closely packed line of broken blocks that heads against a high precipice of syenite at the eastern edge of North Pawtuckaway. Here are cliffs as straight and sheer as the front of a four-story office building, out of which masses 40 to 50 feet in thickness have been cracked off and caught in the slowly moving ice sheet just long enough to be carried partially out of position. Vertical clefts tempt one to slide down into dangerous depths or try to follow leads which cannot be carried through. The once popular name of Devil's Den is scarcely an exaggeration. This is the birthplace of the Pawtuckaway Boulders.

"The largest of the Boulders, Churchill Rock, is said to measure 60 by 40 by 40 feet and to contain about 75,000 cubic feet and to weigh probably 6,000 tons. According to tradition it was named about 1820 when a demented man named Churchill who had escaped from his keepers was found on top of this boulder having climbed up through a



Balance Rock, Pillsbury Reservation, Washington.
Pawtuckaway Boulders, Pawtuckaway State Forest, Nottingham.

narrow joint where no sane man would attempt to go. Of the other ten or more boulders of large size the so called Chase Rock, named for the former owner of the land, is about 40 by 40 by 30 feet and is perhaps the next most interesting. Since Churchill Rock was proclaimed by Hitchcock to be the largest glacial boulder on record, a larger one has been discovered between Madison and Conway known as the Madison Boulder. Whereas the Madison Boulder stands quite alone in second growth woodland, a dozen or more big boulders on Pawtuckaway make a weird group of gray giants under the canopy of a full grown forest."

Blair Lot:

Just north of the Livermore Falls reservation in Campton and adjacent to the Charles H. Pattee tract is located a lot of 108 acres containing young pine growth. This tract was purchased during the spring of 1924 because of its location and value. Formerly owned by the Publishers Paper Company, and operated by them many years ago, this area after some artificial planting will add to the list of valuable pieces of state property.

Red Stone:

In June 1924 the state bought 43 acres of cut over land on the main highway just south of the village of North Conway. This lot although long and narrow contains valuable young growth at its eastern end. A public camp ground is planned along the highway.

Pillsbury Additions:

Hon. Albert E. Pillsbury of Boston, Mass., gave to the State in 1920 about 2,400 acres of land in the towns of Washington and Goshen. At that time the Shepard & Morse Lumber Company were operating adjacent and just south of this reservation. This company has recently finished the logging on these lands and about 700 acres were

sold to the State during June 1924. These lands border the old Croydon turnpike which extends from Washington through Goshen to Newport. Many of these lots are badly stripped and indicate great carelessness in logging. Other areas contain soft wood growth of all ages and represent much potential value. Many camps and the usual debris from lumbering were left as relics of the past. The total area is now over 3,000 acres.

Improvement Work and Planting on State Tracts During 1923 and 1924.

As during previous years improvement work on state lands has consisted of cutting cordwood, thinning pine stands where the work would either show a profit or pay at least the expenses where the cutting was of particular benefit to the tract. On the Haven reservation in Jaffrey a thinning of white pine and the removal of some large inferior pines which were interfering with desirable reproduction has been started on a portion of the tract. About 15 cords were cut and marketed at a profit of about $8.00 per cord. This profit paid for thinning some areas of small pine and hardwood growth. The work will be continued another winter.

On the Kearsarge reservation about 115 cords of wood were removed which after paying a labor charge of $3.25 per cord and 40 cents for overhead, sold at $6.86 netting a profit of $3.21 per cord as the stumpage price. About 3 acres cut over for hardwood were planted to spruce. On the Fox reservation in Hillsboro 70 cords of inferior hardwoods and dead pine were removed for the purpose of improving the general stand and at $4.50 per cord the sale price just paid for the expenses of operation.

The Walker tract in Concord suffered a loss from fire in the spring of 1924. Of the 6 acres burned over about 2¼ acres had been planted to pine some years ago. About 3 acres were covered with hardwoods 2 to 8 inches in diameter. This growth was badly injured by the fire and was

sold for $2.50 per cord on the stump netting a total profit of $125.00. The Boy Scouts of Concord later in the season planted 1,000 trees on the burned area for the practical experience derived and to show their interest in the improvement of this tract. The only expense to the state was supervision, trees being furnished from the state nursery. It is expected that the Boy Scouts will continue this planting and interest themselves otherwise in the further improvement of the Walker tract.

The principle work of improvement on state lands is in planting open and cut over areas. Following are the state reservations and the distribution of the 199,200 trees planted on them during the past two years: Conway Common Lands, 48,000; Fox reservation, 4,500; Honey Brook, 21,000; Huckins, 11,200; Mast Yard, 86,000; Scribner-Fellows, 8,000; E. H. Carroll reforestation, 3,500; George Ames reforestation, 8,500; and Jasper T. Palmer reforestation, 8,500.

Town Forests in Europe.

The American people have not yet awakened to the enormous possibilities of the town owned forest as a means of securing future revenue for the town and as one of the important measures helping to provide for our future timber needs. American foresters have failed as yet to impress their fellow citizens with the knowledge of the European community forests and the benefits derived from them. Our information regarding the town owned forests of Europe is not by any means complete as we must depend upon English translations from European forestry journals or upon observations of American foresters who have examined these forests abroad. Nevertheless there is much interesting and vitally important knowledge available which should be passed on to the American public.

The principle of the European town forest is generally applicable to American forest conditions particularly in the north eastern states where there are reasonably good mar-

kets available. Granting that it is proper to establish and maintain national and state ownership of forests, there are even greater arguments in favor of towns doing likewise. As an educational measure the town forest creates local interest in forestry and pride in local ownership which are not so true in the case of state or national forests. The financial return to the towns in the next generation is capable of being a very real and substantial help to relieve the burden of local taxes. The recreational value is important but less so than in Europe where private forests for the most part are closed to the public. The opportunity of furnishing labor to local people during periods when there is little else to do should not be overlooked as an asset in favor of a town owned forest.

The biennial reports of the Forestry Commission have from time to time briefly outlined and commented on town forests abroad and at home. It is the purpose here to give a brief clear statement of facts in somewhat more detail with the desire in mind of awakening greater interest in town forests to the end that they may be established throughout New Hampshire.

The town forest is perhaps best known in Switzerland, Germany, Sweden and France although by no means confined to these countries. In Switzerland at least two-thirds of all the forests are owned by the communities; in Germany 20 per cent are town owned; Sweden only 4 per cent; France 22 per cent; Czecho Slovakia 29 per cent and Bulgaria 50 per cent. While Sweden has 25 per cent of its forest area in state owned forests and Germany has 35 per cent state owned most of the European countries have very much more forests in town or community ownership than in state and federal ownership combined. Most Americans who know something of the town forest idea do not appreciate this fact. Not a few towns in Switzerland and the other countries escape all local taxes due to the fact that revenue derived from these forests is sufficient for the entire support of the towns. These town forests are under

some state supervision but with the revenue going to the towns. In France 5 per cent of the revenue goes to the state to support its forestry organization. Local foresters are usually appointed by the state forester although in some states the appointment is handled by the local authorities. One forester may supervise several town forests much the same as a school superintendent may have charge of the schools in several towns. These forests are invariably under the best forest management possible. They are divided into blocks or compartments and sales of timber are constantly going on in one compartment or another. As a rule no saw mills operate directly in the forest. All trees for sale are marked by the forester and are sold to the highest bidder. In France the sale is conducted by the forester stating a price and if there is no bidder the price is lowered and perhaps again lowered until acceptable to one of the bidders present. In Germany bidders raise the price as the ordinary American auction sale is conducted. The universal rule in all timber auctions is for the seller to reserve the right to reject any or all bids.

The average net profit from European town owned forests is given as $5.00 per acre per annum but this is little more than New England white pine is capable of returning to the owner at the present time, taxes included, if the pine has seeded naturally without cost of planting and the owner is able to wait at least 40 years for his stand to be marketable.

It is recognized that there can be no forestry without roads and every compartment of a forest is made as accessible as possible by good roads. These roads make fire lanes and permit of frequent thinnings and timber cutting on large or small areas. More important still they make it unnecessary and undesirable to clear cut on any considerable area. If all the trees on a 10,000 acre forest for example were cut at one stroke, the road system and the investment which it represent would become useless for decades and therefore worthless and a loss.

In Switzerland most of the towns own forest land which is held largely as an investment but partly to maintain a forest cover on the water sheds and for recreation purposes. Many of the Swiss communal forests are among the oldest managed forests in Europe and derive an annual net return as high as $8 per acre which goes toward relieving local taxes. The most important of these forests is the Sihlwald, owned by the city of Zurich, containing about 4200 acres, much of which has been under forestry management for over 1000 years. This forest occupies two extensive upland areas ten or twelve miles from the city limits. It is divided into compartments which represent stands of different ages and character. Cutting is going on all the time. There are excellent roads making the forest of great recreational value as well as accessible for operating purposes. A gravity tram road carries logs and wood to a general mill yard. The city forester in this instance does most of the operating and the forest is mainly to supply the needs of the people and industries in Zurich. One man is employed to about each 33 acres and additional labor is used when necessary. A net revenue of from $20,000 to $30,000 a year is obtained. An interesting fact regarding this forest is that the city of Zurich is increasing the area little by little and has paid as high as $80 per acre for bare land. The municipal forests of Lausanne, Berne and other important cities as well as the large number of smaller town forests are almost equally as interesting as the Zurich forest.

In Germany there are no less than 1500 town and village owned forests all of which make for local prosperity and 500 of which not only pay the local expenses but return the surplus as a bonus to the citizens. These forests supply fuel wood free or nearly so to the inhabitants. The recreational value is high and the town forests are usually established game refugees and bird sanctuaries. Doctor C. A. Schenck, a German forester, for many years head of the American Biltmore Forest School, says that the German town owned forests not only returns good revenue to the

town but offers employment to many persons, establishes permanent wood using industries, supplies fuel wood to the local residents, lumber and other products for the market and gives the people a public recreation ground. These forests are a stable institution and a part of the very life of the German people especially in small communities.

Manufacturers are almost never owners of standing timber or forest land but they buy at auction from the town forests. Many examples showing the character of and returns from the German town forests could be given. One of the best known is the Forbach forest about which Mr. Harris A. Reynolds of the Massachusetts Forestry Association makes the following statement. "Forbach is a town of 1,900 people, situated in the Black Forest region in the state of Baden. It has a town forest of 1,482 acres, or about four-fifths of an acre per inhabitant. It is a clean, neat and industrious town, located on a small stream among the high hills. Everybody seems contented and happy. A large percent of the people work in the forest all the year, or farm their little patches in the summer and work in the forest in the winter. Others are employed in wood working industries. The profits of the town forests pay all the communal taxes. A section of the forest is set aside as a reserve, which is used to meet extraordinary expenditures. When a new school house, a town hall or street is to be built, they simply cut enough timber from the reserve section of the forest to meet the cost. This reserve forest takes the place of bonds or sinking funds used by municipalities in this country."

The city of Baden has a much larger forest of 10,000 acres. Heidleberg owns 7,000 acres with a very high yield per acre said to be four cords per acre yearly. The city forest of Frankfurt contains many beautiful stands of American white pine some of which are 60 years old and yielding 40,000 board feet per acre. Municipal forestry in Germany is highly developed in the Black Forest states and it is an interesting fact that all of these communities de-

pending very largely on their forests for a livelihood are happy and prosperous.

While Sweden has approximately 25 percent of all the forests in federal or state ownership and only 4 percent owned by local communities, it is interesting to note that some of the Swedish counties own 250,000 acres and the local forests are divided into 90,000 acres owned by the cities and 1,400,000 by the villages. Remarkable development and excellent management characterizes the Swedish town forests. The town of Orson for example has developed its forest largely by planting through the foresight of preceding generations. The people of this little town are tax free today and have free street car service, telephone, library, schools, etc., from their forest revenue. During the last 30 years this forest has returned over $5,000,000 which has in no way reduced its prospective yield in the future.

A volume might be written about the French community forests if the facts could be gathered together. There are 35,000 towns or communities in France, 11,000 of which own woodland to the total amount of 5,000,000 acres. The average size of the French communal forest is 450 acres. Alsace Lorraine the state which was returned to France at the close of the World War has 1100 communal forests probably the largest number in any single state in Europe.

Town Forests in New England.

In America with thousands of acres of waste and idle forest land in the outskirts of our larger as well as smaller towns for the most part on the market for less than $5 up to $10 per acre, our cities and towns have as yet overlooked the opportunity for forest ownership. Those who have made a study of European communal forests are convinced that town ownership of forests in America is advantageous and economically sound. Professor J. W. Toumey of Yale emphasizes three particular needs which may be supplied

by municipally owned forests. 1. Protection of municipal water supply systems through ownership and reforestation of areas adjacent to the water supply. 2. The development of city and town parks for recreational purposes, but through extensive reforestation. 3. The possibility of financial returns to local communities through the marked decrease in future timber supplies. Towns and cities should be persuaded into purchasing such forests and wealthy citizens encouraged to acquire suitable forest properties and turn them over to the towns as memorials to their home communities. The slight loss in revenue from taxes to the towns will be more than compensated for by future public returns. Here indeed is a rich field for the local development of forestry.

As a nation we emphasize national forest ownership. The public is interested in and approves of state forests but has scarcely begun to think in terms of town forests. Yet some ten of our states have laws enabling towns and cities to purchase or otherwise acquire and maintain forests. Substantial progress has really been made during the past few years in Massachusetts. Of the 355 towns in our neighboring commonwealth 36, or about one in every 10 towns, have acquired from five to 300 acres each with an average of 96 acres per town. These have been set aside under the town forest act for the purpose of growing timber and 29 of them have appropriated over $25,000 to begin planting and improvement work. During the present year more than 13 Massachusetts towns have voted to create forests and altogether raised $9000 for the purpose. They include Plymouth, Wareham, Barnstable, Dartmouth, Lancaster, Monson, Billerica, Merrimack, Pembroke, Scituate, Townsend and Upton. As a result of activities of the Massachusetts Forestry Association 107 other towns have appointed official committees to investigate the subject of town forests. It is said that there are 90 towns which own poor farms averaging 89 acres per town which should and probably will be turned into town forests.

The city of Fitchburg is given distinction in Massachusetts as being the first town to establish a municipal forest under the enabling act of the state. This forest was created in 1914 and contains 109 acres in four separate tracts, one-half of which is in natural pine growth and the other half is being planted.

The town of Walpole, Massachusetts, has 300 acres near the center of the town partly donated by public spirited citizens. In 1914 a plan of development was worked out and the town raised $500 for planting. In one year 40 acres was set out to pines. The first acre was planted by school children, each child contributing by setting out one tree on Arbor Day. The occasion was marked by public exercises in which 2000 people were in attendance. A monument has been erected to commemorate the event.

Petersham owned a poor farm containing 150 acres. Some 20 years ago the almshouse was closed and no one thought much about the farm until a proposal was made for the town to sell it. A committee investigated and found the greater part of the farm covered with growing white pine and yearly increasing about 75,000 board feet. The committee therefore recommended that the property be held as a town forest and this was done. The merchantable timber on 13 acres was sold at auction for $5200. The property is under management together with the Harvard College forest. Professor R. T. Fisher in charge predicts that the returns to the town of Petersham in the next 40 years will be at least ten times the amount already received from the sale of pine on 13 acres.

The city of Springfield has its famous Forest Park made up of different tracts, each bearing the name of the donor to be thus honored in perpetuity. This great park is under management as a forest reservation.

The Massachusetts Forestry Association has for ten years offered to plant free of charge 5000 trees for any town establishing a town forest of 100 acres or more. The New England Box Company has duplicated this offer to

towns in Franklin County. During the past year this plan has been carried out in Bernardston, Falmouth, Goshen, Groton, North Attleboro and Russell, and in addition these towns planted 45,000 trees themselves. Altogether 28 towns have planted 464,500 trees or 16,600 trees per town. These statements show most encouraging progress in the development of town forests in Massachusetts.

