



Trunk of White Pine Affected with Blister Rust Disease.  
Note difference in diameter of trunk at point where infection has set in and the still healthy portions of the tree. The trunk is weakened and will soon break off. If currant or gooseberry bushes had not been growing near this pine it would still be strong and healthy. These bushes should be destroyed wherever found.

State of New Hampshire

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BIENNIAL REPORT

OF THE

Forestry Commission

For the Two Fiscal Years

ENDING

August 31, 1920

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CONCORD  
November, 1920

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## REPORT.

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*To His Excellency the Governor and the Honorable Council:*

The Forestry Commission presents herewith its report for the two fiscal years ending August 31, 1920. On account of the increased expenses of publication and the desire to have a larger number of copies printed this report has been shortened by the omission of many photographs, and the forest laws and list of fire wardens and deputies heretofore included in the appendix.

The Forestry Commission serves to protect the public welfare in all that concerns the forests and the perpetuation of the forests of New Hampshire. It is the medium by which the efforts of various bureaus of the Federal Government, the towns, public and private institutions and individuals are brought together with the State in looking after the forest interests of the State. There had been a larger amount of coöperative work with the Government, towns, public institutions and private individuals during the two years past than in any two year period before. The work is chiefly divided into four branches; namely, forest fire protection, control of the white pine blister rust disease, acquisition and care of State forests and reservations, and reforestation. In addition to these important divisions the Forestry Department carries on within the limits of its appropriations educational work in general forestry, cooperates with public and private interests in the management and improvement of forest lands, and makes investigations and studies of matters relating to forestry in general.

Work which has been suspended during the war or modified to conform to war needs has been gradually

restored. The high cost of labor and materials has necessitated some curtailment, as in planting and other improvement work on State lands and adjoining roadsides, improvements and new equipment for lookout stations, increases in pay of regular employees of the Department, educational work and lectures and fire warden conferences. Every effort has been made to maintain fundamental lines of work and keep up the general efficiency of the Department. The past two years have been difficult and trying and it has been no easy task to maintain efficiency under the adverse conditions and with inadequate funds. Not a dollar of emergency funds has been used, however, during the past year. A favorable fire season for 1920 has left an unexpended balance from the fire fighting appropriation of over \$3,000.

It is with much regret that the Forestry Commission announces the resignation of Mr. E. C. Hirst, who has been the State Forester since this position was created in 1909. Mr. Hirst left the Department on April 1, 1920, to engage in private business and Mr. John H. Foster was appointed by the Commission to succeed him. Mr. Foster is familiar with New Hampshire conditions and its forest problems and has made various investigations and reports within the State during the past 12 years, particularly on the taxation of forest lands, and the marketing of white pine. He was for four years Professor of Forestry at the State College at Durham and since then for a number of years has been the State Forester of Texas.

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### RECOMMENDATIONS.

There is need for an increase in the appropriation of at least \$10,000 for each of the next two years in order to continue on the present basis and in an effective manner the work now carried on in coöperation with other agencies. Special appropriations are also needed for the pur-



chase of a new forest nursery, for acquisition of State forests on a larger scale than heretofore, and for carrying out a system of special forest fire patrol.

No amendments to the forest laws were made at the last session of the General Court. Needed changes should now be considered, particularly in ways to prevent the occurrence of fires by means of special patrol and the disposal of dangerous slash around mills and camps, on divisional lines, by the side of lumber roads and especially dangerous points and a better distribution of fire fighting costs by charging the expenses of fighting fires in lumber operations to the operators if in the judgment of the State fire agents such operator is responsible for the starting of such fire.

The seriousness of the white pine blister rust disease must not be lost sight of. A complete statement of work done is contained in this report and should be carefully read and the recommendations should be adopted.

A survey of the forest resources has now covered 130 towns or 58% of the total area of the State. This survey shows 1 3/4 million acres of forest land to be waste and non-productive. There is a great problem of reforestation ahead. We need a new forest nursery in anticipation of the future tree planting needs.

Acquisition of forest land should be continued and purchases should be made on a larger scale than ever before.

The Federal Government is now working out a National forest policy for fire protection and forest restoration to be put in operation in coöperation with the states, calling for large appropriations by Congress to be used chiefly in states which are willing to enact such measures as are needed to protect the forests and to appropriate money to be used with Federal funds in carrying out these measures. In no state is the subject of the Federal program more important than in New Hampshire.

Somewhat more detailed recommendations are given

under the following heads, reference being made to a more complete discussion of each subject in the body of the report.

### **Forest Fire Service.**

An amendment to the forest fire laws authorizing the Forestry Commission to require the disposal of any lumber slash and other inflammable material close to camps, mills, much travelled roads, boundary lines and other particular locations where such slash endangers other property through the setting or spreading of forest fires. Decisions in this matter should be an administrative function of the Commission.

Means should be provided for special patrol to prevent fires during dry periods. It is estimated that the equivalent of at least one cent per acre annually for all the forest lands of the State should be made available from some source for the special patrol needed. While the funds necessary to maintain this patrol may be provided by direct State appropriation or by requiring each town to raise its proportionate amount, it is believed that private owners of forest land should be required to finance the special patrol needed to protect their lands, reasonable exemptions being made of well protected farm woodlots or other forest areas where there is no particular fire hazard. Under such provision the private owners should be required to carry out the special patrol where necessary and in a manner satisfactory to the State Forester either through their own efforts or by joining an association of timberland owners for purposes of patrol, or by paying the State to provide the patrol. By compulsory patrol the responsibility rests upon the land owner to interest himself in fire prevention. The State Forester should have ultimate control to decide whether or not the protection furnished is adequate and if it is not, to make it so and collect the cost from the owners.



An amendment to the forest fire laws should be made to provide that all just and proper expenses incurred in extinguishing forest or brush fires caused by lumber or other woods operators, or employees of such operators shall be paid by the operators, decisions as to the probable cause of the setting of such fires to rest with the authorized forest fire agents of the State.

Section 6 of the forest fire laws should be amended by striking out the provision which limits the number of fire districts to not more than four. Sufficient funds should be provided so that the State Forester under the direction of the Forestry Commission may divide the State into at least five fire districts, each in charge of a district chief, and pay them for longer periods each year and at higher rates than at present possible.

#### Control of the Blister Rust Disease.

A total of 457,000 acres have been covered by blister rust crews in the eradication of currant and gooseberry bushes at an average cost of 22.7 cents per acre of which the State has paid about five cents per acre. The cost of supervision has been one cent per acre or one fifth of the State's total contribution to blister rust work. At the present rate of progress seven or eight years will be required to cover the remaining pine regions of the State.

All currant and gooseberry bushes, both cultivated and wild, which are now growing within the pine regions must be destroyed in order to protect the pines.

It is believed that where currant and gooseberry bushes are not eradicated there will be great destruction to young pine up to 20 years of age as well as much loss to older pine stands within the next ten years.

The English black currant which is most susceptible to the blister rust disease should be destroyed immediately wherever found. This is also true of any large bushes growing in open and exposed places where the wind can carry the spores to greater distances.



Unless the spread of the blister rust disease is checked it is certain that eventually our white pine forests will become generally diseased and young pines destroyed.

Because the disease does not spread direct from pine to pine its progress will be much slower than that of the chestnut bark disease. The ultimate results, however, will be much more serious in New Hampshire on account of the great value of white pine.

The methods now carried on for removing currant and gooseberry bushes should be continued with all the funds obtainable from all sources for this purpose.

#### Acquisition and Care of State Forests.

The policy of the State, already established, to purchase areas of low value as State forests and to improve them by means of planting and selective cutting should be continued on a larger scale than ever before. It would not be unreasonable for New Hampshire to spend \$50,000 annually for this purpose.

The present State forests are mostly of small size rather widely scattered in order to increase their educational value and avoid hardships to any town through withdrawal of the lands from taxation. It is believed, however, that the State forests should be somewhat more concentrated in sections where values are lower and large areas exist in need of care and improvement. The State should also secure title to many mountain tops where our lookout stations are located and acquire tracts adjoining them where improvement work may be performed by watchmen when they do not need to be at their stations. Since this report went to press a tract of over 2,000 acres in Washington and Goshen has been donated to the State by Hon. Albert E. Pillsbury of Boston.

Eventually, as State forests become revenue producing, a certain percentage of the income should be paid to

the towns where they are located, as is now done with Federal revenue from the White Mountain National Forest.

### **Reforestation.**

It is recommended that a new forest nursery capable of producing a million trees annually after the next three or four years be purchased at a cost of \$8,000. Such a nursery should have enough suitable land to produce several million trees a year if they should be needed. The present nursery and farm should afterwards be sold.

An amendment to the Reforestation Act of 1915 should ultimately be made by striking out the clause which limits the size of the areas which may be deeded to the State for reforestation purposes to 25 acres. This will not be necessary until the State is able to supply trees on a much larger scale than at present. Our future planting program should provide sufficient funds so that the State may reforest large areas of land, without immediate cost to the owners, by taking over such land and returning it later upon payment of the costs, as provided in the present Reforestation Act.

Respectfully submitted,

W. R. BROWN,  
GEO. B. LEIGHTON,  
HENRY W. ANDERSON,  
Forestry Commission.

JOHN H. FOSTER,  
State Forester.

## FOREST FIRE SERVICE

### Organization.

There has been no change in the forest fire laws since the last biennial report. Under the law the State may be divided into not to exceed four fire districts, each in charge of a district chief appointed by the State Forester. The district chiefs have supervision of the lookout stations and the town fire warden organizations, within their districts, and they act for the State Forester and with the town fire wardens in the work of inspecting spark arresters on portable mills, enforcing the slash disposal laws, and in all other forest fire matters.

The four district chiefs are now employed only during the fire season. A large amount of supervision necessarily has to be done by them during this period. The South district, which comprises most of the lower seven counties, cannot adequately be covered by one man. There should be at least two districts in southern New Hampshire and funds available to employ all district chiefs at a higher rate and during a longer period of the year. The State has been very fortunate in retaining the services of the same district chiefs for successive years. The North district is in charge of W. H. Morrison of Gorham who is also Secretary of the Timberland Owners Association. F. P. Allard of North Conway and W. M. Falconer of Milford are in charge respectively of the East and South districts. Early in 1920 the death of W. H. Langmaid of Haverhill in charge of the West district removed one of our most efficient and conscientious workers. His place is being ably filled by Elmer E. Woodbury of Woodstock. It is increasingly hard, however, to keep this type of men permanently on this work unless they can be given more steady employment and adequate compensation.



A fire warden and one or more deputy wardens in each town are appointed by the State Forester upon the recommendation of the Selectmen. They are paid only when employed and the expense is shared by the towns and State. The chief duty of the wardens and deputies is to extinguish fires and to requisition the help necessary to accomplish this purpose. The fire wardens are required to make reports of fires and handle the payrolls incident to the work of fighting fires and also to perform such other duties as inspecting portable mills, roadside slash disposal, posting fire notices, granting permits to burn brush, and acting as local town agents in all forest fire matters. The ability of wardens to perform extra and important service, in addition to actual fire fighting, is limited inasmuch as their pay must come from funds for use primarily in fighting fires. The efficiency for our fire service could be greatly increased by employing the regular fire wardens to a greater extent than at present.

In addition to this regular fire organization there are 179 State highway patrolmen and 209 railroad section foremen appointed deputy wardens who aid substantially in reporting fires and the presence of roadside slash.