In Vermont 17 cities and towns out of over 300 in the state have established a total of 5441 acres in town forests, as follows:

Barre 390 acres, Bellows Falls 400, Chelsea 24, Chester 160, Essex Junction 700, Glover 2, Middlebury 170, Montpelier 800, Northfield 250, Proctor 112, Rutland 1800, Springfield 8, St. Johnsbury 120, Stowe 35, Thetford 75, Townshend 75 and Wilmington 320. On fourteen of these forests about 700,000 trees have been planted, Rutland, Montpelier, St. Johnsbury and Essex Junction having planted extensively on their water supply lands. The city of Rutland since 1916 has set out 380,500 trees and will plant 80,000 more next spring. Montpelier is second with 88,000 trees and will plant 100,000 next spring.

New Hampshire has made some progress and additional information is being secured as to the acreage of forest land now owned by various towns. Since the last biennial report it has been found that a number of additional towns own forest land so that the present total indicates that 21 towns in New Hampshire own 8443 acres besides some 220 acres adjoining public highways which have been donated by the Society for Protection of New Hampshire forests to various towns in which they are located. These various town areas are not by any means under forest management. Nor are they to any great extent looked upon as town forests as in Massachusetts. Much planting will be necessary and local interest and pride can be developed only as improvements become apparent and the people become more acquainted with them.

TABLE 12.

Town Forests in New Hampshire—1924.

Concord	400	acres	Newington	112	acres
Claremont	175	"	Northwood	400	"
Durham	80	"	Raymond	20	"
Franklin	155	"	Richmond	100	"
Gilsum	76	"	Rochester	200	"
Hanover & Dartmouth College	1275	"	Warner	800	"
Hollis	200	"	Weare	150	"
Jaffrey	500	"	Woodstock	40	"
Keene	1800	"		8443	"
Littleton	40	"	Gifts to Towns from Society	220	"
Manchester	1800	"			
Mason	20	"			
Milan	100	"		8663	"

The highway reservation committee of the Society for Protection of New Hampshire Forests was organized in 1922 and has been the means of acquiring in the name of the different towns the tree growth along roadsides in the following places:

Holderness, the growth along the College road from Center Harbor to Holderness.

Madison, growth along the Winter road leading from the main road from Madison to the Madison railway station.

Franconia, along the Gale River road from Franconia to Bethlehem.

Wolfeboro, along the road leading from Wolfeboro Village to the Tuftonboro line.

Sanbornton, growth along the Prescott road from the Chapel to the road from Hill to Gaza, also along the southerly side of said road from Hill to Gaza.

Effingham, along the Swamp road leading from Effingham Falls to the so-called Four Corners.

Keene, old growth pine and hardwoods including 13 acres of land on both sides of the famous Five Mile drive.

North Sutton, two acres near the center of the village bordering the main thoroughfare and Kezar Lake. In addition the village improvement society of North Sutton raised $4000 and purchased a tract of 48 acres of pine and

hemlock forest bordering Kezar Lake near the village. This will be known as Wadleigh Park.

Alton, a committee of the Board of Trade raised $4000 and purchased 8 acres of fine old pine overlooking Lake Winnepesaukee and on the state road between Alton Village and West Alton. This will be known as William Charlesworth Levy Park.

Marlow, the Chamber of Commerce of Keene has acquired title to 100 acres bordering Dartmouth College highway and containing two remarkable features known as the Pophole and the Bear's Den.

Tamworth, a strip containing 12 acres of old pine woodland 250 feet wide extending for over a quarter of a mile on both sides of the state highway just north of Chocorua Lake.

North Sutton, a group of 21 primeval pines and five acres of land on the north road to Warner, one mile from North Sutton Village. The last two reservations were acquired some years ago prior to the organization of the highway reservation committee.

It is worthy of mention that the American Legion in Concord has been instrumental in planting memorial trees along one mile on either side of the Daniel Webster highway south of Concord.

Several schools including the Quimby School and Coe's Academy have through their agricultural instruction been planting trees on areas belonging to the schools.

Following somewhat the course taken in Massachusetts the State Forester prior to the March town meeting of the present year requested the selectmen of the various towns to insert an article in the warrant to see if the towns would appoint committees to investigate the merits of the town forest proposition and report at the next March town meeting. It may be of interest to know that 35 towns have appointed committees consisting of the Boards of Selectmen or of other interested citizens, or both. In order to show along what lines these committees might best conduct their

investigation, the following letter was sent to each committee:

"To the Town Forest Committees:

I am pleased to learn that you have been selected by your town to look into the matter of town forests. I presume the committee is expected to report the results of its investigation at the annual town meeting next March. In the meantime it seems to me desirable to carry out the following plan in general:

(1). Determine what lands the town already owns, examine them for area and suitability as town forests, describe conditions and the needs for planting or other improvement work such as cord wood cutting, liberating pine from hardwoods, etc. Rough maps should be plotted to show the boundaries and forest types or divisions. All the information possible should be obtained as to the history of the tracts, titles, areas, location, condition and value, to be made a part of the report to the town.

(2). If the town owns no land, the next point to determine is what areas may be acquired by the town for forest purposes. Many individual owners have already given land to some of our towns for forestry purposes and doubtless there are persons associated with your town who would gladly do so now if they thought there was real and permanent interest in forest management. A town forest should be readily accessible although not necessarily near a village. It is important to create interest among persons in a position to benefit the town through gift or purchase of land. Such a gift might easily include some older growth which of course is very desirable.

(3). If no land is available except by purchase, examine various lots which would serve the purpose and get the prices on them. Such lots should be described with their conditions. An area of 100 acres would make a fair beginning and should cost no more than a few hundred dollars if in cut over condition. A lot cut over several years ago with slash partly decayed and sprout growth not far ad-

vanced is desirable. Look for pine reproduction for this adds greatly to the value without necessarily increasing the purchasing price. A lot entirely destitute of valuable reproduction with no seeding pines near will probably have to be planted and commands the very lowest price. Some cord wood areas are desirable for early returns to the town in fuel wood. All these points are important and should be kept in mind.

(4). Keep a complete set of notes on the situation as you work it up during the season. Some member of the Forestry Department will be available to meet with the committee and offer suggestions whenever it is most desirable to get together. This would probably be when your information is fairly complete and definite lots can be examined together.

(5). The final report should contain as much information as possible about town forests in Europe and our nearby states and their possibilities and purposes. Then a complete analysis of the local situation with carefully worked out details with recommendations for action at the next town meeting. I presume an article should be inserted in the warrant next spring to see what action the town will take on the report of the committee on town forests.

(6). It has been suggested that a public meeting be held in the town sometime during the fall or winter at which time there can be motion pictures and several addresses pertinent to town forests in order to develop as wide a public interest in the subject as possible.

I am mailing you under separate cover several circulars telling something of the town forests in Europe and the development in Massachusetts. There is also included our last biennial report and I suggest that you read the chapter on Public Forests, particularly the section on Town Forests on Page 78, and that you study a chapter on Management of Farm Woodlots on Page 128. This gives some idea of how our woodlands can be improved under management and the possible returns from them. There is also informa-

tion worth reading on forest management by private concerns.

There are some 16 or more towns and cities in New Hampshire which now own forest land under management or being reforested so that we have made a beginning in our state. I believe that most of our towns should be growing valuable forests on town owned land for future revenue and as an incentive and example to private effort. It will be a pleasure to keep in touch with you on this subject during the coming year."

It is too early to forecast the nature of these reports to be made at the next town meeting. The Forestry Department will try to work with these committees and it is hoped that steps will be taken to acquire land either by gift or purchase or to make use of lands now in possession of the towns. Undoubtedly there are school, church and poor farm lands in many New Hampshire towns which are all but forgotten by local residents. The first step is of course to procure land and the next to reforest and carry out a long time plan of management on them. Such work is indeed worth while and should enlist the support of all those citizens interested in the future welfare of their town.

The Newington Town Forest.

The Newington Forest is the oldest town owned forest in New Hampshire. The present area of 112 acres lies mostly on the main highway leading from Greenland to Dover Point and on both sides of a new road laid out in 1896. Within these boundaries are the church which the town has always owned, the library, town hall, a new school and the old parsonage. Within the past 50 years the town has voted to sell timber from the forest which has netted the treasury over $6,000. In spite of the heavy sales the forest is now covered with a good stand of young pine and clumps of merchantable timber still remain. The town forest can be divided into three units designated as the Church Lot, the Parsonage Lot and the Downing Lot.

NEWINGTON TOWN FOREST.

TYPICAL DEMONSTRATION OF BLISTER RUST AND FARM FORESTRY ON THE WOODLOT.

The Church Lot:

The town land known as the Church Lot lying west of the main highway contains about 42 acres including the old cemetery of five acres. This lot has always been common land and was never allotted by the proprietors. Situated within its boundaries are the old Congregational Church built in 1710 by citizens of the town who contributed labor, materials and cash, the town hall once a school and the Langdon Library built in 1892. Prior to Civil War days this lot was entirely open and was used for raising crops. A young growth of pine became established but was entirely burned in 1889 by a fierce fire which ran over part of this lot and threatened the Church and town house. The land is now well covered with another growth of thrifty pine about 30 years old. The old town cemetery is in the north east corner and has always been used as a burial place for citizens who were born and reared in this town.

The Parsonage Lot:

In 1689 the town of Dover which included Newington and Portsmouth granted to a Mr. Richard Pomery 20 acres on Pitch Pine Plains in the parish of Newington. Mr. Pomery built his home and lived there until his death. Later it was sold to Mr. John Knight and in 1745 to his son Nicholas Knight. At town meeting in March 1765 the voters decided to buy the farm for a parsonage and support of the minister of the gospel. The town at that time already owned about 20 acres adjacent which was likewise common land. The Knight lot was evidently covered with a fine growth of pine as the next year the town voted "that the person or persons which cut the fine young growth of pines shall be entirely cleared and no stir made about it," being supposed that the pines cut were on the fence belonging to the new parsonage. During the next century the different boards of selectmen managed this woodlot, giving fuel to the town poor and allowing citizens to cut their

winter supply of wood. At town meeting in 1870 it was voted to cut and sell the growth on the land which the town purchased from Nicholas Knight in 1765 but the Congregational Association of Newington organized in 1862 protested as they claimed the church owned the land and growth. The Association secured an injunction against the town to prevent any cutting of timber on this lot. Later the case was taken to court and heard in Exeter and was decided in favor of the town as it had held the rights of ownership by long possession. The town decided not to sell any of this timber until 1892 when the sum of $1,400 was realized. This fund helped build the new library with additional contributions by the Hon. Woodbury Langdon. In 1912 the town decided to install a water system in the town buildings and a drinking fountain at the square. More timber was cut and sold, the proceeds used to pay these bills and $700 was turned over to the general treasury. Again in 1919 two small areas of growth located on each side of the new road were sold which netted the town several hundred dollars which was kept in the treasury until the new school house was built in 1920. This is a fine modern building and the pride of the town. The old parish is still standing near the old highway and is now the town historical building.

For a long term of years it was customary for the Representative Elect to the legislature to give a supper to the townspeople. Representative Frink in 1915 wished to help the town in a more substantial manner and at the suggestion of the Chairman of the Selectmen, Mr. Clarence DeRochmont, it was decided to plant the area cut in 1912. Mr. Frink bought 8,000 trees and the town did the planting. In this novel way the town land is being kept in good growing condition. The remainder of the lot is covered with young stands of pine mixed with hardwoods.

The Downing Lot:

There seems to be some doubt as to the manner the town acquired the 30 acres lying north of the new road. The records appear to indicate that it was common land and was part of the 20 acre lot to the south of the road. Some of the inhabitants long understood that Captain John Downing gave this tract of land to the church before he died about 1765. The church and the town being one, this lot was managed by the different Boards of Selectmen and came into the town's possession in this manner. Nevertheless the town has held and managed this tract of woodland since Revolutionary days. No records of cuttings on this lot are noted until 1874 when the town voted to sell at auction 12 two acre lots north of a certain stone wall. The highest bidders hired a portable mill, the first ever in Newington, to do the sawing. The average sale of these lots was about $200. This fund was used to pay off the Civil War debt. In 1919 the growth on the balance of 6 acres of the lot was sold to Brown and Cole of Salem, N. H. In 1922 about 200 cords of wood on the stump were sold for $2.50 per cord which netted the town $500 and greatly improved the general conditions of the stand. At the present time the cut-over lands are coming back to pine with a few blocks of mature pine and hardwoods. There are opportunities here for reforestation which should be carried out before many years. The present value of 112 acres is about $5,800. The only tract of land that has been sold by the town was the 5 acre piece in 1919 to the church for a new parsonage. The growth on this lot was cut and sold to help pay some of the church debts.

FINANCIAL STATEMENT.
July 1, 1922 to June 30, 1923.

	Appropriation.	Expenditures.
Salary of Forester	$3,000.00	$3,000.00
Field Assistance	2,200.00	2,199.97
Clerical Expense	4,000.00	4,000.00
Traveling Expense	1,500.00	1,489.14
Incidentals	1,800.00	1,789.96
Printing Blanks	1,200.00	981.22
Printing Report	800.00	800.00
District Chiefs	7,500.00	7,498.62
Lookout Stations	9,900.00	9,899.48
Conferences	1,200.00	1,200.00
Prevention	3,000.00	2,999.52
Nursery	5,500.00	5,498.81
Care and Acquisition of State Lands	5,000.00	4,965.46
Forest Fire Bills to Towns	7,500.00	4,303.29
Reforestation	3,000.00	2,996.22
White Pine Blister Rust	12,000.00	11,997.62
	$69,100.00	$65,619.31

July 1, 1923 to June 30, 1924.

	Appropriation.	Expenditures.
Salary of Forester	$3,000.00	$3,000.00
Field Assistance	2,200.00	2,200.00
Clerical Expense	4,000.00	3,927.83
Traveling Expense	1,500.00	1,498.56
Incidentals	1,800.00	1,799.53
Printing Blanks	1,200.00	1,195.98
District Chiefs	7,500.00	7,497.06
Lookout Stations	9,900.00	9,899.83
Conferences	1,200.00	1,007.12
Prevention	3,000.00	2,999.83
Nursery	5,500.00	5,500.00
Nursery Water System	3,000.00	
Nursery Water System Emergency Fund	1,000.00	3,999.67
Care and Acquisition of State Lands	5,000.00	5,000.00
Forest Fire Bills to Towns	7,500.00	7,497.64
Reforestation	3,000.00	2,998.99
White Pine Blister Rust	15,000.00	14,999.99
	$75,300.00	$75,022.03

FOREST RESOURCES OF NEW HAMPSHIRE

The following report on the Forest Resources of New Hampshire has been made in collaboration with the State Forester, John H. Foster, and is the substance of a report made to the New Hampshire Survey Committee under the chairmanship of President Hetzel of the University of New Hampshire.

This report is based upon species, volume and area estimates made of each of the 244 towns in New Hampshire gathered by the State Forestry Department, the work being conducted over a period of four years. Valuations and growth have been checked up from many sources, and the estimates here given are thought to be conservative. Conclusions arrived at are believed to be reasonably accurate and sufficient to denote the trend of conditions affecting the forest resources of New Hampshire and offer a fair basis for the formation of policy. Included is much original work contributed by Warren F. Hale, Assistant State Forester; L. E. Newman, in charge of Pine Blister Rust work; Walter H. Tripp, District Fire Chief; Miss Barbara Bean, Statistician; Prof. W. C. O'Kane, Entomologist of the University of New Hampshire; officials of the Railroads and others whose assistance is gratefully acknowledged.

W. R. BROWN, *Chairman,*
State Forestry Commission.

The Forest Resources of New Hampshire will be discussed under the general headings of Areas, Amounts, Consumption, Valuations, Hazards and Reforestation.

Area of New Hampshire.

The area of New Hampshire is not accurately known as the geological survey of the whole state has not been completed and there is survey work still to be done on the boundary, particularly that on the east side between Maine and New Hampshire. For this reason a bill should be passed making cooperation with Maine and the United States Geological Survey possible to locate accurately the eastern boundary. It has also been found that no accurate permanent records are in existence, those now kept being on tracing cloth which is subject to shrinkage, or on plaster casts which are subject to breakage and decomposition. A bill should be passed when accurate measurements have been taken for the construction of a bronze plate map.

However, for the purpose of this report the total area has been found to be about 5,646,051 land acres, exclusive of about 196,030 additional acres of water areas. This has been divided as shown in Table I.

Table I.

NEW HAMPSHIRE AREAS.

	Total Land Acres	Area of Merchantable Timber	Area of Young Growth	Area of Light Producing Lands	Area of Agricultural Lands	Area of Barren Lands, R. R., Highways, Towns, Rock, Swamps, Burns
Belknap	254,680	14,464	52,100	114,734	62,662	10,720
Carroll	588,322	145,191	175,403	174,241	74,484	19,003
Cheshire	447,013	52,705	126,431	158,606	92,265	17,006
Coos	1,150,889	404,284	479,385	162,603	85,478	19,139
Grafton	1,079,164	243,760	264,798	332,368	205,505	32,733
Hillsboro	552,385	36,642	178,167	186,915	117,679	32,982
Merrimack	577,858	51,638	172,986	216,337	116,869	20,028
Rockingham	426,522	21,680	101,971	152,951	120,308	29,612
Strafford	242,308	10,911	46,488	103,576	69,056	12,277
Sullivan	326,910	31,478	100,736	121,244	64,279	9,173
Total	5,646,051	1,012,753	1,698,465	1,723,575	1,008,585	202,673

A—*The Area of Merchantable Timber Land.* This area is land carrying *virgin* stand and *second* cuttings, all species for both, meaning area which carries enough timber the cutting of which would reasonably be conceived to be profitable. This area is found to be 1,012,753 acres, or 18% of the whole.

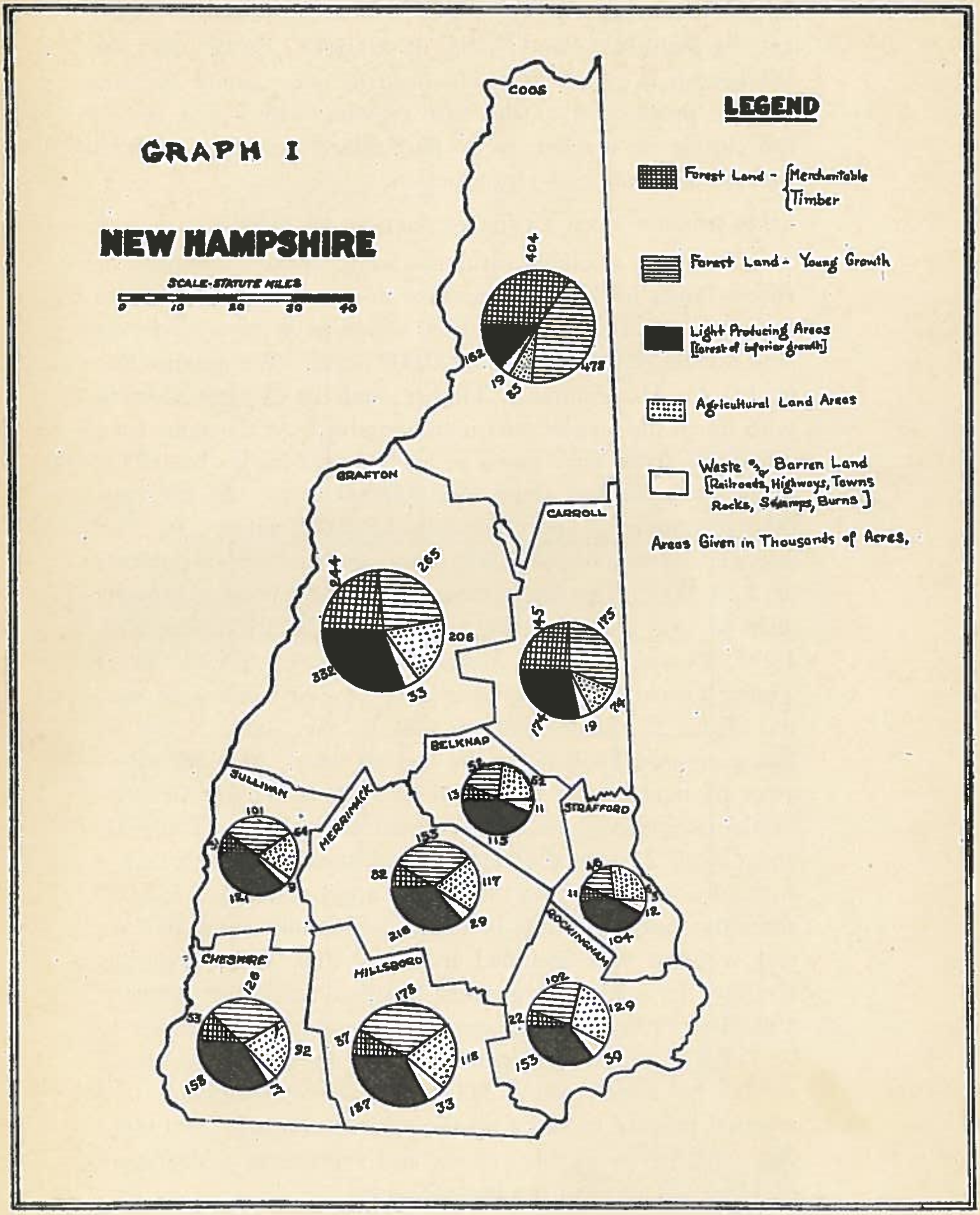
B—*The Area of Young Growth Land.* This area is land not in itself merchantable at present but is coming up to species which will be presumably in time merchantable if protected and allowed to grow. This area is found to be 1,698,465 acres, or 30% of the whole.

C—*The Area of Light Producing Timber Land.* This area is land suitable to produce forests, which has sufficient soil if properly planted to produce merchantable timber, but at present is either waste or covered with a growth so slight or of a cordwood character as to be of little future value. This is found to be 1,723,575 acres, or 30% of the whole.

D—*The Area of Agricultural Land.* This area includes land suitable for farms and pastures, although all of it has not been cultivated and some of it includes land which is in or reverting to forest growth but is conceivably more useful for firewood and the support of the farm than for forestry purposes. This area is found to be 1,088,585 acres, or 18% of the whole.

E—*The Area of Barren Land.* This is all land areas not useful for either forest or agriculture and includes areas of rock, swamp, carriage roads, railroads, town sites, etc. This is found to be 202,673 acres, or 4% of the whole.

From Graph 1, the percentage of lands A, B, C, D, and E, by counties in New Hampshire; it will be seen that the northern counties of Coos, Grafton and Carroll contain a much larger percentage of A—Merchantable Timber Land, and B—Young Growth Land. The southern half of the State, the counties of Hillsboro, Belknap, Strafford, Sullivan, Cheshire, Merrimack and Rockingham, carry a


GRAPH I
NEW HAMPSHIRE
SCALE-STATUTE MILES
0
10
20
30
40
LEGEND
Forest Land - {Merchantable Timber
Forest Land - Young Growth
Light Producing Areas [forest of inferior growth]
Agricultural Land Areas
Waste or Barren Land [Railroads, Highways, Towns Rocks, Swamps, Burns]
Areas Given in Thousands of Acres.
COOS
404
478
162
19
85
GRAFTON
244
265
206
332
33
CARROLL
145
175
174
19
74
BELKNAP
52
13
11
115
SULLIVAN
101
9
MERRIMACK
153
82
117
216
29
STRAFFORD
11
12
104
ROCKINGHAM
102
129
22
153
59
CHESHIRE
126
33
92
158
17
HILLSBORO
178
37
118
187
33

larger percentage of C—Light Producing Timber Land; D—Agricultural Land; and E—Barren Land. As the southern half of the State also has the best climate and soil for the production of the fast growing white pine and is the closest to market, it is particularly suited for both natural and artificial reproduction.

REVERSION OF FARM LANDS TO FORESTS IN NEW HAMPSHIRE

The best available estimates as to former amounts of forest lands in New Hampshire are fragmentary, but an estimate has been found in 1860 which gave the total forest land at that date at about 3,000,000 acres. We assume this to be A—Merchantable Timber and B—Young Growth with much the largest part merchantable. At the same time 2,367,034 acres were given as agricultural land. In 1871 a forest estimate was given of 3,000,000 acres. In 1885 another estimate of approximately 2,800,000 acres. In 1900 another estimate of 3,328,000 acres, and in 1905 an estimate of 3,200,000. The latest estimate of the Forestry Department of true forest bearing land gives 2,711,218 acres, with 1,012,753 acres of this Merchantable and 1,698,465 acres Young Growth. It may therefore be fairly assumed that the actual Forest Producing Area of the State, A and B, has decreased by 10% in the last 60 years, with the character of it changing from Old Growth to Young Growth. Statistics gathered on the reverted farm lands, Table II, and Graph 2, over the same period show in 1860 of D—Agricultural Lands that there were approximately 2,367,034 acres of improved lands in farms. Probably much pasture and woodlot was included in this. This farm area has steadily declined, the greatest decline occurring between 1880 and 1900 until the census shows the present areas to be 702,902 acres of improved lands in farms, to which should be added some 292,683 acres of cordwood and wooded pasture to make up the agricultural area of 1,008,585 acres given in this report, and represents a shrinkage of 1,664,132 acres in the last 60 years.

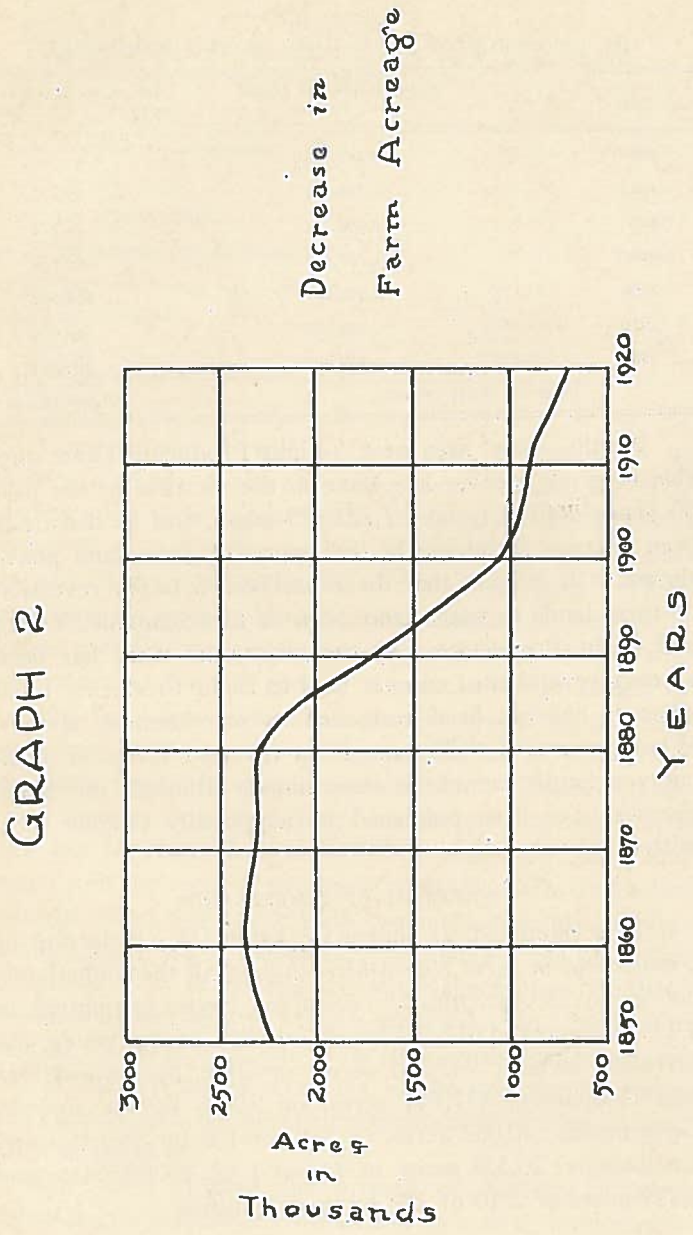

GRAPH 2
Decrease in
Farm Acreage
3000
2500
2000
1500
1000
500
Acres
in
Thousands
1850
1860
1870
1880
1890
1900
1910
1920
YEARS

TABLE II.
THE REVERSION OF FARM LAND IN NEW HAMPSHIRE.

Year	Acres Improved Land in Farms	Decrease in Acres Improved Farm Land
1860	2,367,034	
1870	2,334,487	32,547
1880	2,308,112	26,375
1890	1,727,387	580,725
1900	1,076,879	650,508
1910	929,185	147,694
1920	702,902	226,283
Total in Sixty Years		1,664,132

As the actual area of C—Light Producing Land suitable to grow forests, has been on the increase in the past 60 years until it is now 1,723,575 acres, and as there has been a large shrinkage in the improved farm land above shown, it is evident that there has been a heavy reversion of farm lands to timberland, both in Merchantable, Young and Light Productive. At the same time there has been a heavy reversion of cutover land to Light Producing Land when it has not been restocked to merchantable species. What percent of "C" came from reverted farms or from cutover lands cannot be determined, although unreliable guesses have been published by supposedly reliable committees.

OWNERSHIP OF TIMBERLANDS

It is estimated, as shown by Table III, *Ownership of Timberland in New Hampshire*, that of all the timberlands not given as Agricultural or Barren lands, amounting to 4,434,793 acres, 3,012,144 acres, or 68% of the whole, are privately owned; 945,576 acres, or 21% by corporations and companies; 417,744 acres, or 9½% by the Federal Government; 30,032 acres, or 7/10 of 1% by Societies and Institutions; 20,538 acres, or 1/2 of 1 %, by the State and 8,759 acres or 2/10 of 1% by municipalities.

TABLE III.
OWNERSHIP OF TIMBERLANDS IN NEW HAMPSHIRE.

	Acres	Per cent
Owned by Federal Government	417,744	9.42*
Owned by the State	20,538	.46†
Owned by Municipalities	8,759	.20†
Owned by Societies and Institutions	30,032	.68†
Owned by Corporations and Companies	945,576	21.32*
Owned by Individuals	3,012,144	67.92*
TOTAL	4,434,793	100.

* Plus.
† Minus.

Consequently it will be seen that the adoption of modern methods of forest management depend for their success upon their appeal to the small private owners who own 68% of the timber land largely situated in the Southern part of the State and much of it reverted farms. These small private owners have far less ultimate advantage in future growth than public or corporation or society who are concerned for the general interest, or bond issues, or backing for large investments in mill property, and they have done little forestry cutting or planting as yet. They have little capital to waste in speculation. They will question a forestry investment that does not show present worth than can be realized upon within a reasonable time, and weigh well the risks of fire, pests, drought, taxes and other hazards. They ask how growth compares with interest elsewhere. They ask if insurance is available while they wait for growth. It is difficult to assure them upon all these questions as yet, due to certain unsolved risks, due to the want of complete data, due to the still considerable areas of already mature timber available in the neighboring states and Canada and the severe competition of timber mining which is going on.

For these reasons the growth of forestry practice among the 68 percent of owners will be a slow development

paralleling closely the law of supply and demand reflected in the price of stumpage. The first move is now being made through education to bring out a better forestry treatment of present stands by cutting methods. This will be followed by an era of partial replacements with planted seedlings on light areas in spotty natural reproduction, followed ultimately by artificial planting over complete areas only at favorable places and under ideal conditions.