The lookout stations are the agency for detecting forest fires. The watchmen report fires to the wardens or deputies. They are employed during the fire season and are paid jointly by the Federal Government under the Weeks Law and the State. There are 27 stations operated at present, in addition to one maintained entirely by the Government.

#### Fire Seasons of 1919 and 1920.

The fall of 1918 began with sufficient rainfall so that few fires were reported. There was little snow all winter and in the early spring of 1919 the woods were very dry and three fires were reported in February which is very unusual. At the close of the fiscal year on August 31,

the total number of fires reported was 308 and the average cost per fire amounted to \$34.68.

The fall of 1919 was also one of abundant rainfall and few fires were reported. Following the severe winter and heavy snowfall late in the spring of 1920 no fires were reported in February or March and the total for the year, exclusive of railroad fires, amounted to only 138 at an average cost of \$25.07 per fire. During the early summer of 1920 several severe railroad fires occurred in the eastern part of the State which burned large areas and destroyed valuable standing timber and lumber. With the railroad fires added the total number of fires and the acreage burned in 1920 were nearly the same as in 1919. The area burned each year was about one tenth of one percent of the forest land area of the State.

Table I shows the number of fires by months, exclusive of railroad fires, while Table II gives the areas burned, damage and cost of fighting in each county during each of the years 1919 and 1920, for all fires handled by the town organizations and paid for by the towns and State. Table III is a statement of the railroad fire record for 1919 and 1920, excepting the costs of fighting which are paid by the railroads and are not known.

Table I.  
NUMBER OF FIRES BY MONTHS.  
(Exclusive of Railroad Fires.)

Fiscal Year Ending August 31, 1919			Fiscal Year Ending August 31, 1920		
September	1918	3	September	1919	3
October	1918	1	October	1919	4
November	1918	2	November	1919	1
February	1919	3	February	1920	0
March	1919	14	March	1920	0
April	1919	78	April	1920	26
May	1919	63	May	1920	61
June	1919	35	June	1920	22
July	1919	43	July	1920	15
August	1919	66	August	1920	6
Total		308	Total		138

Table II.  
FIRE RECORD FOR FISCAL YEARS 1919 AND 1920.  
Fires Handled by Town Organizations.

Name of County.	Year.	No. Fires.	Total Area Burned.	Average Area Per Fire.	Total Damage.	Average Damage Per Fire.	Total Cost for Fighting.	Aver. Cost Fighting Per Fire.
Balknap	1919	20	31 Acres	1.5 Acres	\$30.00	\$1.50	\$358.70	\$17.94
	1920	11	40 "	3.6 "	86.00	7.82	229.50	20.87
Carroll	1919	26	407 "	15.6 "	21,885.00	841.73	3,443.73	132.45
	1920	20	1137 "	56.9 "	14,035.00	701.75	1,035.54	51.78
Cheshire	1919	34	191 "	5.6 "	250.00	7.35	690.61	20.31
	1920	16	205 "	12.8 "	900.00	56.25	300.76	18.80
Coos	1919	21	24 "	1.1 "	385.00	18.33	676.19	32.20
	1920	12	122 "	10.1 "	675.00	56.25	546.26	45.52
Grafton	1919	20	127 "	6.3 "	915.00	40.75	500.45	25.02
	1920	7	32 "	4.5 "	530.00	75.71	226.60	32.37
Hillsborough	1919	60	400 "	6.6 "	10,300.00	171.66	1,162.09	19.37
	1920	17	94 "	5.5 "	325.00	19.12	310.33	18.25
Merrimack	1919	28	992 "	35.4 "	3,635.00	129.82	1,643.33	58.69
	1920	21	204 "	9.7 "	630.00	30.00	423.37	20.16
Rockingham	1919	51	911 "	17.8 "	2,137.00	41.90	893.18	17.51
	1920	17	66 "	3.8 "	265.00	15.59	170.55	10.03
Straford	1919	29	350 "	13.1 "	1,780.00	61.38	794.71	27.40
	1920	5	16 "	3.2 "	125.00	25.00	89.23	17.85
Sullivan	1919	19	39 "	2.0 "	70.00	3.68	518.74	27.30
	1920	12	80 "	6.6 "	110.00	9.17	128.08	10.67
Totals for State.	1919	308	3502 "	11.4 "	\$41,287.00	\$134.05	\$10,681.73	\$34.68
	1920	188	1996 "	14.4 "	17,631.00	128.12	3,460.32	25.07



Table III.  
RAILROAD FIRE RECORD FOR FISCAL YEARS 1919  
AND 1920.

Year.	No. Fires.	Total Area Burned.	Average Area Per Fire.	Total Damage.	Average Damage Per Fire.
1919	295	562 A.	1.9 A.	\$2,860.00	\$9.69
1920	416	2,106 A.	5.1 A.	\$7,479.00	90.09

### Causes of Fire.

Table IV shows the causes of damage by fires during the past two years. It will be noted that, next to the 40 percent caused by the railroads, over 26 percent were the result of persons tramping in the woods, such as hunters, fishermen, berry pickers, and choppers, and 14 percent were due to burning brush, grass and rubbish. While the danger from these sources was greater than from any other, the causes are found to vary considerably from year to year.

It is a notable fact that boys and other people who frequent woods from towns and cities picking May-flowers and berries are one of the most serious causes of our frequent forest fires particularly in southern New Hampshire. Such persons often have no knowledge of woods conditions and feel no responsibility for the damage to property and the expense they cause to the towns and the state in fighting fires. Real woodsmen, hunters and fishermen are usually more careful to guard against fires. Careless wood choppers, many of whom today have had little experience in woods work, frequently start fires near where they are working. Persons burning brush and rubbish in the spring too often let fire get away from them or burn without a permit from the fire warden and contrary to law. Persons traveling in automobiles start many fires by throwing lighted

cigarettes and matches into the litter or building fires to cook meals beside the road and it is often possible to trace the origin of fires to roadsides. Cigarette smoking is on the increase and is responsible for many fires in the woods. There is no type of carelessness so general and so dangerous as to throw away lighted cigarettes where fires may start. Sparks from portable mills, which have in years past been responsible for as many as 25 percent of all fires, caused only one percent during the past two years. This may be partly accidental but the spark arrester requirements of the law undoubtedly are largely responsible for this reduction.

Table IV.

## CAUSES OF DAMAGE BY FOREST FIRES.

Two Years Ending August 31, 1920.

Cause.	Percentage of Damage to Total.
<b>MECHANICAL CAUSES:</b>	
Railroads .....	40%
Portable Mills .....	1%
<b>HUMAN CAUSES:</b>	
Burning Brush, Grass and Rubbish .....	14%
Wood Travelers, Campers, Hunters, Fishermen, Flower and Berry Pickers .....	26.6%
Miscellaneous .....	.1%
Incendiary .....	.5%
Burning Buildings .....	.3%
Unknown .....	17.2%
<b>NATURAL CAUSES:</b>	
Lightning .....	.3%
	100.0%

## Cost of Fire Fighting.

In 1911, the average cost per fire amounted to \$53.47. This cost was steadily reduced in the years following, until in 1916 the average cost was \$39.16. In 1917 and 1918 the average costs respectively were \$21.45 and \$28.69. For the past two years the average costs have



been \$34.68 and \$25.07 respectively. The rather constant and notable decrease in the cost of fighting fires is undoubtedly due to several reasons. Lookout stations enable quick notification of fires, the wardens act promptly, employ as a rule only the necessary number of men and by using automobiles and trucks reach the fires in shorter time than formerly. Better tools, equipment and facilities for putting out fires are in a considerable measure responsible. Fire fighters are handled to better effect through the experience of wardens and better knowledge of how such work should be done. In other words the town fire organizations are constantly increasing in efficiency which over balances the higher pay now received by fire fighters. Fires are as a rule not permitted to gain so great a headway before they are extinguished. Upon all these matters the judgment of the town fire warden counts for much. This shows how important it is that district chiefs frequently meet the wardens, especially those newly appointed, and help them to become familiar with their duties.

In 1919 the total cost to the State for fighting fires amounted to \$5,507.99 and in 1920 the cost was \$2,283.90. The towns paid approximately an equal amount each year.

### Fire Damage.

The total damage as shown in Table V was nearly \$100,000 for the past two years, of which about 40 percent was due to railroad fires. As in previous years, a large part of the damage was caused by a few fires. In 1919 four fires were responsible for 75 percent of the damage and in 1920 three fires were responsible for 81 percent. However, the number of fires and cost of fighting them bear little relation to the total damage done. A majority of the fires expensive to extinguish burn in slash and do little damage, but they may endanger adjoining property



of great value. The largest single area burned in 1919 was 800 acres in Hooksett and in 1920 the largest was 1,000 acres in Madison. The greatest damage resulted from two fires in Conway, one in 1919 and the other in 1920, with a total of \$28,900. The most expensive to extinguish was a fire in Hart's Location in 1919 which cost \$1,334.77.

Table V.

**TOTAL FOREST FIRE DAMAGE, TWO FISCAL YEARS  
ENDING AUGUST 31, 1920.**

Year.	Railroad Fires.	Other Causes.	Total Damages.
1919	\$2,860.00	\$41,287.00	\$44,147.00
1920	37,479.00	17,681.00	55,160.00
Totals	\$40,339.00	\$58,968.00	\$99,307.00

**Area Burned in Different Types of Growth.**

In addition to ascertaining as far as possible how and where fires start, it is important to know what types of land chiefly burn over. The following statement is worth considering in connection with a later discussion of lumber slash and the fire hazards connected with it. An analysis of all the areas reported burned over in the past twelve years shows the following percentage of each kind of land burned:

Woodlands recently cut over .....	31.2
Second growth not yet merchantable .....	35.4
Merchantable timber .....	21.7
Fields and pastures .....	11.7

These figures show that about two thirds of the total area burned has been recently cut over or was second growth land. What direction fires may take after start-

ing, whether from slash into merchantable timber or from slash into second growth or from open fields into slash depends upon the wind and surrounding conditions and cannot be determined. That the center of most fire danger is in and around recently cutover land is beyond dispute. Without a slash menace the spread of fires would be comparatively easy to control and the danger to merchantable timber far less than at present.

### Fire Fighting Tools.

The Forestry Department has long felt the importance of towns being equipped with the right kind of tools for fighting forest fires and having such tools where they are available for use on short notice. Towns have for a number of years been aided in securing tools at wholesale prices. For the past two years, with the consent of the Governor and Council, the Department has used certain balances from its fire fighting appropriation to purchase standard tools and equipment for distribution to the towns at 50 percent of the purchase cost. Since December, 1919, tools ordered by the towns under this arrangement have cost the towns \$976.57 and consist of the following:

4 Automobile Trailers	33 Collapsible Canvas Pails
73 Extinguishers	38 Heavy Road Rakes
2 Tool Boxes	38 Socket Hoes
57 Long Handled Round- Pointed Shovels	18 Mattocks
156 Short Handled Round- Pointed Shovels	20 Handled Axes
185 Galvanized Iron Pails	21 Lanterns
	4 Double Forester Pumps
	3 Knapsack Sprayers

At the close of the last fiscal year the Department purchased \$2,000 worth of additional tools which will be similarly distributed to towns during the coming year.