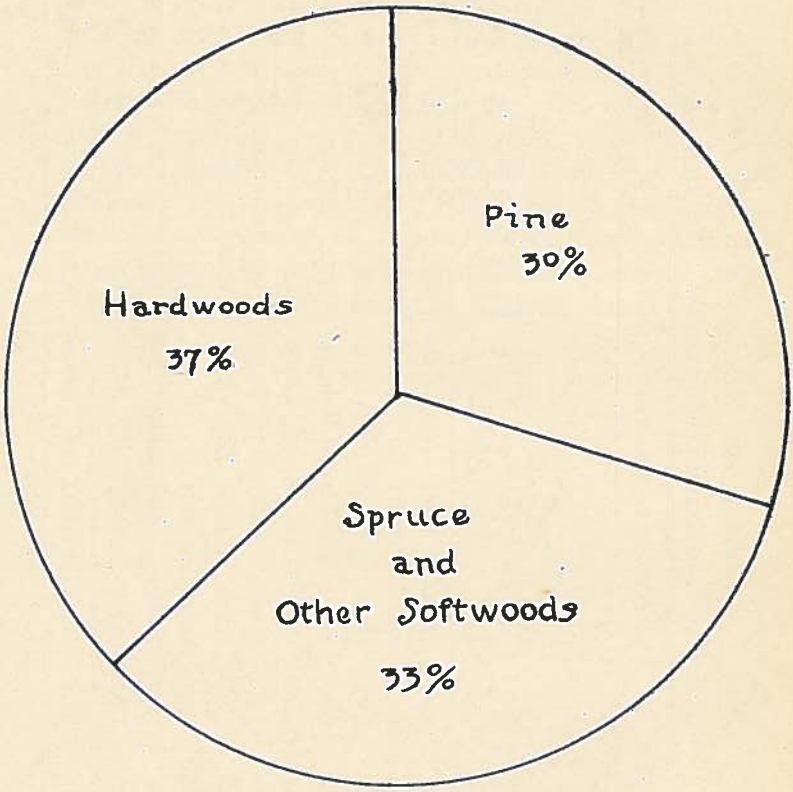
In Tables IV, V, VI, and Graphs 3 and 4, *Areas and Amounts of Merchantable Timber and Young Growth,* estimates are given of the stand of White Pine, Spruce and other Softwoods, and Hardwoods, also in a separate table, VII, the amount of Cordwood on Areas A, B and C.

TABLE IV.

AMOUNTS OF MERCHANTABLE TIMBER.

COUNTIES	PINE				SPRUCE AND OTHER SOFTWOODS				HARDWOODS			
	Total Amount M. Bd. Ft.	Per Cent Area	Acreage if Brought Together	Volume per Acre if Brought Together	Total Amount M. Bd. Ft.	Per Cent Area	Acreage if Brought Together	Volume per Acre if Brought Together	Total Amount M. Bd. Ft.	Per Cent Area	Acreage if Brought Together	Volume Per Acre if Brought Together
Belknap	144,539	50	7,241	19,961	16,804	14	1,973	8,517	44,725	36	5,250	8,519
Carroll	364,599	30	44,061	8,275	171,254	33	46,645	3,671	200,034	37	54,485	3,671
Cheshire	302,080	42	22,223	12,593	79,660	25	12,942	6,155	107,964	33	17,540	6,155
Coos	15,650	4	1,699	9,211	1,168,960	41	179,203	6,523	1,457,146	55	223,382	6,525
Grafton	354,300	11	26,212	13,517	760,648	51	123,947	6,136	574,411	38	93,601	6,137
Hillsboro	235,741	53	19,643	12,001	23,279	13	4,501	5,172	64,631	34	12,498	5,171
Merrimack	337,007	41	21,483	15,687	76,369	22	11,331	6,739	126,868	37	18,824	6,740
Rockingham	218,638	72	15,591	14,024	6,432	5	1,106	5,815	28,968	23	4,983	5,813
Strafford	103,035	69	7,579	13,595	5,070	8	840	6,036	17,208	23	2,492	6,905
Sullivan	115,314	22	7,081	16,285	105,216	42	12,940	8,131	93,152	36	11,457	8,131
TOTAL	2,190,903	17	172,813	13,514	2,413,692	39	395,428	6,289	2,715,107	44	444,512	6,108

GRAPH 3



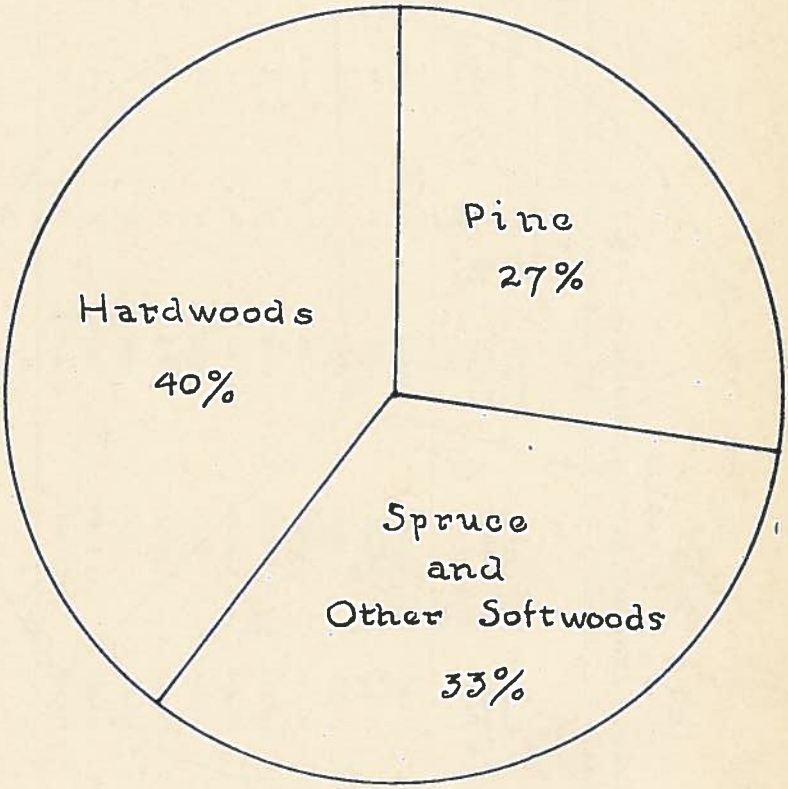
Circle represents Total Volume of all Species 7,319,702 M bd. ft. and shows percentage of each.

TABLE V.

AVERAGE STANDS MERCHANTABLE TIMBER, ALL SPECIES.

COUNTIES	Total Amount M. Bd. Ft.	Acreage	Average Stand Per Acre Bd. Ft.	PER CENT OF SPECIES		
				Per Cent Pine	Per Cent of Spruce and Other Softwoods	Per Cent Hard-woods
Belknap	206,068	14,464	14,070	70	8	22
Carroll	735,887	145,191	5,068	49	24	27
Cheshire	489,704	52,705	9,291	62	16	22
Coos	2,641,756	404,284	6,534	.6	44.2	55.2
Grafton	1,689,359	243,760	6,930	21	45	34
Hillsboro	323,651	36,642	8,833	73	6	21
Merrimack	540,244	51,638	9,765	62	14	24
Rockingham	254,038	21,680	11,718	86	3	11
Strafford	125,313	10,911	11,485	82	4	14
Sullivan	313,682	31,478	9,965	37	34	29
TOTAL	7,319,702	1,012,753	7,227	30	33	37

GRAPH 4



Circle showing percentage of different types of Young Growth Areas.

TABLE VI.

AREAS AND AMOUNTS OF YOUNG GROWTH.

COUNTIES	Total Acreage Young Growth	Per Cent of Pine	Area of Pine	Amount of Pine at 3 M. Per Acre	Per Cent of Spruce and Other Softwoods	Area of Spruce and Other Softwoods	Amount of Spruce and Other Softwoods At 2 M. Per Acre	Per Cent of Hardwood	Area of Hardwood	Amount of Hardwood at ½ M. Per Acre
Belknap	52,100	50	25,946	77,838	14	7,398	14,796	36	18,756	9,378
Carroll	175,403	31	53,849	161,547	32	56,655	113,310	37	64,899	32,449
Cheshire	126,431	42	53,354	160,062	25	31,355	62,710	33	41,722	20,861
Coos	479,385	.3	1,438	4,314	45	214,285	428,570	55	263,662	131,831
Grafton	264,798	11	28,598	85,794	51	135,577	271,154	38	100,623	50,312
Hillsboro	178,167	53	94,785	284,355	13	22,805	45,610	34	60,577	30,289
Merrimack	172,986	41	71,616	214,848	22	37,365	74,730	37	64,005	32,003
Rockingham	101,971	72	73,623	220,869	5	4.895	9,790	23	23,453	11,726
Strafford	46,488	69	32,168	96,504	8	3,628	7,256	23	10,692	5,346
Sullivan	100,736	23	23,270	69,810	41	41,201	82,402	36	36,265	18,132
TOTAL	1,698,465	27	458,647	1,375,941	33	555,164	1,110,328	40	684,654	342,327

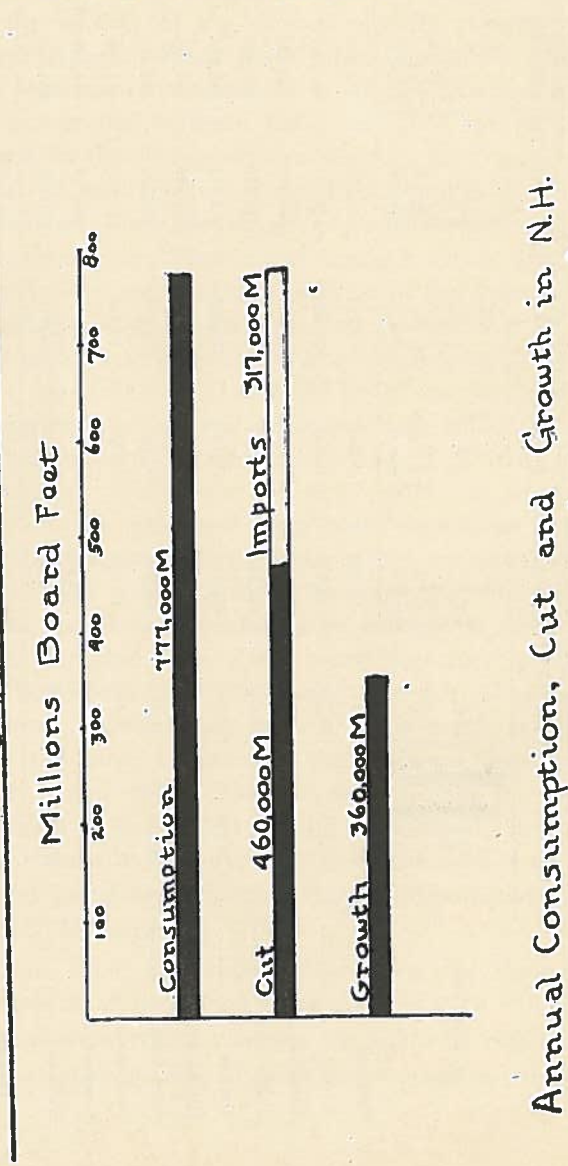
While much of the land estimated carries all the species, the approximate area that would be covered by each species if brought together in a fair stand per acre has been given, in order to assist further computations and show the percent of the various counties covered by the different stands. From these tables it will be seen that white pine grows abundantly in all the counties of the State except the northern Coos, and that spruce and fir dominate in the three northern counties of Coos, Grafton and Carroll, and the two Connecticut counties of Cheshire and Sullivan; that hardwoods cover all counties equally; that there is a small amount of hemlock evenly distributed except in Coos and Grafton; and that of merchantable timber available to be cut there is close to 2,190,903 M board feet of pine; close to 2,413,692 M board feet of Other Softwoods; and close to 2,715,107 M board feet of Merchantable Hardwoods. It will be asked how amounts can be estimated in board feet on areas coming up to young growth from existing small trees too small to be cut and scaled. This is only by inference using board feet as an index of potential value as soon to develop into an actual cutable cordage. The young growth therefore for the sake of valuating has been estimated at an amount of 3,000 board feet per acre for Pine, 2,000 board feet for Spruce and Other Softwoods, and 500 board feet for Merchantable Hardwood. Such young growth areas occur in approximately the same counties as the areas of merchantable timber. Young White Pine potential cordage is estimated at 1,375,941 M board feet; young Spruce and Other Softwoods potential cordage is estimated at 1,110,328 M board feet; and young Merchantable Hardwood potential cordage at 342,327 M board feet.

From Table VII, showing the *Area and Amounts of Cordwood* on all producing areas in the State it will be seen that the three northern counties are relatively rich in cordwood, having over 50% of the whole amount for the State,

TABLE VII.
AREAS AND AMOUNTS OF CORDWOOD ON—A. MERCHANTABLE, B. YOUNG GROWTH, and C. LIGHT PRODUCING AREAS.

COUNTIES	CORDWOOD ON MERCHANTABLE AREAS			CORDWOOD ON YOUNG GROWTH AREAS				
	Pine Areas at 5 cds. per Acre	Other Softwood Areas at 3 cds. per Acre	Hardwood Areas at 10 cds. per Acre	Pine Areas at 3 cds. per Acre	Other Softwood Areas at 2 cds. per Acre	Hardwood Areas at 5 cds. per Acre	Cordwood on Light Producing Areas at 4 cds. per Acre	Total Amount of Cordwood
Belknap	32,192	7,122	52,500	69,814	17,714	93,780	458,936	732,058
Carroll	189,133	149,287	544,850	140,323	121,028	324,495	696,964	2,166,078
Cheshire	93,653	44,054	175,400	137,811	70,801	208,610	634,424	1,364,763
Coos	8,494	535,052	2,233,820	4,794	426,652	1,318,310	650,416	5,177,538
Grafton	110,204	378,099	936,010	74,144	275,390	503,115	1,329,476	3,606,438
Hillsboro	86,568	16,998	124,980	252,997	57,013	302,885	747,656	1,589,097
Merrimack	94,929	37,747	188,240	192,013	83,034	320,025	865,348	1,781,326
Rockingham	71,161	5,356	49,830	202,922	16,316	117,265	611,804	1,074,654
Strafford	30,447	5,256	24,920	79,027	14,877	53,460	414,308	622,297
Sullivan	27,349	41,278	114,570	55,405	87,640	181,325	484,976	992,503
TOTAL	744,130	1,220,209	4,445,120	1,209,250	1,170,465	3,423,270	6,894,308	19,106,752

which is estimated at a little over 19,000,000 cords, or about 5 cords to the acre over all the Merchantable, Young Growth and Light Producing Areas.



Annual Consumption, Cut and Growth in N.H.

Consumption.

Table VIII, and Graph 5, gives an estimate of the annual amounts of timber Cut, Imported, Consumed and Exported and the Annual Natural Growth on the Merchantable and Young Areas. This has been compiled from census figures, from the State report on Wood Using Industries and from the files of the railroads. It is given for Pine, Other Softwoods and Hardwoods. Unfortunately the im-

TABLE VIII.
ANNUAL CUT, CONSUMPTION, GROWTH, IMPORTATION AND EXPORTATION.

ANNUAL CUT.	
Average Annual Cut of Pine	173,107 M.
Average Annual Cut Other Softwood	250,931 M.
Average Annual Cut Hardwood	35,189 M.
TOTAL AVERAGE ANNUAL CUT	459,227 M.
ANNUAL CONSUMPTION.	
Pine Used in N. H., 1923	252,626 M.
Other Softwood Used in N. H.	435,825 M.
Hardwood Used in N. H.	88,613 M.
TOTAL CONSUMPTION	777,064 M.
ANNUAL GROWTH.	
Total Annual Growth of Pine	142,710 M.
Total Annual Growth Other Softwood	116,923 M.
Total Annual Growth Hardwood	101,625 M.
TOTAL ANNUAL GROWTH	361,258 M.
ANNUAL IMPORTATION.	
Average Annual Imp. Pine Lbr., Hdw. Lbr., Sftdw. Lbr., etc.	163,000 M.
Average Annual Imp. Pulpwood	154,569 M.
TOTAL IMPORTED	317,569 M.
ANNUAL EXPORTATION.	
Average Annual Exp. Pine Lbr., Hdw. Lbr., Sftwd. Lbr., etc.	316,854 M.
Average Annual Exp. Pulpwood	30,000 M.
TOTAL EXPORTED	346,854 M.

ports and exports of white pine lumber separate from other lumber could not be obtained from the railroads, so that imports and exports of lumber are given as a unit.