### Mountain Lookout Stations.

The State owns and has maintained during the past two years the following stations:

## NORTH DISTRICT:

Mountain	Town	Mountain	Town
Deer	Pittsburg	Magalloway	Carlisle & Webster
Sugar Loaf	Stratford		Millsfield
Black	Cambridge	Signal	Kilkenny
Pine	Gorham	Cabot	

## EAST DISTRICT:

Mountain	Town	Mountain	Town
Kearsarge (N.)	Chatham	Rosebrook	Bethlehem
Carrigain	Lincoln & Livermore	Chocorua	Albany
Israel	Sandwich	Shaw	Moultonboro

## WEST DISTRICT:

Mountain	Town	Mountain	Town
Agassiz	Bethlehem	Black	Benton
Osceola	Livermore & Waterville	Stinson	Rumney
Smarts	Lyme		

## SOUTH DISTRICT:

Mountain	Town	Mountain	Town
Croydon	Croydon	Kearsarge	Warner
Belknap	Gilford	Blue Job	Farmington
Pitcher	Stoddard	Pawtuckaway	Nottingham
Uncanoonuc	Goffstown	Monadnock	Jaffrey
Jeremy Hill	Pelham		

The Crotched Mountain station in Franconstown and one or two other secondary stations are kept as emergency stations, but have not been operated during the past year. The station on Carter Dome has been maintained and operated by the U. S. Forest Service since the area protected by it is largely within the White Mountain National Forest.

In the South district a 17 foot steel tower has been erected at the Croydon station which extends the view and increases the value of the station. The Blue Mountain Forest Association has shared in the expense of erecting this tower and in rebuilding the telephone line to the summit of Croydon Mountain. At Jeremy Hill the watchman cabin was completed, the tower put in general



condition for operation and a well dug to supply drinking water. The platform on the tower at the Uncanoonuc station has been enlarged so that the map has a permanent mounting and is more available for immediate use.

In the East district a new tower was erected on Mount Rosebrook and new cabins on Mounts Carrigain and Kearsarge (North). The cabin on Carrigain is built of logs, while the one on Kearsarge (North) has a tower on top which makes a serviceable and convenient combination for the watchman.

In the North district, a new tower on Dix's Peak and a trail and telephone line to the station were recently constructed in coöperation with the Dixville Notch Hotel Corporation. This station will be operated another season. On Deer and Signal Mountains the towers have been enclosed and a watchman cabin built on the peak of Sugar Loaf Mountain. A new metallic telephone line has been constructed to Pine Mountain.

In the West district no improvements have been carried on except to paint the towers, keep the trails open and maintain the telephone lines in as good condition as possible. Another year several new cabins will have to be constructed to replace those which were first built and a number of the telephone lines are in need of improvement in construction. It is most essential that telephone lines are in good working condition at all times as the value of any station depends upon the assurance of the line being in order. The Department has been unable through lack of funds to carry on all improvement work necessary to keep the stations and their equipment in suitable condition.

The Federal government coöperates with the State in paying the services of the watchman. The cost of improvements and upkeep, is borne by the State. New Hampshire receives the benefit of lookout service from stations close to the State line in Massachusetts, Ver-

mont and Maine. Coöperation has been secured from private parties in establishing and helping to maintain some of the stations. Permission is often granted by owners of land to cut poles and use teams in hauling supplies and equipment to points adjacent to the stations. It is felt that even more assistance should be received from parties who are benefited by the service from these lookout stations.

Table VI shows the number of fires reported by the watchmen during each of the last two years. The fact that a larger number of fires is reported by the stations than appears in the reports of the wardens indicates that certain fires reported by the stations proved to be under control and authorized by the fire wardens or were reported from two stations. Very few fires are handled by the wardens which are not first reported by the lookout watchmen.

Table VI.

FIRES REPORTED BY THE LOOKOUTS.

Date.	North District.	East District.	West District.	South District.	Total.
1919	39	45	60	177	321
1920	34	17	44	120	215

Patrol.

New Hampshire Timberland Owners Association.

The special patrol furnished by this Association of timber owners in northern New Hampshire is one of the important safeguards against forest fires in the North Country. The Association was organized in 1911 and the acreage owned by its members has varied from year to year and has somewhat decreased since part of their holdings have been taken over by the Government. An acreage tax is assessed each year against the members



to take care of the necessary patrol and other expenses. In 1919, 739,264 acres constituted the holdings of the Association and a tax of three fourths of a cent per acre was levied on the members. In 1920, the acreage was increased to 815,770 and the tax was also increased to one cent per acre. Approximately 83% of the funds raised are used for actual patrol while the balance pays for general overhead, chiefly for the services in part of the secretary, W. H. Morrison, Gorham, N. H., who is also district chief for the State in charge of fire prevention for the North district.

#### **Town and State Patrol.**

Under the forest laws the State Forester may instruct fire wardens to patrol areas in their towns when necessary during dry periods. State funds, however, are not large enough to begin to take care of any amount of patrol work. The State patrols the Crawford Notch reservation and fire wardens near cities sometimes patrol on holidays when many people are in the woods or where berry picking is extensive. In order to make such patrol possible on a larger scale and save much fire fighting expense and damage, some means not now established should be determined for raising the necessary funds.

#### **Other Patrol Agencies.**

The State road patrolmen are appointed deputy wardens through coöperation with the Highway Department. They caution highway tourists about fires, and render valuable service in enforcing the roadside slash law along the sections they patrol. There are at present 179 of these patrolmen holding deputy appointments.

There are 209 railroad section foremen who also hold appointments as deputy forest fire wardens. They are instructed both by the State and railroad companies to be constantly on the lookout for fires and to patrol



dangerous sections during dry weather. Since the railroads pay the cost of fighting fires which start from the railroads there is no lack of effort on the part of the railroads to see that their foremen do efficient work.

Rural mail carriers through coöperation with the Post Office Department and the U. S. Department of Agriculture are required to report fires to the nearest warden or deputy, but since no special duties or reports of slash can be required of them much valuable patrol service is of course lost.

Game wardens under the Fish and Game Department are in a position during the fishing and hunting season to render much service to the State in fire prevention and by extinguishing incipient fires.

#### **Coöperation with the U. S. Forest Service.**

Under the Weeks Law first passed by Congress in 1911 annual appropriations have been made by Congress each year for coöperation with the states in fire prevention. The amount available to New Hampshire has, however, been decreased from \$6,500 in 1918, to \$5,500 in 1919, and \$5,800 in 1920. The Federal funds are used exclusively to pay for services of lookout watchmen under the direction of the State Forester. The reduction in Federal allotment has been due to the fact that the appropriation of Congress has increased very little, while the benefit of coöperation has been gradually extended to a larger number of states. There is every expectation that the National forest policy in regard to state coöperation will very soon be changed in a way to give much greater assistance to states in fire protection.

#### **Spark Arresters on Portable Mills.**

Portable steam sawmill operators are required by law to use a spark arrester approved by the State Forester.

There is no question but the law has largely reduced the number of fires caused by sparks from such mills. It is very difficult, however, to keep in touch with the location of mills due to their frequent changes of location within a town and from one town to another. While operators for the most part conform to the law as regards using a suitable spark arrester, there are many who do not notify the fire warden when they move from one place to another within a town or notify the State Forester when they move to another town. Consequently the district chiefs and the fire wardens are constantly finding mills in operation for which permits have not been renewed, although the spark arresters may be in satisfactory condition.

The requirements of the State Forester are fully explained in a special circular sent to operators upon application for permits. In general, the requirements call for a one eighth inch wire mesh where direct vent and no deflecting device is used and a three sixteenths inch mesh where indirect vent and inverted cone deflectors are installed. When the wire is not sufficiently heavy it quickly burns out and if the operator does not renew these screens from time to time the conditions may be unsatisfactory and not come to the attention of the fire wardens or district chiefs for some time. The law is satisfactory and could be efficiently enforced if the district chiefs were able to keep in closer touch with fire wardens and mill operators and more frequent inspections could be made. In order to establish a still further check on the operations of portable mills and place the responsibility for the condition of the stacks more directly upon the operator it would be a good plan to license operators and require them to pay a nominal fee in order to operate.

In 1917, approximately 100 portable sawmills were reported in the State. At the present time permits have



been approved for the operation of 134 mills; of these, 49 were granted for the first time in 1920.

The law authorizing the State Forester to require the cleaning up of slash for a distance of 100 feet from any mill where necessary is an excellent measure tending to prevent fires from portable mills.

### Disposal of Lumber Slash.

Four years ago the requirements for the clearing of slash on land adjacent to railroad rights of way and public highways were changed by increasing the width of the clearance strip along railroads from 40 to 60 feet and along highways from 20 to 25 feet. An amendment was also made at that time requiring operators to fell trees away from and not towards or parallel with property lines of abutting owners.

The operation of the slash disposal law has been generally successful. Compliance with the law is not unjust and the protective benefits are very great. There is a tendency on the part of operators not to move the slash until after an operation is completed and the fuel wood, if any, has been cut. Those who try to avoid carrying out the requirements of the law do so by making only a feeble attempt at disposal or delaying all work of disposal until after the case has been reported by the fire warden or district chief to the State Forester, hoping that the situation may not come to their attention. Months may elapse after the operation is completed before a report is made if the locality happens to be remote and unfrequented. When the case is reported the operator may have sold the land or moved away and considerable difficulty and delay follow before the slash is finally cleared up. In no instance has it been impossible for the Forestry Department to secure compliance with the law although delays in certain cases unfortunately persist. It is particularly annoying because much of the slash could



be avoided in the first place by felling the trees away from the highway. Very few operators are now unfamiliar with the law requirements and it will be the policy whenever new slash is reported to take legal action against offenders after the sixty-day limit has expired and it is apparent that they are trying to avoid their responsibility.

As regards slash on abutting property lines the Forestry Department requires removal wherever adjacent land owners make complaints. There is no difficulty whatever in maintaining clearance strips of 60 feet along the rights of way of railroads. This is because section foremen are continually passing over the lines and see to it that slash is moved while the operation is in progress or report the cases promptly. This is true of slash along most of the State highways where road patrolmen are in charge. The greatest delay in enforcement is on unfrequented roads and in these places of course the danger of fire is less.

### Cutting of Roadside Brush by Towns.

The principal concern of the Forestry Department relating to the roadsides is to see that they are free from lumber slash and brush which may cause the spread of forest fires. Lumber operators and owners of land are responsible for the slash made by them, while the towns are responsible for the brush cut by the road agents, which is often as great a source of fire danger as lumber slash. Under the law, towns are required during August and September, or at other times, to cut and dispose of trees and bushes which cause damage to the highways, or the travelling public or which are objectionable from a material or artistic standpoint. A later amendment to the law authorizes the State Forester to dispose of such brush, if not done within a period of 30 days, and assess the cost to the towns or other parties responsible for its removal.

It is no easy task for towns to cut and dispose of all bushes within the limits of the highways each year. The cost is prohibitive and the result is that bushes grow to considerable size before the towns undertake to remove them. The difficulty of entirely disposing of them later is therefore increased. In the judgment of the State Forester it is most unnecessary and undesirable to cut all bushes back to the extreme limits of the highways, except where they may obstruct the view ahead. Instead, the bushes should be well cleared back from the ditches, but beyond the point necessary to accomplish this, there is little fire preventive or other reason why all the bushes should be cut.

Efforts should be made to trim up desirable young trees growing beside the roads and thin out heavy clumps of bushes, leaving the straighter and more desirable ones to grow. This practice would tend to secure well formed trees all along but well back from the roads, shade out the sprouts and growth starting afterwards, and greatly reduce the cost of roadside work. All cut bushes should be disposed of at once, preferably by burning, and not be allowed to remain within 25 feet of the road. Green bushes, especially well trimmed young trees, are a protection rather than a menace and they improve the general appearance. Selectmen and road agents of towns are urged to conform to this practice and not attempt to cut all bushes to the highway line and thus cause an unsightly appearance, unnecessary expense and, if they do not immediately dispose of the cut bushes, also cause a fire hazard.

Towns which leave large quantities of dry bushes along the roads are guilty of creating as dangerous a fire condition as any operator leaving lumber slash and they violate the roadside slash law equally as much. While town officers may exercise their discretion about cutting bushes, they must dispose of the slash caused by the



cutting. The Forestry Commission will insist that towns as well as private parties conform to the law in this regard.

### **Cost of Fire Protective Work.**

It may be of interest to know what the present system of fire protection is costing annually. The State expenditures for fire protection during the past year were \$32,406.37. This amount together with the funds paid by the towns for fire fighting, by the Federal Government for lookout work and the Timberland Owners for patrol work make a total of \$49,586.12. This is exclusive of railroad and other private expenditures, and the cost to the Government of protecting the White Mountain National Forest. Exclusive of Government land, the forest area of the State is 4,119,744 acres and the cost per acre for fire protection is one and two tenths cents per acre. This is a very small amount indeed for the protection of property of such great value. If the forests of the State are worth \$100,000,000 we are now spending annually to protect them from fire only one twentieth of one percent of their value. It would not be unreasonable to spend two or even three cents per acre annually, which would mean \$100,000, or more. The State alone should bear only a part of this expenditure. It is the feeling that a larger responsibility should rest upon timberland owners themselves to pay for additional protection, much of which is needed because of the hazards brought about by lumbering operations.

### **Need for Future Slash Disposal and Special Patrol Measures.**

Our machinery for detecting fires by means of lookout stations and fighting fires through the town warden organizations is efficient and reasonably satisfactory. The weakness of our fire service is in not having the means to



prevent many of the fires from starting. Fire prevention is the removal of unusual fire hazards or actual patrol of them during dry weather. If the dangerous places can be protected the fire expenses and damage may be greatly reduced.

Many examples can be given to show the need for preventing fires. Since the close of this fiscal year several fires have occurred within a period of a few days which started in the vicinity of active logging operations on a large scale, burned over hundreds of acres and will cost the State and towns large sums to extinguish, not to mention the damage to property. The cause of these fires is given as unknown, but they started in lumbering territory and were undoubtedly due to carelessness of employees. In one instance the fire started within 200 feet of a lumber camp and burned over 225 acres. It seems reasonable that the operators be made responsible for taking every possible precaution to prevent such fires. Having caused the fires to start, involving large expenses for fire fighting, it seems only fair that the operators should pay the bills.

Situations arise where inflammable material is left near buildings, standing timber and other valuable property, not alone belonging to the owners of the premises, but to many other adjoining. The danger from fire is known and recognized by the fire wardens and other town authorities. When a dry period occurs, unless the menace is removed, great expense for fighting fires and loss to property may occur.

Some operating companies take every possible precaution to guard against fires, employ patrol about their camps and works, prohibit smoking of employees in the woods during dry periods, post notices calling attention to the fire danger and keep the areas about the camps and logging roads well cleaned up, with the result that fires do not occur. Other operators allow slash to remain near buildings and about trails and principal logging roads,

take no apparent interest to prevent fires from starting and when serious fires occur as they are sure to do in time, turn over their men to fight the fires and the expenses are chargeable to the State and towns.

Dangerous slash left adjacent to valuable property of another or near camps, well travelled trails and logging roads, or in other places where fires are likely to start should be considered a public menace not to be permitted. Authority should be given the State Forester to declare such dangerous slash to be a nuisance and to require the abatement of it as has been done in Pennsylvania, Washington, Oregon and California.

Where the fire danger is great but where actual disposal of the slash would be unreasonable, as in logged over territory or forest land in general during dry periods, special patrol measures should be undertaken. It is cheaper to pay a patrolman for a whole season or several seasons than to bear the cost of fighting one bad fire, not counting the damage to the land. It would not be unreasonable to provide for isolating large areas of inflammable slash after logging operations are completed, prohibit hunting and fishing and patrol such areas for a number of years during which time the danger from fire is greatest.

It is estimated that the equivalent of at least one cent per acre for all the forest lands of the State should be made available annually from some source for the special patrol needed.

The question arises as to who should pay for this patrol. If the State should pay for it, a very much larger appropriation is needed than has ever before been appropriated for fire prevention. It is not reasonable that the State should bear this burden of expense. In Maine the State levies a special tax of one cent per acre upon land owners in the wild land district to pay for fire protection. Unfortunately, the measure would not be constitutional in this State.



New Hampshire might require each town to raise a special patrol fund each year, the amount to be equivalent to one cent per acre for all the forest lands in the town. The amount would not be burdensome to any town and would be largest in towns mostly forested where the need for patrol is most important. This method would make possible a system of patrol by the regular fire warden organizations. It would be workable and elastic and would give good results, but the expense could not be confined to owners of forest land or to those who were chiefly responsible for dangerous slash conditions. It would not encourage private owners to interest themselves in fire protection.

A third method would be for the State to require the owners of forest land to provide adequate patrol of their own land as is now done in Oregon and Washington and to some extent in other states. The Oregon compulsory patrol law is founded upon the principle that if protection against fire is considered necessary by half the owners of timberland and by the general public, it is necessary for all owners and that all owners should share in the cost of maintaining the force necessary to give adequate protection. Under the provisions of the Oregon law an owner may patrol his own land independently or by joining with other owners or else pay the State for providing the patrol. Both the Oregon and Washington laws recognize a maximum of five cents per acre per annum as a legitimate price to pay for special patrol. Under these laws the State Forester has ultimate control to decide whether or not the protection furnished by an owner is adequate and if it is not, he can make it so and collect the cost from the owner. The Vermont law works indirectly for special patrol. The owner of unoccupied or unenclosed land containing inflammable material shown not to have been adequately protected during the preceding year pays one half the forest fire expenses, not to exceed five cents per acre in case a fire occurs. This act tends



to cause owners to protect their lands in order to avoid sharing the town's expenses of fire fighting.

The Timberland Owners Association of New Hampshire now furnishes special patrol on three fourths of a million acres belonging to its members and incidentally protects lands of others who are not willing to be members and subject to their tax. The State should either take over the work of this Association and distribute the cost among all owners by some fair method or require other owners not in the Association to protect their lands. By compulsory patrol the responsibility rests upon the timberland owner to interest himself in fire prevention. Coöperation between the State and private owners and associations of owners is stimulated. The provisions should apply to the whole State with reasonable exemption of forest areas which are well protected or where no particular fire hazard exists. The only objection to this method is the difficulty in determining what exemptions should be allowed and in enforcing the provisions against a large number of owners of comparatively small areas of forest land. These are administrative difficulties which can be overcome if the State has sufficient means for supervision and inspection of the protective work.

It has been stated that some of the most serious fires occur in and around active logging operations. There is no reason why the State and towns should be liable for the expense caused by carelessness of operators or their employees in territory where logging operations are in progress. It is believed that when fires are caused by lumber or other operators or their employees, the State Forester should be empowered to charge the cost of fighting such fires against the operators, decision as to the cause of such fires to rest with the authorized forest fire agents of the State.

## CONTROL OF THE WHITE PINE BLISTER RUST

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### Introduction.

The white pine blister rust, a serious bark disease of our native white pine, is now known to be generally distributed throughout the pine regions of New Hampshire. Since 1916, the year when investigations were first inaugurated to determine the extent of this disease, many new areas of infection have been found each season. This does not necessarily indicate that the blister rust is spreading so rapidly as to become eventually beyond control, but rather, since the majority of outbreaks recently discovered have been found in regions not previously examined, it shows a much wider distribution than was first thought to be the case. This condition also serves to emphasize the necessity of not only continued and increased endeavor to control the spread of this serious menace in localities where it has been found, but also to prevent its entry into regions still free—or supposed to be—from this disease. The fact that the rust has not been turned up in a community does not prove conclusively that infection is absent, nor is it any guarantee that it will not appear eventually.

There is but one known and proved measure which will successfully check the spread of the rust; namely, the removal of wild and cultivated currants and gooseberry bushes, since these plants are the carriers of this disease from pine to pine. The work carried on by the New Hampshire Forestry Department during the past three years has proved that these bushes can be destroyed effectively and at a reasonable cost.



### Distribution of Blister Rust on White Pines.

The first outbreak was observed in a plantation of imported pines in the town of Marlow by Dr. Perley Spaulding of the Federal Office of Forest Pathology. During the spring and summer of 1916, the Forestry Department, in coöperation with the Bureau of Plant Industry, U. S. Department of Agriculture, conducted extensive investigations to determine the distribution of the disease throughout the pine regions of the State. The result of this work indicated the presence of the rust on either pines or currant and gooseberry bushes in 79 out of 119 towns examined. In practically all towns where the disease was observed only on currants or gooseberry bushes in 1916, it has since been found on white pines, thus proving conclusively that it is bound to crop out eventually on the pines as long as currant and gooseberry bushes are permitted to remain.

While 1917 marks the first systematic attempt to remove and destroy wild and cultivated currant bushes, the importance of increasing the knowledge as to the prevalence of the rust on pines was not lost sight of, for continued scouting was carried on in conjunction with the control work of 1917, 1918, and 1919. During these years, new outbreaks on white pines were reported from 43 additional towns.

The size of infected areas thus discovered ranged from plots of a few trees to several hundred acres. At many points where diseased pines have been found the trees are already dead or dying; in others the growth is noticeably stunted. Re-inspection of infected areas from year to year has indicated that this disease is fully capable of effecting serious damage in as brief a period as twelve months; in fact, many pines, green and living a year ago, have been found during the past summer with trunks so weakened by the attacks of the rust that several feet of



the top have broken off. There are many regions where serious loss is bound to occur within a few years.

A survey made by the Federal Office of Blister Rust Control during the late winter of 1919-20, along and in towns adjacent to the Ammonoosuc Valley, showed that on a strip seventy miles in length, 24 per cent of the pines were infected with blister rust. In this same region, on a plot of 43 acres, investigations indicated that 55 per cent of the pines were diseased.

In the Spring of 1920, the Federal Office of Blister Rust Control made available additional funds for the purpose of inspecting pines in towns which had never been examined. This work was carried on under the direction of the Forestry Department. Out of a total of twenty four towns thus scouted, diseased pines were found in the following eleven towns, Newbury, Sunapee, Newport, Northfield, Northwood, New Durham, Bedford, Hollis, Chester, and Derry. The largest areas of infection were located in Sunapee and Newbury. A careful count on the Newbury area showed that over 800 pines were seriously affected by the rust.

During the last summer, crews engaged in the destruction of wild currant and gooseberry bushes reported blister rust on pines for the first time in Goffstown, Raymond, New London, Center Harbor, Moultonboro, Holderness, Westmoreland and Surry. Other members of the field force have located during the same period diseased pines in Marlboro, Lempster, Laconia, Lyme, Langdon, Eaton, Tuftonboro, Tamworth, Tilton, Belmont and Rye. Thus, a summary of inspection work indicates that the rust has been found in 1920 in twenty-nine additional towns.