From this table it will be seen that the annual cut of 460 million board feet exceeds the annual growth of 360 million board feet by 100 million board feet; that the annual consumption of 777 million board feet exceeds the annual cut of 460 million board feet by 317 million board feet; and that this shortage is increased by the excess of exports over imports by 29 million board feet, so that there is actually an annual balance needed to supply local and foreign consumption of 346 million board feet, which is apparently made up by the annual growth of 360 million board feet. Unfortunately, much of this is not now so situated as to be available and will not be for many years and a large part of it is of other and less desirable species. As much the largest percent of the lumber exported is white pine, and as the cut and growth of white pine exceeds the consumption, and as there has been a steadily increasing reversion of areas to white pine, it is presumable that up to the present time the supply of white pine has kept up to the demand, both for home consumption and exportation. What the future demands for white pine will be depends upon the growth of population within the State (now stationary), and within the nation (now on the increase), upon an increase or diminution of the reversion of farm land to white pine, and upon the competition of other woods, (such as western fir), which in the course of time due to demands nearer home, should decrease. Future export of an increasing volume of white pine to an increasing market, should add to the potential wealth of the State and be useful as an exchange value for other woods needed within the State later. The small consumption of hardwoods and the immense areas of merchantable hardwood uncut, the cutting of which would assist in the growth of the more valuable softwoods, makes the cutting of hardwood a most

desirable adjunct of forestry practice for some years to come. Consequently the real problem of need occurs in the spruce, and other softwood timber which is being consumed and exported both as lumber and in the form of pulpwood faster than it is produced within the state, as the tables show that the cut and the growth of these softwoods does not equal the consumption, and that there is a much larger annual importation than exportation of pulpwood. As the growth of spruce is less rapid than the growth of pine, and as the area over which it can be grown is less extensive and on less productive soil, less returns can be expected and the possibilities of increasing the State's wealth from this source is more remote. The exchange of the fast growing pine for the balance of other softwood needed to maintain the state's industries dependent on these woods in the future is the best forestry economics.

From Table IX, *Lumber Cut in New Hampshire from 1880-1920* and from *Graph* 6, it will be seen that the peak of the lumber cut was reached between 1899-1909, and since that date there has been a steady decline in the total amount of lumber cut, the greatest decline being in Spruce and Other Softwoods and a lesser decline in Pine and in Hardwoods.

GRAPH 6
NEW HAMPSHIRE
LUMBER CUT
FROM
1880-1920

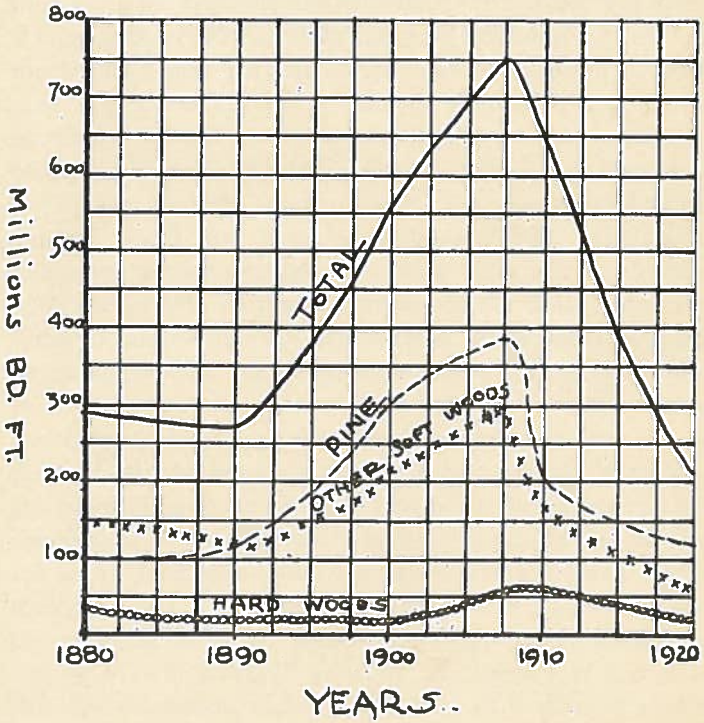


TABLE IX.

LUMBER CUT OF N. H. FROM 1880-1920, WITH AVERAGE 1915-1921.

Year	Total Lumber cut	Pine Cut	Other Softwoods Cut	Hardwoods Cut
1880	292,267 M	99,440 M	153,172 M	39,652M
1890	266,890			
1899	562,258			
1900	562,258	307,211	231,579	23,468
1904	491,591			
1905	340,727			
1906	539,259	333,296	146,254	59,709
1907	754,023	399,585	296,331	58,107
1908	606,760			
1909	649,606	260,182	332,481	56,943
1910	443,907			
1911	388,619	183,732	152,002	52,885
1912	479,499			
1913	309,424	184,195	77,778	47,451
1914	482,744	268,716	160,166	53,862
1915	388,995	189,760	156,059	43,176
1916	336,064	194,387	102,691	38,986
1917	263,511	172,236	64,642	26,633
1918	304,999	188,769	83,866	32,364
1919	338,777	176,012	123,217	39,548
1920	223,376	121,202	69,685	32,489
1921	261,999	169,381	59,490	33,128
Average: 1915-1921	302,532	173,107	94,236	35,189

Figures obtained from U S. Forest Service Records.

From Table X, *Wood Using Industries Exclusive of Wood Pulp in New Hampshire by Classes, Location of Largest Wood Using Industries Exclusive of Wood Pulp,* it will be seen that these industries use about 445 million board feet, of which 282 million board feet is wood cut in New Hampshire, and 163 million board feet is imported by

railroad, boat and truck. These figures indicate that a little more than one-third of the materials used by our wood using industries exclusive of wood pulp come from outside of New Hampshire. Also that about half of our products are made from pine and that two-thirds of the plants are located in southern New Hampshire.

TABLE X.

WOOD USING INDUSTRIES EXCLUSIVE OF WOODPULP IN N. H. BY CLASSES.

Hardwood Industries (using hardwoods only)	92
Box and shook mills (using softwoods only)	63
Cooperage	11
Door, Sash and Blind Mills	8
Manufacturer of caskets	2
Wooden novelties	5
Excelsior	10
Permanent saw mills producing lumber only	24
Wood working plants	7
Miscellaneous (producing various forms of products)	3
TOTAL	225

SPECIES CONSUMED.

Pine Used	205,467 M.
Spruce and Hemlock Used	84,385 M.
Hardwoods Used	72,785 M.
Miscellaneous Lumber, Poles, Ties, etc.	82,087 M.
TOTAL	444,724 M.

ORIGIN.

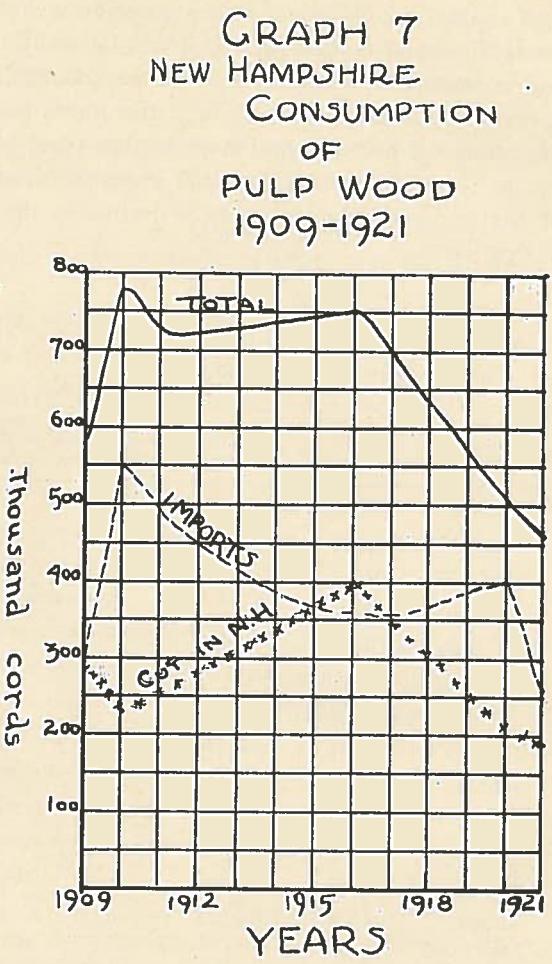
Origin N. H. (by truck to wood-using plants)	100,784 M.	
Origin N. H. (by rail to wood-using plants)	125,150 M.	
Origin N. H. (transportation not indicated)	55,790 M.	
	281,724 M.	from N. H.
Imported by truck	10,000 M.	
Imported by rail and boat	153,000 M.	
	163,000 M.	Imported
TOTAL	444,724 M.	

From Table XI, *Pulpwood Consumption and Wood Pulp Production,* and from *Graph 7,* it will be seen that the pulpwood consumption from all sources reached its maximum between the years 1910-1916, and that there has been a steady falling off in consumption since that time, both in wood cut in New Hampshire and that imported from outside the State, together with a steady decline in the wood pulp production.

TABLE XI.

PULPWOOD CUT, IMPORTED, AND CONSUMED, AND WOOD PULP PRODUCTION, WITH AVERAGE 1916-1921.

Year	Wood Consumed (Cords)	Cut in N. H. (Cords)	Imported (Cords)	Slabs & Mill Waste Used (Cords)	Wood Pulp Produced (Tons)
1909	585,352	289,248	296,103	14,158	359,696
1910	784,380	251,072	533,308	41,398	476,689
1911	729,067	236,963	492,104	50,015	449,758
1912	Data Not Obtainable.				
1913	Data Not Obtainable.				
1914	Data Not Obtainable.				
1915	Data Not Obtainable.				
1916	752,232	402,744	349,488	23,700	517,109
1917	645,892	364,961	280,930	27,391	400,982
1918	627,011	308,293	318,718	20,181	405,861
1919	523,081	315,555	207,526	37,811	324,311
1920	578,474	333,638	244,836	27,887	348,974
1921	459,691	191,838	267,853	10,329	278,725
Average: 1916-21	597,730	319,505	278,225	24,550	379,327
	=1.64 cds. per ton.				
Average: 1916-21 in M. Bd. Ft.	332,072	177,503	154,569		



From Table XII, *Imports of Lumber and Pulpwood in 1923,* the only year obtainable, the origin is given of the 163,000 M board feet of lumber of all kinds imported into the State. The annual average pulpwood importations between 1916-1921 was 278,000 cords, or 154,569 M board feet. Together they indicate an average annual import in the neighborhood of 317,837 M board feet. Meanwhile the

TABLE XII.
APPROXIMATE LUMBER AND PULPWOOD IMPORTS TO NEW HAMPSHIRE 1923.

		M. Bd. Ft.
Rail Imports from Canada		40,000
Rail Imports from Maine and the Provinces		33,000
Rail Imports from Vermont		10,000
Rail Imports from West		16,000
Rail Imports from South		36,000
Rail Imports by Boat from West and South		18,000
Rail Imports by Truck, Local		10,000
		163,000
Average Pulpwood Imports to N. H. 1916-1921:		
Imports from Canada, Maine and Vermont	278,000 Cords	=154,569
TOTAL IMPORTS		317,837

export of lumber for 1923, Table XIII, is shown to be 316,000 M board feet (of lumber) and the estimated average export of pulpwood 50,000 cords yearly or 30,000 M board feet, or a total average annual export of 346,854 M board feet. Much of the lumber imported is undoubtedly of special species and for special purposes and this lumber could not be purchased within the State due to the demand for qualities and sizes unobtainable here, but it is reasonable to suppose that most of the lumber of its equivalent in pine, and some of the pulpwood, could as well have come from within the State's borders, and a very great saving in freight from the North, South and West been affected.

TABLE XIII.
EXPORTS OF LUMBER AND PULPWOOD FROM NEW HAMPSHIRE—1923.

Railroad Lumber Shipments originating in N. H.:		M. Bd. Ft.
Boston & Maine	296,644	
Grand Trunk	15,622	
Maine Central	6,588	
		316,854
Average Annual Export of Pulpwood from N. H.	54,000 Cords	= 30,000
TOTAL		346,854

In Table XIV, *Freights on Lumber and Pulpwood Imported for 1923,* an estimate has been made of the amounts expended beyond the State's borders in freight, which expenditure amounts to about $2,282,665 yearly. The localities from which this comes is shown by Graph 8.

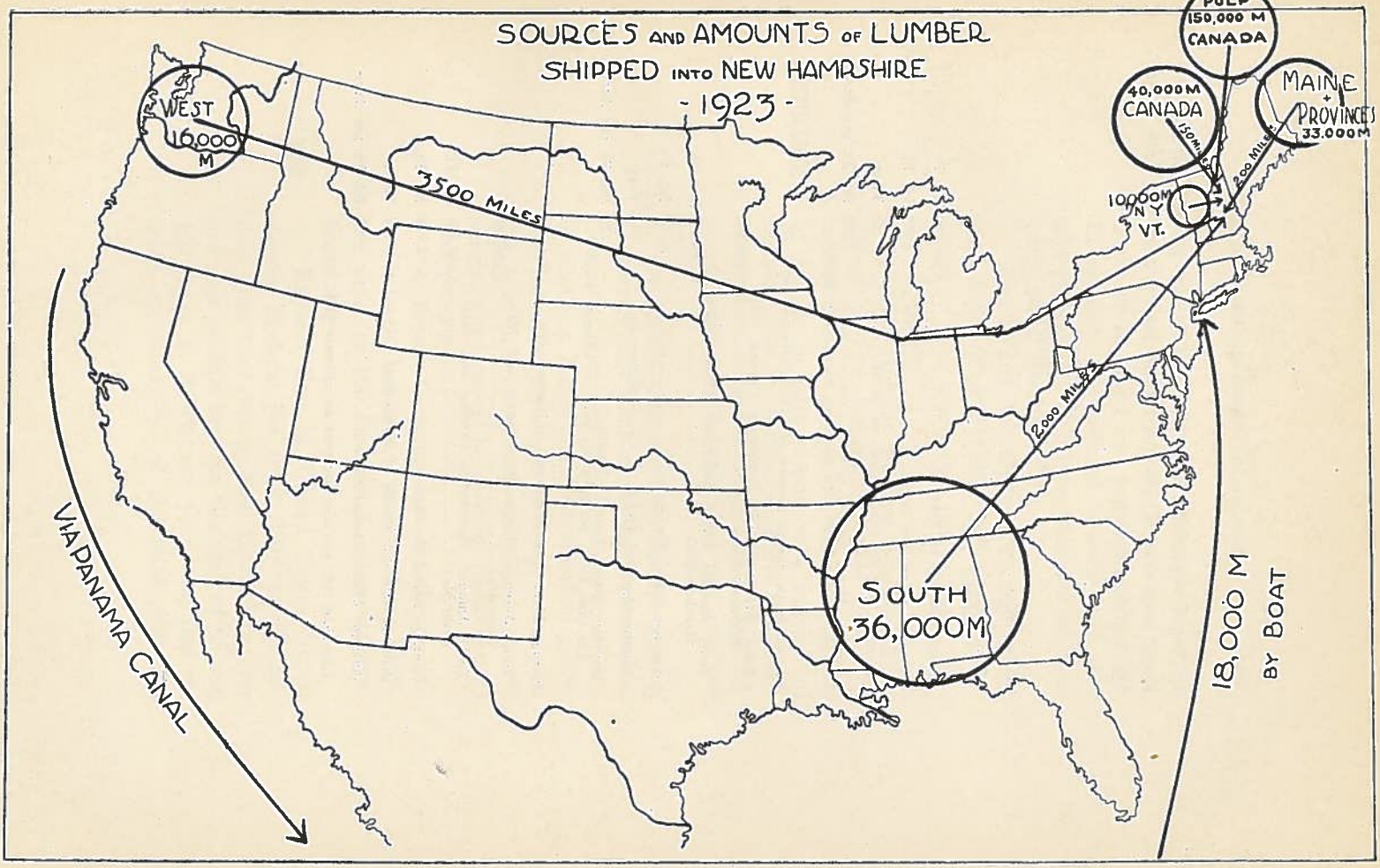
TABLE XIV.