Infections notable on account of the large areas which they cover or because of the loss already effected, may be found in the towns of Temple, Swanzey, Stratham, Sunapee, Newbury, Hebron, Orford, Ossipee, Tamworth, Conway, Littleton, Lisbon, Landaff and Hampstead.

### **Distribution of Blister Rust on Currants and Gooseberries.**

A most alarming fact, brought out as a result of the control measures now being carried on, is that in every town where either eradication work or scouting has been conducted, cultivated as well as wild currants and gooseberries are found to be generally infected. This condition is brought about by the ability of the rust to spread long distances from infected pines to currant bushes, and also because of its added power to jump from bush to bush. Many persons contend that the removal of cultivated currants or gooseberries is often unnecessary because their distance from white pine is too great to cause infection. This contention might have weight if it had not been proven conclusively that the disease can and does travel long distances by passing from one currant bush to another, thus affording ample opportunity for the disease to reach pines in this way. In all control areas, therefore, it is important to remove all cultivated currant and gooseberry bushes in addition to the wild varieties. Thousands of actual tests and examinations in the field emphasize the necessity of immediate, concerted and continued action on the part of the State and owners of pine woodlands towards the destruction of all currant and gooseberry bushes both cultivated and wild.

### **Results of Control Measures.**

Since the late spring of 1917, systematic destruction of wild and cultivated currant and gooseberry bushes have been carried on by the Forestry Department, financial coöperation being received on the dollar for dollar basis from the Federal Bureau of Plant Industry. The following tabulation indicates in brief the progress made during the past four years to date:



**Table VII.**  
**PROGRESS IN CONTROL WORK—1917 TO 1920.**

Year.	Number of towns worked.	Acres covered.	Average cost per acre.	Wild bushes destroyed.	Cultivated bushes destroyed.
1917	4	23,043	\$0.42	462,500	500
1918	30	66,292	.39	959,312	8,427
*1919	49	164,413	.19	1,659,936	21,171
†1920	49	203,641	.175	2,057,936	21,298
Totals.....		457,389	.227	5,139,704	51,396

\*Work in three towns now completed.

†Work in six more towns completed.

### Coöperation with Towns.

The year 1919 marks the second season in which towns in this State have appropriated funds for the purpose of coöperating with the Forestry Commission and the United States Department of Agriculture in the control of this disease. Re-appropriations were made that year by 36 towns and 16 additional towns appropriated for the first time. Through the aid extended by the Federal Government, the towns were offered State and Federal aid on the basis of \$3.00 for each dollar of town money, the State covering the town appropriation dollar for dollar and the Federal Government covering both State and town with an equal amount.

In the spring of 1920, in addition to the re-appropriations made by 30 towns, funds were voted by 21 new towns for blister rust control, the total amounting to \$8,275.00.

### Private Coöperation.

One of the most significant developments in blister rust control may be found in the widespread interest by private owners of pine growth who have paid for the



removal of currant and gooseberry bushes upon their own property. That this interest is rapidly increasing is proved by the fact that while in 1919, 42 persons and organizations paid for such control work, in 1920, more than 100 individuals, firms and organizations coöperated in blister rust control. Among this number were four manufacturing enterprises, three lumber companies, two hotel corporations, one commercial forest nursery and one large park association. Nearly one thousand dollars were contributed in the towns of Hebron and Surry for private coöperation, the majority of the contributors being residents of these two towns.

A large number of requests for coöperation in 1921 have already been received by the Forestry Department. At the present time, all private subscriptions are met on the dollar for dollar basis by the Federal Government, there being no State funds available for such a purpose. The general plan of coöperating with woodland owners is for the individual to pay an amount necessary to cover his own land. An equal sum then becomes available from Federal funds and is used in extending his protected area, thus offering additional protection to the coöperator's pines.

### Organization.

The actual field work in blister rust control is handled by Mr. L. E. Newman, a Federal agent of the Bureau of Plant Industry, U. S. Department of Agriculture, under the direction of the State Forester. There are two town supervisors who are in direct charge of the State crews, each crew consisting of a foreman and six men. The work of all the crews engaged in the removal of wild and cultivated currants and gooseberries is checked by inspectors of the Federal Government.

### Plan of Work and Eradication Methods.

Before the actual destruction of currant and gooseberry bushes is begun, an examination is made of the town in which such work is to be carried on, in order to select the proper area as a control area, with due regard to points of infection and the amount of young growing white pine. Owing to the limited amount of money available in the several towns, it is not possible to cover the whole of any town in any one season. The location of the control area having been determined, posters are then placed in different parts of the town, declaring either the whole town or a specified section a control area, thus conforming to Chapter 187, Laws of 1917.

A feature of control work worthy of mention is the success of what has been termed the "advance scouting" method in the eradication of currants and gooseberries. Previous to 1919, during the process of locating and destroying bushes, it was found that there were many areas in which but few currant bushes existed, and it was proved by experimentation that larger areas could be covered with a lower cost per acre by utilizing a man to make a preliminary examination of the areas where control measures were to be put into effect. This man, known as an advance scout, equipped with a map of the region, carefully examines all water courses, swamps and other places which experience has shown are the most likely places for currant and gooseberry bushes to grow. In addition, the higher points of land are also carefully examined and where such bushes are found only scattering, or in numbers too small to warrant the use of a crew, they are removed by the scout as he progresses. Any plots of currants and gooseberry bushes which are so extensive as to make their removal impracticable by the scout are carefully marked by means of



symbols designed for this purpose and the crew foreman takes his men to such points and the bushes are removed. By this method, it is possible to examine and to give protection to larger areas of pine growth with the available appropriation than was possible under the old method formerly used. That this scheme of advance scouting is practicable and efficient is proved by many checks which have been made of the scout and crew work. It is obvious that it is much more economical to secure the removal of currant and gooseberry bushes through the medium of one man where conditions warrant such a procedure than to utilize the services of five or six men.

#### **Effective Removal of Currant and Gooseberry Bushes.**

It is claimed by some persons to be impossible to locate and destroy wild currant and gooseberry bushes with reasonable completeness. As proof that this claim is erroneous, mention is made of a checking system inaugurated to determine the thoroughness of the work performed by the eradication crews. The foreman of every crew is required to check over each day a portion of the ground covered by his men, recording the number of bushes found the first time over the plot, and also the number secured the second time. The results of several hundred such checks indicate that the crews are removing better than 96% of the bushes. Equally favorable reports of the crew work have been received as a result of careful inspection by agents of the Federal Government.

#### **The Labor Situation.**

While the results of control work during the season of 1920 exceeded all expectations, both as to quality of work performed and the amount of land covered, there is no



doubt but greater progress would have been made if labor had been more abundant and reliable. It is important to employ in this work only men of good appearance, who are reliable and intelligent and who are genuinely interested in the work. In normal years comparatively little difficulty has been experienced in keeping the field personnel up to standard, but during the past season efficient help was extremely hard to secure.

The various crews were often short handed and such a condition naturally had a tendency to curtail the projects under way. Considerable time of the field supervisors was necessary in securing labor which at times greatly reduced the amount of constructive work they might have been doing. Out of a total of 266,000 acres covered in the New England States and New York during the past season, however, 203,000 acres are credited to the New Hampshire crews at an average cost of only seventeen and one half cents per acre. This very satisfactory record is due in large measure to the efficient work of the supervisors and crew foremen.

### **Necessity of Continued Control Measures.**

It has been shown elsewhere in this report that white pine blister rust has been found generally throughout the pine regions of this State and that in many sections the amount of infection indicates a loss of pine growth in the very near future. The result to date of the eradication of currants and gooseberries proves that these bushes can be removed effectively and at a very reasonable cost per acre in comparison to the value of the pine involved. The continued presence of both wild and cultivated currant and gooseberry bushes is a decided menace to white pine as these bushes carry the disease from infected trees to healthy ones. The value of white pine in New Hamp-

shire is too well known to necessitate a discussion here, and the importance of protecting such a valuable asset cannot be emphasized too strongly. Inasmuch as there are many towns only partly completed and others in which no work has yet been started, but where the interest is very strong, it is apparent that work should be continued until the pine areas of the State have all received proper protection.

There is a widespread and genuine interest in blister rust control which is evident through the action taken by so many towns and private owners throughout the State. For the past three years town appropriations for cooperative control have averaged each season about \$8,000. Present indications point strongly to a decided increase in the number of coöperating towns and consequently in the appropriations.

In order that eventually much of the burden of actual control work may be withdrawn from the shoulders of the State and Government, it is necessary that additional educational work be carried on. The most effective means of proving to the public locally that the control of this disease is essential may be found in the display of infected specimens and the publishing of information relative to the localities where the rust has been found on the pine. It has been the experience of the Forestry Department that wherever pines infected with blister rust have been found, proper display of such trees always produces a surprising amount of interest and is instrumental in securing immediate action by the local authorities and private parties.

There still remains a considerable number of towns which should be examined for evidence of the rust so that a decision may be reached as to the extent of control measures necessary. This need of preliminary examinations and the very probable increase in town appropriations warrants an increase in the existing State appropriation for blister rust control, thus permitting

more rapid progress in control work. Nearly half a million acres have now been eradicated in New Hampshire. This has cost the State about five cents per acre, the balance having been paid by the Federal Government, towns, and private owners. It will not be time to turn responsibility for protection over to the owners of land or the towns until the pine area of the State has once been covered, which will require seven or eight years longer, at the present rate of progress. Failure to eradicate currant and gooseberry bushes in the pine region will eventually result in as great a loss to pine as the chestnut bark disease has already caused to chestnut throughout its range.

Table VIII is a statement in detail of the blister rust control work, showing the funds available, costs, acreage covered and bushes removed for each town during each of the two years 1919 and 1920.



Table VIII.  
COST OF BLISTER RUST CONTROL BY TOWNS.

CONTROL AREA.	SEASON OF 1919.					SEASON OF 1920.				
	Town, State, Federal Approp.	Cost of work.	Acreage covered.	Average cost per acre.	Wild Ribes destroyed.	Town, State, Federal Approp.	Cost of work.	Acreage covered.	Average cost per acre.	Wild Ribes destroyed.
Alstead	\$400.00	\$396.63	1,190	\$0.333	18,704	\$190.74	\$190.74	673	\$0.283	7,531
Alton	600.00	585.30	2,400	0.243	43,696	800.00	695.94	3,252	0.213	30,359
Antrim	800.00	797.25	3,379	0.236	56,994	800.00	695.94	3,252	0.213	30,359
Bartlett—3	600.00	531.91	1,971	0.269	898	500.00	473.39	1,082	0.437	57,750
Bennington	500.00	154.59	2,131	0.072	1,012	2,000.00	732.38	2,009	0.360	3,579
Blue Mt. Forest Assn.—1	400.00	425.00	1,616	0.263	7,897	2,000.00	327.55	3,520	0.093	2,849
Bow	600.00	500.00	1,768	0.283	21,703	400.00	356.43	1,415	0.251	1,842
Bristol	500.00	154.59	2,131	0.072	1,012	2,281.18	2,054.50	6,065	0.339	60,438
Brookfield	800.00	798.08	4,992	0.159	22,725	400.00	383.08	3,071	0.124	22,814
Center Harbor—1	800.00	798.08	4,992	0.159	22,725	800.00	783.06	3,838	0.204	18,173
Charlestown	800.00	798.08	4,992	0.159	22,725	400.00	368.36	1,480	0.255	69,762
Chesterfield	800.00	798.08	4,992	0.159	22,725	800.00	797.37	3,219	0.247	40,183
Clarendon	800.00	798.08	4,992	0.159	22,725	800.00	797.37	3,219	0.247	40,183
Derry	1,200.00	1,221.86	3,767	0.324	78,511	800.00	649.80	2,539	0.255	33,294
Dover	900.00	720.16	3,006	0.240	8,631	800.00	807.36	3,898	0.237	21,484
Dublin	900.00	720.16	3,006	0.240	8,631	400.00	370.24	2,966	0.194	28,269
Durham—2	1,240.00	1,041.25	4,450	0.236	77,846	800.00	649.80	2,539	0.255	33,294
Epsom	317.80	332.00	1,104	0.299	3,597	800.00	807.36	3,898	0.237	21,484
Exeter—2	2,000.00	1,548.74	5,629	0.273	192,976	400.00	370.24	2,966	0.194	28,269
Farmington	800.00	738.40	3,112	0.238	12,815	111.00	100.08	454	0.220	265
Fitzwilliam	600.00	628.79	412	0.298	27,163	600.00	581.26	2,087	0.278	23,913
Fremont	600.00	628.79	412	0.298	27,163	600.00	581.26	2,087	0.278	23,913
Gilford—1	500.00	178.73	400	0.446	1,100	1,200.00	687.36	9,540	0.072	4,770
Gilmanton	500.00	178.73	400	0.446	1,100	500.00	500.00	2,961	0.174	45,369
Gilsum	500.00	178.73	400	0.446	1,100	500.00	500.00	2,961	0.174	45,369
Goffstown	500.00	178.73	400	0.446	1,100	500.00	500.00	2,961	0.174	45,369
Goshen	500.00	178.73	400	0.446	1,100	500.00	500.00	2,961	0.174	45,369

Hampstead—8	700.00	634.16	3,218	0.197	3,869	600.00	369.87	5,772	0.063	312
Hampton—3	600.00	600.00	5,000	0.120	18,614	400.00	273.96	724	0.378	4,038
Hancock						400.00	383.50	1,152	0.352	4,241
Haver						1,000.00	694.05	2,503	0.276	218,506
Hebron—2	1,010.00	1,001.71	3,000	0.338	38,768	1,088.00	965.80	6,850	0.140	128,540
Henniker	600.00	616.86	2,413	0.255	42,652	800.00	750.39	3,247	0.231	79,098
Hillboro—2	1,000.00	976.97	1,508	0.647	206,688	800.00	693.54	6,865	0.101	65,518
Holderness						800.00	678.08	9,042	0.074	4,786
Holls										
Hopkinton	600.00	569.05	2,764	0.204	12,504	1,600.00	1,300.87	11,216	0.116	15,888
Jaffrey	1,200.00	1,290.24	7,307	0.176	40,198	1,200.00	1,196.50	1,050	0.294	66,789
Keene							639.16		0.606	25,032
Keene Forestry Assn.—1	600.00	620.68	1,283	0.480	44,139	1,000.00	766.52	7,930	0.066	21,025
Kennington						400.00	400.78	850	0.471	16,033
Lancis						400.00	400.00	1,082	0.369	41,303
Langdon						800.00	800.00	1,680	0.490	30,573
Lempster										
Lisbon	800.00	770.04	1,500	0.513	24,002	900.00	859.59	675	1.270	63,016
Litchfield—3	600.00	371.20	9,568	0.038	10,952					
Littleton—2	900.00	940.24	1,100	0.854	36,542					
Madbury	400.00	404.98	1,200	0.337	20,289					
Manchester—1	684.16	745.54	2,832	0.254	16,697					
Marbleboro	400.00	361.23	1,440	0.250	4,227	500.00	432.46	1,251	0.345	31,379
Meredith—2	480.00	418.04	2,458	0.170	31,142	420.00	400.00	15,910	0.025	567
Merrimack										
Milton—3	800.00	563.96	12,994	0.043	10,397	400.00	385.00	2,080	0.185	32,413
Monktonboro						500.00	500.00	1,094	0.457	12,437
Newfields—3	500.00	500.00	900	0.555	47,520	811.28	641.20	1,649	0.388	33,466
Newbury-New London—1						400.00	288.97	1,504	0.128	5,111
New Hampton						800.00	653.44	5,023	0.130	7,972
Newmarket—3	897.20	766.52	2,362	0.320	26,091	1,670.00	1,492.32	2,868	0.586	155,748
Newport—2										
Newton	600.00	581.09	1,950	0.298	12,261					
Newton—2	400.00	397.76	2,582	0.135	27,612	600.00	600.00	1,801	0.333	29,276
Oxford	600.00	632.00	1,380	0.457	9,380	875.00	837.58	11,866	0.073	98,699
Ossipee—2	1,080.00	946.09	3,000	0.316	35,033	379.00	379.56	2,707	0.140	5,774
Peterborough—3	1,080.00	1,263.54	14,484	0.087	113,197	600.00	597.00	945	0.631	79,073
Petermont	600.00	588.96	1,853	0.318	99,385					
Pittsfield	600.00	559.10	2,445	0.238	54,673	400.00	369.84	1,858	0.195	7,264
Raymond										
Raynham	500.00	423.80	3,069	0.137	8,501					
Rumney										
Sandwich—2						1,242.44	1,165.76	3,288	0.354	193,156
Surry—2	900.00	886.32	2,400	0.478	77,767	800.00	743.67	7,082	0.123	18,873
Swansey								4,448	0.165	50,901



Table VIII.—Concluded.

CONTROL AREA.	SEASON OF 1919.				SEASON OF 1920.					
	Town, State, Federal Approp.	Cost of work.	Acreage covered.	Average cost per acre.	Will Ribes* destroyed.	Town, State, Federal Approp.	Cost of work.	Acreage covered.	Average cost per acre.	Will Ribes destroyed.
Tamworth—2	\$1,410 00	\$768.59	3,098	\$0.247	14,861					
Tilton	600.00	562.20	2,753	0.194	56,107	\$800.00	\$600.00	1,733	\$0.324	7,691
Tufonborough						800.00	792.02	2,931	0.270	54,129
Wakefield	810.00	792.20	1,965	0.431	15,852	800.00	435.38	7,688	0.056	14,560
Westmoreland—2						554.00	542.82	2,324	0.233	23,375
Wilton—3	762.00	613.70	11,732	0.052	14,121	1,000.00	920.24	6,403	0.143	71,530
Wolfeborough—2	1,276.00	1,017.98	3,000	0.335	31,142					
Grand Totals	\$36,537.10	\$32,983.35	163,414	0.201	1,659,936	\$41,756.05	\$35,804.48	204,093	0.175	2,061,996

## SUMMARY OF CONTROL WORK.

	Cost of Work.	Acreage Covered.	Average Cost Per Acre.	Wild Ribes Destroyed.	Cultivated Ribes Destroyed.
1919—49 Town Areas worked.....	\$32,988.35	163,414	\$0.20	1,659,936	21,171
1920—54 Town Areas worked.....	35,864.48	204,093	0.175	2,061,996	22,206
	\$68,852.83	367,093	0.189	3,721,932	43,377

1919—The cost of destroying cultivated bushes was \$1,795.94; Total Expenditure, \$34,784.29.  
 1920—The cost of destroying cultivated bushes was 2,181.88; Total Expenditure, 38,172.36.

Note: \*"Ribes," the Botanical name for currants and gooseberries.

1. Project financed by Private and Federal Funds.
2. Project financed by State, Town, Federal and Private Funds.
3. Towns completed.

## PUBLIC FORESTS.

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### Summary of Public Forests in New Hampshire.

White Mountain National Forest .....	433,179 acres
State Forests, received by gift or purchase	12,163 "
State Tracts received under the Reforestation Act .....	250 "
Municipal Forests .....	6,566 "

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Total areas public forest land ..... 452,158 acres

### Owned by Forest Societies and Institutions.

Society for Protection of New Hampshire Forests .....	2,399 acres
Appalachian Mountain Club .....	761 "
Yale Forest School .....	900 "

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Total ..... 4,060 acres

### National Forests.

The following statement on the progress of Federal acquisition and management in the White Mountains is given by Mr. J. J. Fritz, Gorham, N. H., Supervisor of the White Mountain National Forest.

#### Extent.

About 433,179 acres have been approved for purchase in the White Mountain National Forest, of which 383,332 acres have passed title, 355,472 acres being in Coos, Carroll and Grafton Counties, N. H., and 27,860 acres in



Oxford County, Me. In the eastern mountains of the United States the Government has now acquired by purchase a total of 1,443,675 acres.

#### **Administration.**

The headquarters office is at Gorham, N. H. Permanent ranger headquarters are located at Bartlett Village, the east side of the Pemigewasset River in Woodstock, and on Gale River near Pierce's Bridge in Bethlehem. Permits to camp and build fires may be secured upon application to any of the rangers, guards, or the Forest Supervisor at Gorham. Maps and booklets of the White Mountain area showing the location of the National forest, ranger headquarters, and other features may be secured upon application to the Forest Supervisor at Gorham.

#### **Improvements.**

Ranger stations are connected by telephone, and as fast as funds are made available the lines will be extended to points within the forest. Complete plans have been made whereby telephone lines and trails will be constructed to best provide for fire protection.

As the income from forest uses increases, a sum equivalent to 10 percent of the returns will be available for road construction in coöperation with the State and counties in which the National forest is located. Numerous trails have been improved as tracts have been acquired in order to make the area more accessible for the purposes of fire protection.

#### **Recreation.**

A general plan for the development of recreational uses on the National forest is in a formative stage. In addition to the Forest Service taking over some of the more important scenic trails, it has opened to the auto-

mobile campers and trampers, public camp grounds at Copp Spring on the Glen Road, at the crossing of Gale River on the Profile road, and on Wild River. The camp ground at the Copp Spring was used during the summer of 1920 by people from twenty two of the United States, and from the District of Columbia, Hawaiian Islands, England, Scotland, South Africa and Canada.

Recreation within the National forests can be enjoyed with privileges equal to those enjoyed within National parks. All correspondence relating to the recreational uses of the National forest should be addressed to the Forest Supervisor, Gorham, N. H.

#### **Reforestation.**

White and Norway spruce plantings made along the Profile road near Gale River in 1917 show a small percentage of failures. Some small transplant beds are being made at the Gale River ranger station to hold over stock to be had from the State and other nurseries until it can be planted to advantage on idle non-agricultural lands.

#### **Timber Sales.**

Approximately 4,000,000 feet board measure of both hard and soft wood timber have been cut during each of the last two years under sales administered by the Government. This is only about twelve per cent of the annual growth. All timber to be removed is marked or designated by a forest officer. Soft-wood brush is required to be burned while cutting is in progress. Spruce and balsam fir are utilized to a four-inch top diameter and in log lengths down to four feet. Ordinarily, a cutting diameter of 12 inches, breast height, is the minimum allowed for spruce, fir, hemlock and pine. Hard woods are utilized down to eight foot lengths, according to the species being removed. Such portions of the tops as are not utilized for cordwood must be limbed out so that they will lie close to the ground to insure their rapid decom-



position. All timber is scaled before removal from the forest. The cubic foot rule is employed in scaling National forest timber, 161 cubic feet equaling 1,000 board feet Blodgett or New Hampshire rule, which is the standard log rule in the White Mountain region.