FREIGHTS ON LUMBER AND PULPWOOD IMPORTS 1923.

Lumber Imports from far West:		16,000 M.	
Average Freight Rate....	$26.40 per M.		
Average N. H. Rate.....	5.75 per M.		
	$20.65 In Excess of Local Rates		
	Total Freight Costs in Excess of Local Rate		$330,400
Lumber Imports from the South:		36,000 M.	
Average Freight Rate....	$15.00 per M.		
Average N. H. Rate.....	5.75 per M.		
	$ 9.25 per M. in excess of Local Rates		
	Total Freight Costs in Excess of Local Rates		$333,000
Lumber Imports from the South by Boat:		18,000 M.	
Average Freight Rate....	$13.80 per M.		
Average N. H. Rate.....	5.75 per M.		
	$ 8.05 per M. in Excess of Local Rates		
	Total Freight Costs in Excess of Local Rates		$144,940
Lumber Imports from Maine:		33,000 M.	
Average Freight Rate....	$ 6.15 per M.		
Average N. H. Rate.....	5.75 per M.		
	$ .40 per M. in Excess of Local Rates		
	Total Freight Costs in Excess of Local Rates		$ 13,200
Lumber Imports from Canada:		40,000 M.	
Average Freight Rate....	$ 7.50 per M.		
Average N. H. Rate.....	5.75 per M.		
	$ 1.75 per M. in Excess of Local Rates		
	Total Freight Costs in Excess of Local Rates		$ 70,000
			$901,540
Average Imports Pulpwood by Rail:		278,225 Cords	
Freight Rate in Excess of Local Rates $5 per cd.			1,391,125
TOTAL			$2,282,665

Table XV, *Annual Growth,* shows a mean average annual growth for pine of 226 board feet per acre; for other softwoods 123 board feet per acre; and for hardwoods 90 board feet per acre. The figures for growth arrived at for this report, therefore, are conservative and allow for depreciation from burns, pests, wind throw, uncut maturity,

GRAPH 8


SOURCES AND AMOUNTS OF LUMBER
SHIPPED INTO NEW HAMPSHIRE
- 1923 -
WEST
16,000
M
3500 MILES
PULP
150,000 M
CANADA
40,000 M
CANADA
150 MILES
MAINE
+
PROVINCES
33,000 M
200 MILES
10,000 M
N Y
VT.
2,000 MILES
SOUTH
36,000 M
VIA PANAMA CANAL
18,000 M
BY BOAT

etc., and represent less than 2% a year growth on White Pine, less than 1½% on Other Softwoods, and less than 1% on Hardwoods.

TABLE XV.

ANNUAL GROWTH.

Average Mean Annual Growth of N. H. Pine:

Total Acreage Pine Lands (Young and Merchantable)	631,460	
Total Amount of Pine	3,566,844	Bd. Ft.
Average Stand Per Acre	5,649	Bd. Ft.
Average Age All Pine Stands of N. H.	25	Years
Average Mean Annual Growth	226	Bd. Ft. per Acre

Less than 2% per acre per year on ultimate yield.

Average Mean Annual Growth of Other Softwoods in N. H.:

Total Acreage Other Softwoods (Young and Merchantable)	950,592	
Total Amount Other Softwoods (Young and Merchantable)	3,524,020	Bd. Ft.
Average Stand Per Acre	3,703	Bd. Ft.
Average Age All Stands of Other Softwoods	30	Years
Average Mean Annual Growth	123	Bd. Ft. per Acre

Les than 1½% per acre per year on ultimate yield.

Average Mean Annual Growth of Hardwoods in N. H.:

Total Acreage Hardwoods (Young and Merchantable)	1,129,166	
Total Amount Hardwoods (Young and Merchantable)	3,057,434	Bd. Ft.
Average Stand Per Acre	2,708	Bd. Ft.
Average Age All Stands of Hardwood	30	Years
Average Mean Annual Growth	90	Bd. Ft. per Acre

Less than 1% per acre per year on ultimate yield.

GEN'L Zon and Sparhawk give as figures for the United States on the total forest area an increase of 58 board feet per acre per year for all species. The Second Growth land they give separately at 109 board feet per acre per year for all species.

Hawes and Hawley give as figures for New England on the total forest area an increase of 137 board feet per acre per year for all species.

Louis Murphy in the United States Forest Service Bulletin No. 544 gives the annual average growth over 5 year periods

SPRUCE of Spruce in pure stands on a number of sample plots in Northern Maine and New Hampshire, between the ages of 40 and 100 years 1.9% or 170 board feet per acre per year.

A Brown Company test for the growth of pure Spruce stand shows for a number of trees of various ages under various conditions in Northern Maine and New Hampshire over the period required for the tree to put on the last inch of growth 1.63% of growth yearly, which would be upwards of 200 board feet per year.

A Brown Company test for the growth of Fir by the last inch of growth shows 2.16% per year for 100 fir trees 5 inches diameter breast high.

FIR Raphael Zon in United States Forest Service Bulletin No. 65 in 1914 set the annual growth of Fir in New Hampshire over five year periods between the ages of 65 and 100 years at 2.94% per year, and that fir made up about 9% of the total pulpwood

stand in New England. The Spruce Bud Worm which has worked extensively in the fir of late may have changed this estimate of stand.

S. F. Spring in the United States Forest Service Bulletin No. 63, gives for old field types of White Pine in New England for the yearly annual growth over 10 year periods from 25 to 55 years, the very high increase of 8.9% or better than 900 board feet per acre per year, but this is at the period of greatest growth and under most favorable conditions.

PINE

Professor Toumey of Yale has also noted certain acres of Pine that increased 900 board feet per acre per year.

Brown Company office record for the growth of pure White Pine stand shows for a number of average size trees in Maine over the period required for the tree to put on the last inch of growth 2.2% of growth yearly.

Louis Margolin in the Woodsman's Handbook, Table 69, in 1905, gives figures for White Pine growth over 10 year periods for round edge box stock in lower New Hampshire between 20 and 90 years of age for first class stands, 6.2%, or 1077 board feet per acre per year.

A. B. Recknagel of the Empire State Forest Products Association gives 1% as the average pulpwood growth in the Adirondacks.

PULP-WOOD

Stanley H. Sisson of the Sisson Lumber Company, Potsdam, N. Y., gives an actual test of 57,000 acres in the Adirondacks as 1/5 cord of pulpwood per acre per year, equal to 120 board feet.

E. A. Sterling of J. D. Lacey & Co., gives the annual growth of pulpwood on representative Adirondack lands as not less than 2% and not over 3%.

E. F. McCarthy of the Appalachian Forest Experiment Station, Ashville, N. C., gives the annual growth of pulpwood in the Adirondacks at 1.4%.

Professor H. C. Belyea of the New York State College, Syracuse, N. Y., gives the annual growth of pulpwood in the Adirondacks at about 1/5 cord per acre, or 2%.

Harvard Bulletin No. 2 gives annual growth per acre for first quality stands of hardwood in Central New England from 30 to 80 years old in 10 year periods .82 cords or 1.97% for all trees 2 inches and up B. H. D., and for trees 40 to 80 years old 7 inches and up B. H. D. 3.2% or 1.2 cords.

HARD-WOODS

Brown Company gives for 32 poplar trees 5 inches and over B. H. D. in Northern New Hampshire the average yearly per cent of growth over the period required to put on the last inch of diameter about 5%.

The United States Forest Service gives for pure white birch stands in Northern Maine over 10 year periods, between 25 and 65 years the annual growth per acre at 4.6% or 71.2 cu. ft.

Valuation.

For the sake of setting up a rough basis of general timberland values in order to estimate the relative importance of various forestry methods Table XVI is here given on the valuation of the 4,434,793 acres of actual or potential forest land not agricultural or barren land. Land chiefly valuable for the production of timber is estimated at $4 an acre throughout; all merchantable softwoods are estimated at $9 per thousand; all merchantable hardwoods at $3 per thousand; and all merchantable cordwood at 50 cents per cord. Young softwood growth is arbitrarily given at an assumed stand of 3,000 bd. ft. per acre for Pine, and 2,000 bd. ft. per acre for Spruce and Other Softwoods valued at $7 per M. Young hardwood growth at an assumed stand of 500 bd .ft. per acre value at $2.50 per M. Cordwood on the Light Producing area is estimated at an assumed stand of 4 cords per acre for a strip cut, valued at 50 cents per cord.

The 1,012,753 acres of merchantable area, land and timber, is valued at $56,770,418, or about $56 per acre; consisting of 172,813 acres of Pine at about $115 per acre if considered as an unmixed stand; 395,428 acres of Other Softwoods, chiefly spruce, fir and hemlock, if considered as an unmixed stand, at about $55 per acre; and 444,512 acres of Hardwoods and cordwood if considered as an unmixed stand at about $18 per acre. The estimated value of cordwood on merchantable areas is about $3,000,000. The 1,698,465 acres of Young Growth area, land and timber, is valued at $27,955,055, or about $16 per acre, consisting of 458,647 acres of young Pine at $21 per acre if considered as an unmixed stand; 555,164 acres of other young Softwoods (chiefly spruce, fir and hemlock), at $14 per acre if considered as an unmixed stand; and 684,654 acres of young Hardwoods, at about $2 per acre, if consid-

ered as an unmixed stand. The estimated value of cordwood on young growth areas is a little less than $3,000,000.

The 1,723,575 acres of Light Producing area, land and cordwood, is valued at $10,341,454, or about $6 per acre, if the cordwood on it is considered as evenly distributed. And the total acreage of tree bearing land is valued at $95,066,927, or about $21.21 per acre. It is evident that the situation of any particular tract in regard to the size, quantity and quality of the species growing thereon, its accessibility for logging and nearness to market will be modifying factors in regard to its valuation as compared with these general values given for the whole State.

TABLE XVI.

VALUATION OF FOREST PROPERTY

MERCHANTABLE TIMBER AREA:		
Pine:	172,813 acres bare land at $4 per acre	$ 691,252
	2,190,903 M. bd. ft. at $9 per M.	19,718,127
Spruce and other softwoods:	395,428 acres at $4 per acre	1,581,712
	2,413,692 M. bd. ft at $9 per M.	21,723,228
Hardwoods:	444,512 acres bare land at $4 per acre	1,778,048
	2,751,107 M. bd. ft. at $3 per M.	8,253,321
Cordwood:	6,049,459 cds. at 50 cents per cd.	3,024.730
		$56,770,418
YOUNG GROWTH AREA:		
Pine:	458,647 acres bare land at $4 per acre	$ 1,834,588
	1,375,941 M. bd. ft. at $7 per M.	9,631,587
Spruce and other softwoods:	555,164 acres bare land at $4 per acre	2,220,656
	1,110,328 M. bd. ft. at $7 per M.	7,772,296
Hardwoods:	684,654 acres bare land at $4 per acre	2,738,616
	342,327 M. bd. ft. at $2.50 per M.	855,818
Cordwood:	5,802,987 cords at $.50 per cord	2,901,494
		$27,955,055
LIGHT PRODUCING AREA:		
	1,723,575 acres bare land at $4 per acre	6,894,300
Cordwood:	6,894,308 cds. at $.50 per cord	3,447,154
		$10,341,454
GRAND TOTAL		$95,066,927
TOTAL ACREAGE		4,434,795
AVERAGE VALUE PER ACRE		$21.21

Fire Hazards and Expenditures.

TABLE XVII, FIRE HAZARDS AND EXPENDITURES, and GRAPHS 9 and 10, are based on accurate information gathered by the Forestry Department since 1911, and show that in thirteen years a total of $157,000 has been spent in apprehending and putting out fires by all agencies; or an average annual expenditure of $89,000, or 2 cents per acre per year has been spent to protect a valuation of $95,000,000, which is equivalent to paying less than 1/8 of 1% premium on an insurance policy. During this time 167,000 acres, or about 13,000 acres a year, has been burned over, or an average of 2/5 of 1% of the whole area, resulting in a total damage of $1,320,000, or $102,000 average per year, or about 1/10 of 1% of the whole forest value. In other words the area burned was so often second cuttings and comparatively valueless that the resulting loss in value was slightly in excess of the amount expended for the fire protection of the State.

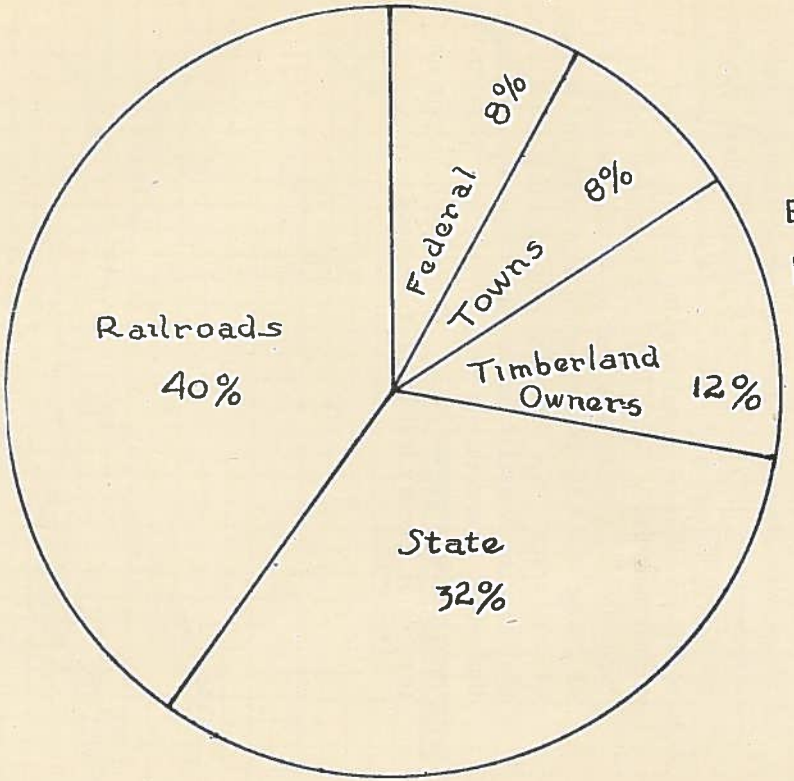
The agencies making these expenditures were first, the railroads, who during the period of thirteen years have spent $504,000; the State and Towns, which have spent $438,000; the New Hampshire Timberland Owners, who have spent $127,000; and the Federal Government, which has spent $88,000.

TABLE XVII.

FIRE HAZARD AND EXPENDITURES BASED ON TOTAL FOREST AREA OF 4,437,793 ACRES VALUED AT $95,066,927.

Year	Total Amount Expended	Federal	State	Towns	N. H. Timberland Owners' Assoc.	Railroads	Average Cost Per Acre Per Year	% of Whole Forest Value	Area Burned	% of Whole Forest Area	Total Damage	% of Whole Forest Value	Average Damage Per Acre
1911	$53,713.00	$6,212	$13,486	$3,215	$10,800	$20,000	.015	.059	30,958	.72	290,000	.300	.065
1912	60,851.00	7,733	15,301	4,500	10,817	22,500	.014	.064	16,948	.38	80,000	.084	.016
1913	69,913.00	7,999	18,000	7,147	11,767	25,000	.016	.072	18.149	.41	136,000	.142	.036
1914	88,766.00	7,300	24,190	7,684	9,592	40,000	.020	.093	14,615	.33	93,000	.099	.021
1915	128,801.00	5,624	44,609	26,368	9,200	43,000	.029	.135	35,376	.80	211,567	.227	.048
1916	85,552.00	6,152	21,672	2,928	7,300	47,500	.019	.089	8,840	.20	53,075	.057	.012
1917	79,953.00	6,027	21,486	2,278	6,762	43,400	.018	.084	3,360	.07	38,153	.041	.009
1918	85,711.00	6,556	22,692	4,383	8,480	43,600	.019	.089	9,562	.22	103,539	.129	.023
1919	94,584.00	5,402	32,406	5,082	8,694	43,000	.021	.100	4,064	.09	44,147	.046	.010
1920	88,246.00	5,798	25,952	2,296	10,200	44,000	.020	.092	4,102	.09	55,160	.058	.013
1921	106,584.00	7,712	36,686	7,255	11,731	43,200	.024	.112	7,575	.17	69,299	.073	.016
1922	109,126.00	8,787	36,739	7,500	11,700	44,400	.025	.115	10,474	.23	108,641	.114	.024
1923	105,330.00	6,833	35,399	8,442	10,356	44,300	.024	.111	3,252	.07	37,427	.041	.008
Totals	1,157,130.00	88,135	348,618	89,078	127,399	503,900	.261	1.215	167,275	3.78	1,320,008	1.411	.302
Averages	89,010.00	6,779	26,817	6,852	9,800	38,762	.020	.122	12,867	.29	101,539	.107	.023

GRAPH 9

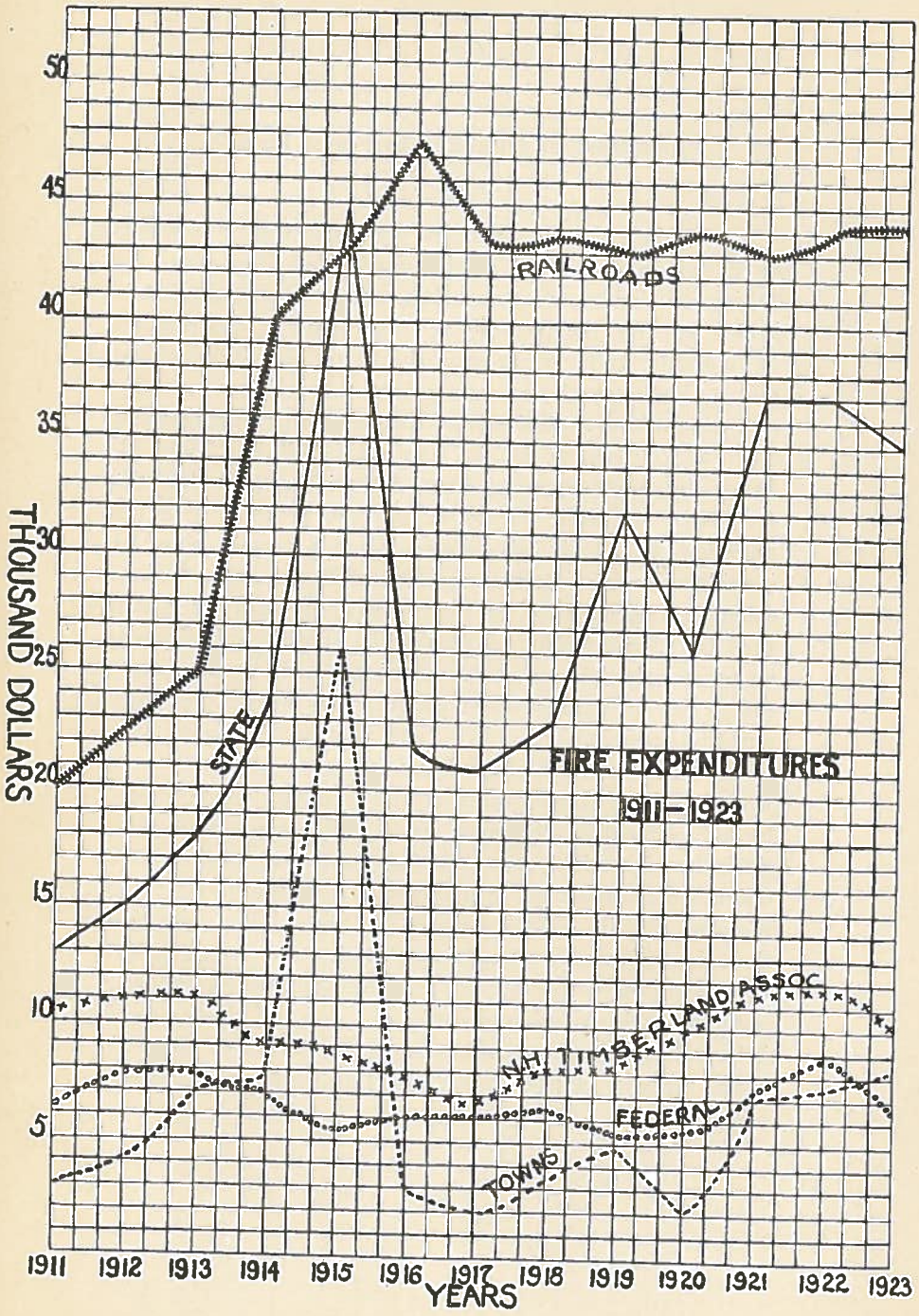


Circle showing Annual Average Expenditure for Fire Protection.

As the damages sustained have been fairly uniform throughout this period, the conclusion can be drawn that the State of New Hampshire is quite relatively free from the dangers of a conflagration, even in unfavorably dry years, and that the average annual loss in values does not rise above 1/5 of 1% and averages less than ⅛ of 1% yearly and is an exceedingly insurable risk, and that the insurance problem depends largely on obtaining enough area and wide distribution to secure an average of the whole.

The first timberland insurance company of the United States was started by the timberland owners of New Hampshire in 1917 and did a good business for three years with little or no loss, but was discontinued on account of lack of sufficient capital to swing the area needed. They turned over their business to be continued by old line companies in a small way, but up to the present the rate of 2% has not been low enough to encourage the inclusion of large areas. It is the writer's opinion that when a rate shall be offered equal to that in some of the factory mutuals, timberland insurance will be both safe and profitable for some of the large companies. Its ultimate bearing on the practice of forestry will be most beneficial.

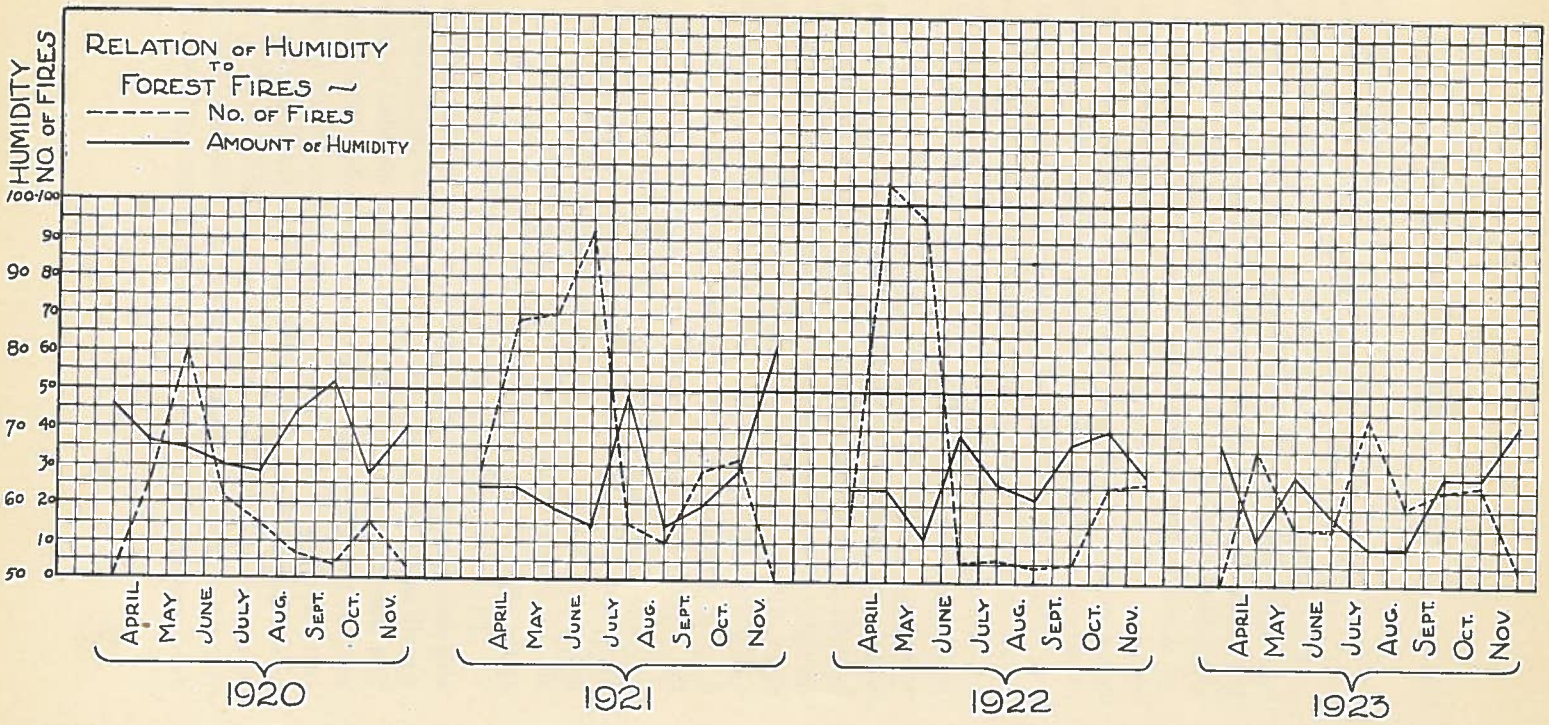
GRAPH 10


50
45
40
35
30
25
20
15
10
5
THOUSAND DOLLARS
RAILROADS
STATE
FIRE EXPENDITURES
1911-1923
W.H. TIMBERLAND ASSOC
FEDERAL
TOWNS
1911
1912
1913
1914
1915
1916
1917
1918
1919
1920
1921
1922
1923
YEARS

Relation of Humidity to Forest Fires.

In addition to the usual fire protective measures which have been developed and carried out in New Hampshire resulting in efficiency of control, as noted above, a study has been made for the purpose of this report of the relation of humidity to forest fires as shown by Graph 11. Two plotted lines are shown, one giving the relative humidity at a certain hour, and the other the number of fires between April and November for the four years 1920-21-22 and 23. From the intersection of these lines it appears that the frequency of fires varies in obverse proportion to the humidity in the air, above and below a certain point of humidity intermediate between 60 and 70 degrees. A more accurate determination of this point of humidity at which fires commonly spring up during the summer months will be of considerable value for warnings, as it would appear that a day or so intervened between the drop in humidity and the springing up of fires, and as it would appear that at times of relatively high humidity, even although there was a lack of actual rainfall, the humidity made it extremely difficult for fires to start, while at times of relatively low humidity, even although there was rainfall, fires continued to occur. It is presumable that the humidity on the same day in various parts of the State differs, and that there is a difference at varying altitudes and even in adjacent localities, so that a more scientific study and systematic notation of this relation might be of value and give advance information of approaching dangerous period of fire. A State forestry appropriation for this purpose is recommended.

GRAPH 11


RELATION OF HUMIDITY TO FOREST FIRES
No. of Fires
Amount of Humidity
HUMIDITY
NO. OF FIRES
100-100
90 80
70 60
80 50
70 40
30
60 20
10
50 0
APRIL MAY JUNE JULY AUG. SEPT. OCT. NOV.
1920
APRIL MAY JUNE JULY AUG. SEPT. OCT. NOV.
1921
APRIL MAY JUNE JULY AUG. SEPT. OCT. NOV.
1922
APRIL MAY JUNE JULY AUG. SEPT. OCT. NOV
1923

Insect and Fungi Hazards.

Federal, State, Municipalities and Private Individuals are contributing funds to combat and control insect and fungi hazards.

Concerning the spruce bud worm, which works in the spruce and fir, New Hampshire was not severely hit, there being but a few areas in Coos County. As the depredations of this insect was of short duration, and as its recurrence is problematic, and as the salvage has been high, the per cent. of injury sustained has been slight, although this is not true for Maine and Quebec. Merchantable trees attacked by insects and fungi of all kinds, can in many instances be salvaged, so that the greatest loss is felt in young trees which are either destroyed or sustain a loss in annual growth or in development as to quality. What this constructive loss amounts to in value is a matter of guess, but it is without doubt high. Estimates given by the best authorities affirm that 5% of the young white pine from 3 to 10 years are affected by the pine weevil, which kills the leader, stunts the growth and leaves a deformed tree; that 1% of the white pine and hemlock south of the White Mountains is affected by the gypsy moth, which retards its growth by a third; and that from 8% to 15% per cent of all the young white pine in the State under 25 years of age is affected and killed by the white pine blister rust.

The most optimistic judgment of the experts involved will not permit them to report further than that the pine weevil and gypsy moth depredation is now stationary and that the white pine blister rust is on the increase in areas not yet brought under protection. The white pine blister rust having a dual life on the wild currant leaves as well as on the pine, with the possibility of the eradication of all wild currant bushes from the State, is controllable, while control of the depredations of insects is problematic. Therefore appropriations by the State and Towns for control of

the white pine blister rust is both legitimate and desirable, and the sooner adequate sums to protect the $29,000,000 worth of white pine value in the State are voted, the less future call there will be for such appropriation and the less loss will be sustained by the white pine owners in the future. When sufficient expenditures are made by Town and State the average annual loss by the blister rust disease can be easily kept within insurable limits. The past and average appropriations to combat the white pine blister rust are given in TABLE XVIII.

TABLE XVIII.
WHITE PINE BLISTER RUST APPROPRIATIONS IN NEW HAMPSHIRE

Year	State	Town	Private	Federal	Total for Year
1916	$ 400.00			$ 2,000.00	$ 2,400.00
1917	8,000.00			8,904.00	16,904.00
1918	10,000.00	7,200.00	811.00	16,000.00	34,011.00
1919	10,000.00	6,310.00	2,054.00	19,000.00	37,364.00
1920	10,000.00	8,000.00	4,509.00	20,000.00	42,509.00
1921	10,000.00	4,350.00	2,689.00	28,000.00	45,039.00
1922	12,000.00	16,800.00	9,398.00	30,000.00	68,198.00
1923	15,000.00	28,765.00	7,635.00	32,500.00	83,900.00
1924	17,000.00	38,975.00	2,615.00	33,000.00	91,590.00
	$92,400.00	$110,400.00	$29,711.00	$189,404.00	$421,915.00

NOTE—The figures shown above do not represent the expenditures made in Blister Rust Control. Several thousands of dollars have been returned to towns, cities and individuals.

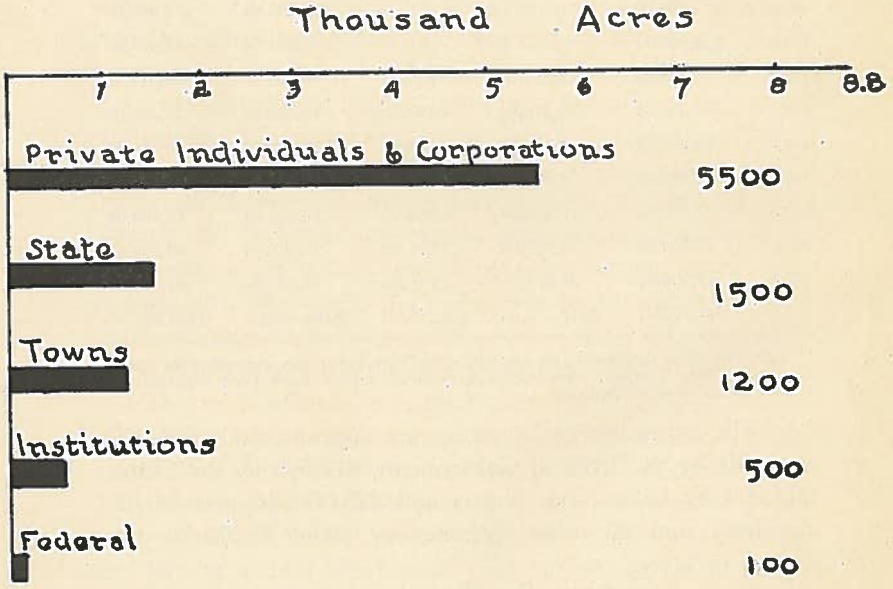
The expenditures for moths are approximately $96,000 annually by the Federal Government, $12,500 by the State, $15,000 by Cities and Towns and $25,000 by private individuals and all other agencies or about 1½% of the values involved.