In timber sales amounting to over \$100, the regulations require that they must be advertised in at least one newspaper for a period of at least 30 days previous to the closing of bids. All timber is paid for in advance, and in large sales a bond is required to insure compliance with the terms of the contract.

The general policy of the Forest Service will be to make small sales rather than large ones, having always in mind to serve the greatest number of people within and adjacent to the forest, and to make improvement cuttings. Close utilization, brush disposal, the improvement of the stand, stream flow, protection and fire prevention are the primary results sought, and the removal of mature timber wherever the conditions warrant.

Under the terms of the Weeks Act, 25 per cent of the gross revenue from National forests is paid to the State Treasurer to be disbursed to the towns from which this revenue is derived.

### State Forests and Reservations.

Under the law the Forestry Commission is authorized to purchase land for State Forests and to accept gifts of land for the same purpose to be managed and reforested as examples of forestry demonstration and timber protection. Approximately \$5,000 per year has been made available for purposes of purchase and care of State lands. The general policy has been to acquire small areas, for the most part cut over, and by planting and improvement cutting to bring these areas into valuable growing condition to the limit of the funds available. The demonstration value to the public is always kept in view. It

has been the policy to purchase areas along public highways wherever possible, in order that the educational value and also enjoyment by the public may be as extended as possible. These tracts are scattered over a large number of towns in various parts of New Hampshire. In addition to the small demonstration tracts there are a number of mountain reservations of larger acreage some of the more valuable of which have been donated to the State. While the price of land has increased somewhat within the past two years, it is still possible to acquire cut over land for as low as \$4.00 per acre up to \$6.00 per acre.

Acquisition of forest land by the Government and State has passed the experimental stage. It is a public necessity. We are now beginning to realize the great mistake made years ago in giving away title to its wild forest lands. The very lands now being acquired by the Government and which will in the future have to be acquired by the Government and State in cut over and devastated condition formerly belonged to the State and, with all the glory of virgin timber, were turned over to town proprietors, educational institutions and private individuals without any adequate compensation or assurance even that the future productivity of these lands would be maintained. Nearly one half million acres have been sold by the State of New Hampshire at an average of eight cents per acre. We might have supported the State Government in large part out of the revenue from these lands and still owned them in productive condition today. The public now begins to realize that Government and State ownership of much greater areas than at present will eventually be necessary in order to guarantee a supply of wood and timber for future generations to use.

The State forests and reservations acquired to date are listed in Table IX which shows also the date of acquisition, location, area, purchase cost, planting cost, number of trees planted and the total cost per acre for each tract.



Table IX.  
STATE FORESTS AND RESERVATIONS.

NAME.	Date of Transfer.	Location.	Area.	Condition of Tract.	Purchase Cost.	Purchase Cost per Acre.	No. of Trees Planted.	Planting Cost to Date.	Cost of Land and Planting per Acre.
Miller Park—1 .....	1891	Peterborough.	3	Ledge.					
Cathedral and White Horse Ledges—1 ...	1901	Bartlett and Conway.	40	Open pasture, pine, and ledges.			6,000	\$75.00	\$15.00
Monadnock—1 .....	1915	Jaffrey.	493	Old pasture and young spruce.			9,000	148.98	19.86
Haven—1 .....	1908	Jaffrey.	95	Mature pine.			1,500	21.82	17.74
Harriman-Chandler—1	1911 and 1919	Warner.	405	Old pasture, spruce and hardwoods.			38,900	353.96	11.21
Crawford Notch—2 ....	1913	Hart's Location.	5,925	Hardwoods and spruce.					
Merriman—3 .....	1913 and 1919	Bartlett.	417	Pine and Hardwoods.	\$150.00	\$8.82			8.82
State Nursery .....	1914	Boscawen.	143	Farm buildings and woodlands.	3,435.00	24.02	21,400	161.66	33.16
Huckins—1 .....	1914	Ossipee.	100	Cut over.			48,500	438.06	10.95
Everett, formerly Dunbarton .....	1915	Dunbarton.	56	Cut over.	362.00	6.46	11,100	89.94	15.44
Walker—1 .....	1915	Concord.	45	Cut over land, and pine.			24,500	331.51	16.37
Davisville .....	1915	Warner.	32	Burn.	125.00	3.91	31,000	360.45	17.98
Alton Bay .....	1915	Alton.	269	Cut over.	523.50	2.50	37,500	559.67	17.01
Mast Yard .....	1915 to 1920	Concord and Hopkinton.	396	Cut over and burned.	2,094.00	5.29	147,750	1,371.33	16.59
Sentinel Mt. ....	1915	Piermont.	143	Spruce and old pasture.	712.50	4.98	22,500	155.25	13.16
Livermore Falls .....	1916	Campton.	134	Young pine and hard woods.	910.00	6.79	50,000	720.36	24.27

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Blue Job .....	1916	Farmington.	99	Young pine and hard woods.	700.00	7.07	7,000	99.25	21.69
Mascoma .....	1916	Ganaan.	174	Cut over and young growth.	700.00	4.02	34,000	458.83	20.35
Litchfield .....	1916	Litchfield.	122	Cut over and burned.	325.00	2.56	6,000	91.83	20.92
Salmon Falls .....	1916	Rochester.	20	Cut over.	60.00	3.00			3.00
Bear Brook .....	1916	Allenstown.	413	Cut over and young pine.	1,000.00	2.42	8,200	76.04	13.92
Sugar Hill—1 .....	1917	Bristol.	57	Pine and hard woods.			9.75	40.68	40.68
Kearsarge Mt. ....	1917 and 1919	Wilmot and Andover.	839	Open pasture, pine, and spruce.	6,396.50	7.62	20,000	434.88	22.01
Jeremy Hill .....	1917 and 1918	Pelham.	63	Young pine and hard woods.	825.00	13.09			13.09
Cardigan Mt. ....	1918	Orange and Alexandria.	700	Young spruce and hard woods.	2,950.00	4.21			4.21
Honey Brook .....	1918 to 1920	Axworth and Marlow.	284	Cut over, pine, and hard woods.	1,700.00	5.93	14,500	266.79	28.25
Stoddard .....	1918	Stoddard.	71	Hard woods and pine.	335.00	4.71			4.71
Dodge Brook .....	1919	Lempster.	62	Cut over.	248.00	4.00			4.00
Black Mt. ....	1919 and 1920	Haverhill.	343	Open pasture and young spruce.	637.52	1.85			1.85
Scribner-Fellows—1 ..	1918	Ashland.	140	Cut over.					
Contoocook .....	1920	Hopkinton.	30	Cut over and burn.	120.00	4.00			4.00
Nottingham .....	1920	Nottingham.	16	Cut over and young pine.	200.00	12.12			12.12
Ponemah .....	1920	Amherst.	63	Cut over and burn.	378.00	6.00			6.00
Crane Hill .....	1920	Henniker.	31	Cut over and burn.	124.00	4.00			4.00
Total .....			12,163		\$25,010.02	\$5.38	557,325	\$6,408.71	\$14.91

1. Acquired by gift or local subscription.
2. Not purchased by Forestry Commission; acquired by Governor and Council under special act.

3. Gift of 410 acres.



## **Description of Tracts Acquired in 1919 and 1920**

### **Chandler Tract.**

Admiral Lloyd H. Chandler gave a tract of 195 acres to the State in 1919 as a memorial to his father, Senator William E. Chandler. It adjoins the present Harriman tract in Warner and will be known as the Harriman-Chandler tract. This land lies on the west and north slopes of the Mink Hills and is composed of young hard woods with some scattering pines. The open land will be planted.

### **Kearsarge Mountain Addition.**

In the fall of 1919 a tract of 330 acres was purchased on the northern slopes of Mt. Kearsarge in the town of Andover and adjacent to 500 acres already owned by the State. There is a good stand of spruce, estimated to be 400,000 feet covering portions of the tract together with much young growth. This area is well adapted for a State forest being accessible and suitable for growing timber.

### **Nottingham State Forest.**

This small tract of 16 acres is the first purchase in Rockingham County to be used by the State for forestry demonstration purposes. Situated on the Northwood-Nottingham highway this lot contains some fine young growth of pine, spruce and hemlock. The reproduction has seeded in from an adjoining stand which has been thinned at times but not entirely cleared. The growth ranges from seedlings to trees of almost merchantable size. Areas with no growth will be reforested.

### **Merriman Addition.**

A long narrow strip of 17 acres of young Norway pine and hard woods were purchased to straighten out the lines of the original Merriman gift in the town of Bart-

lett. This land is on the southern side of the State forest and was formerly part of the Kimball farm. The Norway pine is of good size and condition.

**Dodge Brook State Forest.**

A purchase of 62 acres of cut-over land in Lempster on both sides of the Newport-Keene highway was made in 1919 for reforestation purposes. The tract is bounded on the west by Dodge brook and along its bank is a valuable stand of young larch suitable for posts. This lot was logged for spruce two or three years ago and the slash in places should be cleared before reforestation begins.

**Craney Hill State Forest.**

This tract consists of 31 acres of cut-over and burned land along the Concord-Keene highway in Henniker and was purchased in 1920. Areas not covered with young growing poplar are suitable for planting. This is part of a large tract of waste land repeatedly burned and which should be taken over by the State to be reforested.

**Contoocook State Forest.**

In 1920 about 30 acres of burned over waste land were purchased on the west bank of the Contoocook river in West Hopkinton. This is a good location for a planting demonstration, being on the Concord-Keene highway adjoining the railroad. A fire line will be made to protect the areas before it is reforested.

**Black Mountain State Forest.**

This tract comprises 343 acres of open pasture and young growing spruce on the west slopes of Black Mountain in Haverhill and was purchased in 1919 and 1920. The area is adjacent to the Black Mountain Lookout Station and will enable the lookout watchman to do



some necessary planting and improvement work from time to time.

#### **Ponemah State Forest.**

This is an area of sixty-three acres purchased in 1920 along the Nashua-Keene highway in Amherst. The land has remained waste for many years as a result of fires. It is easy land to plant and should be the beginning of much larger holdings in this locality.

#### **Honey Brook Additions.**

In 1920 valuable additions amounting to 208 acres were made to the Honey Brook tract in Acworth and Marlow. These lots border the Newport-Keene and the Bellows Falls-Keene highways near their junction. All types and conditions of growth from pine seedlings to stands of nearly merchantable pine are represented. This tract is very accessible and should make an excellent demonstration forest for the handling of timber land.

#### **Mast Yard Additions.**

Additions amounting to 155 acres and composed of many small parcels were purchased in 1920 for the purpose of consolidating the Mast Yard State forest. It is now possible to extend the fire lines protecting the whole area from the railroad. Most of the purchases are burned over lands but two lots contain some valuable Norway and white pine and hemlock. To date approximately 147,000 trees have been planted and are growing well.

#### **Reforestation Tracts.**

The following tracts shown in Table X have been acquired by the State under Chapter 163, Laws of 1915, which provides that areas adapted to forest growth not to exceed 25 acres in any one tract may be deeded to the

State for reforestation purposes and returned to the donors at any time within ten years upon payment of the cost of reforestation with interest at 4 per cent.