By TABLE XIX, ARTIFICIAL REFORESTATION IN NEW HAMPSHIRE, and by GRAPH 12, it will be seen that little artificial reforestation is being done and that little start has been made to bring back into forest produc-

tion the LIGHT PRODUCING LAND area of 1,723,575 acres, of which only one-half of one per cent. has been planted. These lands now are coming up to little or nothing but cordwood, but without doubt a considerable portion of this area could be brought into forests. Up to the present time the market prices, the risks involved, abundant supply of cheap timber from outside the State, and ignorance of method, have combined to be a deterrent in the improvement of these lands.

The State is, however, maintaining a nursery at Boscawen (Gerrish P. O.) for the distribution at cost of young trees and is conducting an educational program and a start

GRAPH 12



Artificial Reforestation in N.H.

TABLE XIX.

ARTIFICIAL REFORESTATION IN NEW HAMPSHIRE

	Timberland Acreage	Per cent of Whole Acreage	Acres Planted	Per cent Timberland Acreage Planted
Federal Government	417,744	9.42	100	.024
State	20,538	.46	1500	7.3
Towns	8,751	.20	1200	13.8
Institutions	30,032	.68	500	1.6
Private individuals and corporations	3,957,720	89.24	5500	.14
TOTAL	4,434,793	100.00	8800	

has been made. The State is also planting and maintaining small tracts of demonstration forests widely distributed for the same purpose.

The problem of reforestation on the million acres of MERCHANTABLE TIMBERLANDS lies principally in the method of cutting to assure the greatest future returns. Intelligent handling here involves a knowledge of soils, suitable species to be raised for the particular region, the growth to be expected, the best rotation of crops, the cost of operating, the situation towards the market, and some other items that would have a bearing on the success of the method of cutting adopted.

Clean cutting is often advisable where young growth of the right quantity and quality is abundant. Selective or strip cutting at other points is advisable where it is desirable to seed in sufficient young growth, and the merchantable trees left to be taken at a future date. No cutting at all should be done at some places which should be kept as recreational parks for the public pleasure and health.

Generally speaking every tract of land needs treatment peculiar to itself, ascertainable best through the judgment and advice of a trained forester, and no general rule can be laid down.

On the Merchantable area without doubt much more timber can be grown to the acre than is now being done and a considerable increase in values can be had, both by the private owner and the State, by more intelligent comprehension of the problems involved.

On the AREA OF YOUNG GROWTH a greater return can be had by the suppression and destruction of undesirable species and the encouragement and filling in of the more desirable ones.

How far artificial reforestation can be profitably carried at present is problematic, but it is evident with present market conditions that it should be restricted to the best soil, the best climatic conditions, under the best logging surroundings, and with the greatest nearness to market. It is possible that to meet conditions within and without the State in the future that recuperation of these lands might conceivably be a State enterprise warranting a bond issue.

Taxation.

The whole question of the hazard from taxation rests on the determination as to whether the average annual growth of any stand at an increasing value for the stumpage per year is being absorbed by the valuation placed thereon, the rate of the tax, the interest on the investment, and the carrying charges. In case the growth is being so absorbed, it is evident that the owner thereof would be of a mind to cut his timber and secure his value thereon and deposit it in some property which would yield him a fair annual income.

In taking up the question of taxation in New Hampshire it is at once seen that the constitution still considers timber in the light of a mining property and in no degree as a crop, and that it is valued and assessed in the same manner as other property, and that it is unconstitutional to do otherwise. The facts are that timber in New Hampshire is passing through an intermediate stage between mine and crop, and that a consideration of it at present, to be just, should cover both aspects of the case. There is old growth timber left which is being held for investment, and there is young growth and plantations coming up that are strictly a crop and should be treated as such. Stumpage value also through the law of supply and demand is still advancing. General methods of taxation throughout the country, which are swinging from property values to income values, complicate the matter, as it is difficult to find reliable growth tables for different species under many varying conditions. The risks are uncertain and the values to be reaped problematic.

It is not possible to show tax tables of values and rates, as the great body of timber in the state, amounting to 68% of the whole, is owned by individuals, and its value is merged by the tax assessors in with farm and other property and not shown separately. The unincorporated

towns show only State and county taxes and are not a fair basis of comparison of the general conditions. However, some individual instances of overtaxation occur, usually among the white pine lands in the southern part of the State, and these are of sufficient frequency to show that such a problem does exist and that in some instances it interferes with the holding of timber for growth and with the practice of forestry.

At present the crop character of timberland has not been clearly enough demonstrated, and the substitution of the income tax in place of property tax has not met with enough favor to bring constitutional action to relieve the tax hazard where it occurs.

Granting that a constitutional amendment is advisable at the present time, many plans have been put forth to rectify the tax hazard, and attention has been drawn to a number of laws that have been passed by other States now in the process of trying out. Most of these are based upon the valuation of the soil as a growing proposition and the original investment in trees and their maintenance as capital, and the increment of profit from the investment when the trees are marketed as taxable income to be assessed at a rate to cover the growth over the whole period, rather than to assess it yearly when the amount of it is problematic and while it is uninsurable and liable to be wiped out by fire and other hazards. In other words the theory is to place a potential present value on the land taxable yearly and to treat timber as a growing crop taxable only when reaped. Such a plan is given by the Committee on Taxation of the New Hampshire Civic Association and appended hereto, and while undoubtedly sound reasoning, if timber is considered wholly as a growing crop, there is too rapid a transition from the former long held property idea to cover actual conditions at present, and the Legislature is to a certain degree right in holding that stumpage values still increase as well as tax rates and there is still some property values left. Most bills of this kind are too com-

plicated for the comprehension of the ordinary legislator and are also still a matter of debate among experts and would be found complicated in operation. Such plans are usually based on yield tables which have not been verified; they assume a rate of interest which is not certain; they assume a certain standard scale applied and supervised in the same manner over long periods of years, which is not assured; they assume an extensive knowledge of boundaries and estimates which are now obscure and which would take much time and expense to secure; and they do not assure a sufficient and steady income which is essential.

My thought is that an intermediate stage must be passed through and a modification of the present system of taxation be adopted more in accord with the facts as they now stand, and that such an intermediate state, when the constitutional right to install it has been obtained, would be the valuation of all timberland at full value as at present and the assessment of it at a reduced rate that would offer a rough approximation of justice, all things being considered, one that would be easily understandable by the ordinary legislator and tax assessors, and one that would yield the necessary annual income to the towns, counties and state. This plan like every other tax plan would be only a rough approximation of justice and like them open to criticism as too broad to apply to every individual case, but the usual Board of Equalization in the State could smooth out the rough edges.

APPENDIX.

New Hampshire Civic Association Committee on Forest Taxation.

Under the present law assessors cannot do their official duties and deal justly with forests as compared with other forms of property which yield an annual income. In the past, due to low valuation, actual taxes paid on forests have not been too high generally as compared with other property. In recent years the raising of valuations has placed a heavy burden upon forest property and made the holding of partially mature timber very expensive. The situation is constantly growing more serious. If the present system is continued there is little likelihood of the large and increasing amount of idle, non-agricultural land becoming restocked with valuable forest trees by private enterprise. Woodlots are being thrown on the market and cut off 10 to 20 years before they should be, because the owners realize that the value of the yearly growth is not sufficient to pay the taxes and interest charges alone. Under these circumstances there is no disposition to borrow or use funds otherwise available with which to pay the taxes in order to hold the timber after it becomes marketable. When lots are prematurely cut, a considerable quantity of timber, which would otherwise be available later, is lost and virtually wasted. There is a ready market for higher grades of lumber which cannot be produced from the timber cut at 30 to 40 years of age and such lumber has to be imported from a distance. The town is certain to lose when a lot is prematurely cut as afterwards it must be assessed as cutover land.

In order to determine how many years a pine owner can hold his timber without financial loss under conditions existing at the present time, the following table has been prepared to show the actual expenses and net profit per

acre at five year periods up to 60 years for white pine stands, resulting from both natural reproduction and from planting. The expenses consist of taxes on the land, taxes on the timber beginning with the fifteenth year, interest on the value of the land, and the cost of planting, all carried forward at 5 per cent compound interest. The value of bare land was placed at $5.00 per acre, the tax rate at 2½% and planting at $15 per acre. The value of the timber at each five year period was placed at $12 per thousand feet for the amount of timber given in our New Hampshire yield table for fully stocked stands of white pine growing under average conditions. The taxes are assessed on the full values indicated for periods of five years. These are conservative figures and if higher rates and a lower stumpage value were used, the costs would increase and the net profits correspondingly decrease.

FINANCIAL ROTATION OF WHITE PINE.

Money Value 5%; Value of Land $5 per A.; Cost of Planting $15 per A.;
Tax rate, 2½%.

Rotation Years	Stumpage Value at $12 per M.	Natural Reproduction						Plantations			
		Expenses						Expenses			
		Taxes			Interest						
		Taxes on Timber		On Land							
		Annual for Five Year Periods	Accrued to end of Rotation	Accrued to end of Rotation	On Value of Land Accrued to end of Rotation	Total Expenses	Net Profits	Taxes and Interest on Timber and Land Accrued to end of Rotation	Cost of Planting Carried to end of Rotation	Total Expenses	Net Profits
15	$25.00	$.625	$.....	$2.832	$5.604	$8.44	$16.56	$8.44	$31.183	$39.62	—$14.62
20	37.00	.925	3.626	4.339	8.603	16.57	20.43	16.57	39.799	56.37	—19.37
25	71.00	1.775	9.994	6.264	12.431	28.69	42.31	28.69	50.795	79.48	—8.48
30	150.00	3.750	23.054	8.720	17.316	49.09	100.91	49.09	64.829	113.92	36.08
35	293.00	7.325	51.181	11.854	24.766	87.80	205.20	87.80	82.740	170.54	122.46
40	394.00	9.850	107.820	15.854	33.059	156.73	237.27	156.73	105.599	262.33	131.67
45	487.00	12.175	194.758	20.960	43.644	259.36	227.64	259.36	134.775	394.14	92.86
50	558.00	13.950	319.204	27.476	57.152	403.83	154.17	403.83	172.010	575.84	—17.84
55	607.00	15.175	488.332	35.793	74.393	598.52	8.48	598.52	219.534	818.05	—211.05
60	638.00	15.950	711.293	46.407	96.397	854.10	—216.10	854.10	280.187	1134.29	—496.29

From the table above it may be seen that the highest net profit is obtained when the timber is cut at 40 years of age. If held beyond this period there is a rapid decrease in profit and if the owner should hold the timber 60 years, there would be a net loss of $216.10 per acre, where natural reproduction can be secured and $496.29 per acre where the expense of planting is included. The table shows that 27% of the total value is taken in taxes on the timber alone in 40 years; 57% is taken in 50 years; 80% in 55 years; and 111% in 60 years. In addition, the risk of loss or injury from fire, disease and insects has to be carried by the owner during the entire period of growth. In general it is a showing which could hardly be expected to encourage timber growing from now on.

Principles on Which Forest Taxation Should be Based.

1. Income from forests is "deferred income" and is collectible only at long intervals.

The taxation of forests should not aim to favor forest property as against other property. Forests should bear their fair share of the burden of supporting government. It is customary to regard standing growing timber as real estate to be taxed as other forms of real estate, that is, as capital which earns income; whereas it is really an annual crop income deferred and therefore accumulating. In this connection it is worthy of mention that the General Court recognizes the principle of crop values in its total exception of live stock until it approaches maturity. An investment in a young growing forest carries hazards which cannot be controlled and the investment cannot be withdrawn until the timber is cut.

2. Deferred returns from forests require that interest on annual expenses be compounded annually.

The amount and infrequency of return from forests as compared with other property, and of different kinds of forest growth, should be recognized and provided for. The basis of valuation of any income-producing property is the income which it is expected that property will produce in the future. If forest income were annual—that is, if the addition of each year's woody growth in a forest could be taken, cut and turned into money each year—then the usual tax appraisal approximating sale value would not be unjust as compared with taxation of other property; but because there is no annual income from forests out of which to pay the annual taxes the money to pay these taxes must be taken by the forest owner from funds which could be invested or used elsewhere. Hence the forest growth, if it pays the owner to hold it, must return him these taxes with interest compounded annually. The growth of forests

is not rapid enough to pay this where the tax valuation approximates sale value and the rates are the current rates for real estate. Hence if taxes are paid annually either the valuation or the rate should be adjusted sufficiently to offset this factor of compound interest. Wherever this is not done, growing immature forests are bearing a heavier share of public expenses than other real estate which is taxed at or near its sale value.

3. Forest tax laws should do justice to forest property and not offer low taxes as a reward for the practice of forestry.

Forest tax laws should take into account all the costs of growing timber and the risks involved, and aim to permit the growing of forests by private owners for profit under reasonably successful management. While recognizing the value to the State of keeping a large amount of land under forest cover, of perpetuating the timber supply, and the value to communities of preserving small scenic forests, no subsidy in the form of specially low taxes should be sought. Since it is necessary and desirable to encourage the increase of forest growth this should be done by furnishing planting stock at cost, by good protection against fire and pests, and the dissemination of scientific information, all of which are proper state functions. But the direct encouragement of forestry practice through low taxes is wrong and in the long run will defeat itself by arousing the opposition of owners of most other forms of property. We believe therefore legislation for taxation of forests should not be a part of laws for the promotion of forestry nor the practice of forestry. They should be "tax" laws pure and simple. While justice in forest taxation will help to clear the way for the practice of forestry by the private owner, the forest tax laws should aim to be just and no more, and above all should *not be tied up with red tape requiring expensive examinations, inventories, land classifications and rules of forest administration.* They

should not be so complicated as to be difficult of satisfactory administration by local assessors.

With this statement of the unsatisfactory results produced by the present system of forest taxation and a consideration of the fundamental principles involved in the search for a just system, we should naturally come to the question of the comparative merits of the methods proposed in order to apply the principles to the facts of the situation.

These appear to classify themselves along three main lines. One is the land and yield method by which the tax payer would pay an annual tax on the land regardless of the growth and then pay a yield tax (products tax) when the timber is cut, perhaps 10% of the stumpage value, or perhaps at a graduated scale according to the age of the growth. Another is the percentage valuation method by which the tax payer pays an annual tax at the current local rate for all property, but with a valuation adjusted to allow for the crop character of growing timber which carries with it deferred returns and compound interest or the overhead charges. The third method is the full value flat rate method which would tax the land and growing timber at full sale value as under the existing system, but impose a rate lower than the current local rate to offset the factors of deferred returns and carrying charges. This method has a precedent in the present law, which taxes savings deposits at a flat rate of ¾ of one per cent.

All these methods have their staunch advocates; all are in actual operation in one or more states in the country. They vary in the extent to which they interfere with familiar taxing methods and in results on the continuity of public revenue to the towns. It would take a great deal of space to discuss the comparative merits of these different plans.

It is sufficient to say at this time that no one of the methods suggested can be enacted into law without an amendment to the Constitution. Under the present consti-

tutional limitations we are powerless to suggest a single substantial improvement to the present law.

We therefore recommend that the Constitutional Convention be reconvened at the earliest possible date and an amendment submitted to the people preferably in general terms in connection with a general tax amendment which will remove the present restrictions.

When this has been done we are firm in the belief that out of the methods which have been proposed and the suggestions which have been made a satisfactory measure can be framed and put on the statute book which will give the desired relief and still be consistent with the spirit and traditions of our institutions.

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