Table X.

## TRACTS ACQUIRED UNDER REFORESTATION ACT.

Name.	Location.	Acres.	Date of Transfer.	No. of Trees Planted to Date.
W. D. Baker.....	Rumney .....	25	10- 4-15	25,200
Jason E. Russell.....	Mason .....	25	10-28-15	25,500
George D. Pattee.....	Campton .....	5	10-30-15	6,550
George B. Leighton....	Dublin .....	25	12- 4-15	32,500
Charles E. Tilton.....	Tilton .....	25	4-26-16	23,300
John Q. Hodgman.....	Amherst .....	18	8-10-16	35,000
Charles H. Allen.....	Concord .....	25	8-26-16	33,100
Edward H. Carroll....	Warner .....	25	8-29-16	11,500
Ernest R. Kimball....	Mason .....	25	9-20-16	18,950
Charles H. Pattee.....	Campton .....	8	12- 9-16	9,900
Charles F. Young.....	Merrimack .....	25	15-29-16	29,500
George E. Barnard....	Bow .....	13	2-28-18	6,550
Jasper T. Palmer.....	Brookfield .....	6	11-11-19	6,000
				263,550

## RETURNED.

Jeremiah E. Smith....	Northfield .....	17	7-28-20	8,850
Charles H. Woodman..	Madison .....	18	7-28-20	None

The work of reforesting these tracts is carried on as rapidly as funds and the output of trees from the State nursery will permit. The present high cost of labor and the consequent expense of reforesting land has deterred many persons from deeding their lands to the State for this purpose during the past two years. Several reforestation tracts are now in process of transfer. Two tracts have been returned to their donors during 1920, one having been entirely reforested and paid for, while the other was returned because the expense of reforestation was considered unwarranted.



## **Improvement Work and Planting on State Tracts during 1919 and 1920.**

### **Haven Tract.**

During the winter of 1919-20 some 15 acres of pine were thinned which produced about 42,000 feet of logs which sold locally at \$18.00 per M. Limb wood from this thinning amounting to 50 cords were sold at \$2.00 per cord in the woods. Most of the slash was piled and burned on the snow leaving the area in excellent growing condition.

### **Livermore Falls.**

Hardwoods on about 25 acres of mixed pine and hardwood growth were sold on the stump to different parties. Several thousand pines have been planted where needed so that the tract is gradually being changed into a coniferous forest.

### **Sugar Hill.**

Improvement thinning on about ten acres have resulted in the removal of hardwoods down to one inch in diameter. The brush was piled and burned and the stand is in better growing condition than before.

### **Crawford Notch.**

In the fall of 1918 when coal was difficult to obtain, an extensive cutting of hardwoods from a previous blow-down was undertaken in order to place this much needed wood on the market. A loading platform was built on the railroad, and camps were provided for the men. A total of 346 cords were cut and shipped to different markets. The results were not financially profitable but much down timber was removed along the State highway and the wood was greatly needed by the public. This operation was justified only by the war emergency existing at the time.

Improvements along roadsides bordering the State reservations have been made on the Carroll reforestation tract and the Gerrish, Everett and Alton Bay State forests.

Table XI shows the number and species of trees planted on the State forests and reforestation tracts during the past two years.

Table XI.  
PLANTING ON STATE TRACTS.

Name.	Species.	Spring, 1919.	Fall, 1919.	Spring, 1920.
Mascoma	Norway Spruce	16,500	.....	.....
Sugar Hill	White Pine	800	.....	.....
	Norway Spruce	100	.....	.....
	Fir Balsam	75	.....	.....
Alton Bay	White Pine	.....	1,000	6,500
	Scotch Pine	30,000	.....	.....
Kearsarge Mountain	Norway Spruce	7,500	5,000	8,500
	White Spruce	5,000	.....	.....
	White Ash	.....	3,000	.....
Monadnock	Douglas Fir	3,500	.....	.....
	Norway Spruce	3,500	.....	.....
Salmon Falls	Red Pine	3,000	.....	.....
	Scotch Pine	5,000	.....	.....
Livermore Falls	White Pine	.....	25,000	.....
	Red Pine	.....	.....	25,000
Honey Brook	White Pine	.....	5,500	.....
	Red Pine	.....	4,000	.....
	Scotch Pine	.....	.....	5,000
Chas. H. Allen				
Reforestation Tract	Red Pine	.....	3,500	.....
E. H. Carroll	White Pine	.....	.....	8,000
Reforestation Tract	Norway Spruce	.....	.....	3,500
John Q. Hodgman	Red Pine	.....	.....	2,500
Reforestation Tract	Scotch Pine	.....	.....	2,500
George B. Leighton				
Reforestation Tract	White Pine	.....	.....	3,000
Totals		74,975	47,000	59,500
Grand Total				181,475

### Municipal Forests.

A substantial start has been made by cities and towns in acquiring and managing woodland as municipal forests to protect public water supplies, for park purposes and for production of wood and timber to supply schools and public buildings. It is only a beginning and every town should acquire by gift or purchase a considerable area of forest land for purposes already acquired and also for



future revenue. Towns and cities in Europe have for many years managed forests of their own which are so remunerative that they often pay a large part of the expenses of town government. Such lands should be reforested where necessary and improved by right methods of cutting and kept in the best of growing condition.

The General Court of 1913 passed an act to enable towns to purchase woodlands and manage them for forestry purposes under the direction of the State Forester, the revenue to go to the towns. While most of the present town forests in New Hampshire were gifts to the towns this act will tend to encourage acquisition by purchase. Many of these towns look to the State for advice in the management of their lands. According to the records of the Forestry Department the following woodland areas are now owned by cities and towns in the State:

Town or City	Acres
Concord .....	400
Franklin .....	155
Gilsum .....	76
Hanover and Dartmouth College .....	1,000
Jaffrey .....	500
Keene .....	1,800
Manchester .....	1,800
Milan .....	100
Newington .....	200
Richmond .....	100
Hollis .....	200
Littleton .....	40
Claremont .....	175
Raymond .....	20
Rochester .....	200
Warner .....	800
Total .....	6,566

The Hollis Town Forest is an example of excellent improvement work. During the past two years 100 cords of fuel wood have been cut for use of the town schools. Improvement of young pine growth by removing over topping birch netted an additional 15 cords. A plantation of 15,000 white pines planted by the State several years ago has changed a badly cut over area into good growing condition. Under the terms of the will of the donor the town expends \$50 per year in improvement work and planting. The tract is largely in valuable growing condition already and will eventually be a source of real revenue to the town.

The most recent acquisition is a gift of 800 acres to the town of Warner by Admiral Lloyd H. Chandler in memory of his father, Senator William E. Chandler. This tract of land lies in the Mink Hills and includes a fine growth of mixed pine, hemlock and hardwoods. The mature pine has been reserved by the donor and the cutting operations are under the general supervision of the Forestry Department. The slash left from logging is being disposed of as far as possible and the more heavily cut over areas will be reforested. The tract should furnish an unlimited supply of fuel wood for schools and other purposes and continually increase in value and revenue to the town.

#### Forest Reservations of the Society for Protection of New Hampshire Forests.

Mount Sunapee Reservation .....	656 acres
Lost River Reservation .....	148 "
Roadside Reservation in Tamworth .....	12 "
Masonian Reservation on Monadnock .....	650 "
Primeval Pine Trees in Sutton .....	5 "
Derby Woods on Monadnock .....	125 "

*Royal Arch Reservation in Springfield.....	35 acres
**Portion of the Cathedral Woods in Intervale	10 "
Beaver Meadows, adjoining Lost River .....	152 "
Frank West Rollins Memorial Reservation on Kearsarge Mountain .....	521 "
Richard M. Colgate Memorial Reservation on Mount Sunapee .....	75 "
*Meadows adjoining the Royal Arch Reser- vation .....	10 "
<hr/>	
Total .....	2,399 acres

**Forest Reservations of the Appalachian Mountain Club  
in New Hampshire.**

Madison Spring Reservation, 1888, with Club hut .....	1 acre
Lead Mine Bridge Reservation (Shelburne) 1897 .....	37 acres
Snyder Brook Reservation (Randolph) 1895	36 "
Joseph Story Fay Reservation (Woodstock) 1897 .....	150 "
Three Mile Island (Lake Winnepesaukee) not public, 1900 .....	43 "
Farrar Reservation (Temple) 1901 .....	4 "
South Baldface Reservation (Chatham) 1902	10 "
Kearsarge Reservation (Chatham) 1902 ....	10 "
Rhododendron Reservation (Fitzwilliam) 1902	300 "
Sky Pond Reservation (New Hampton) 1910	100 "
Walter R. Davis Reservation (Jackson) 1913	30 "
Cold River Camp (North Chatham) 1919 ...	40 "
<hr/>	
Total .....	761 acres

\*Title rests in the town of Springfield.

\*\*Gifts of Charles W. Hubbard and his sister, Mrs Davis.  
Title rests in the town of Conway.



The following huts are located on reservations of the Appalachian Mountain Club: Madison Spring, Carter Notch, Lakes of the Clouds, Refuge Hut and the Pinkham Notch Chalets.

#### Yale Forest School Tract.

The Yale Forest School during the past few years has acquired a reservation of 900 acres on both sides of the State road from Keene to Hinsdale in the town of Swanzey. This reservation is part of the equipment for forestry instruction and the woodlands are being brought into valuable growing condition through the cutting out of hardwoods from pine and by planting.

The Forestry Department does not have a complete record of forest lands owned by other public and private institutions and associations. There are many such scattered about the State and it is the purpose not only to become acquainted with them, but if possible to coöperate in their management and improvement.

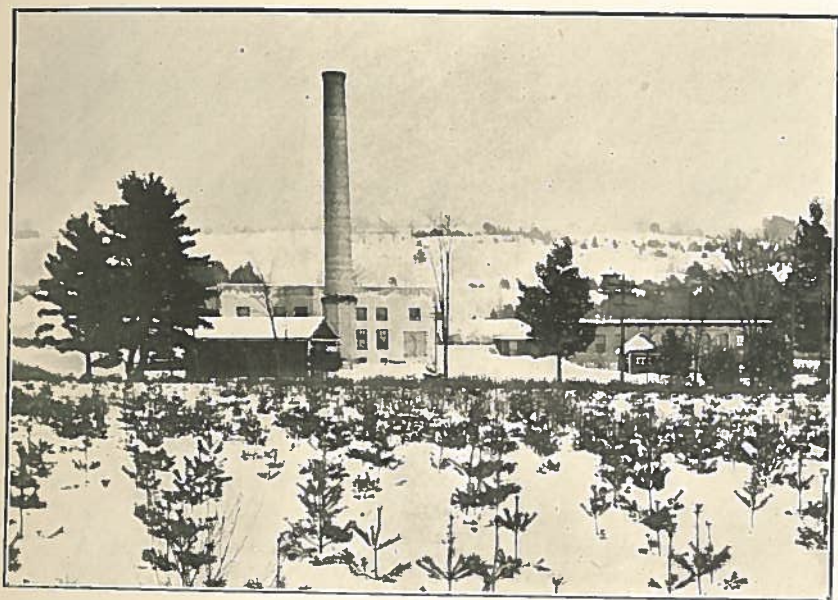
## REFORESTATION

Owing to war conditions no trees were shipped from the State nursery during the fall of 1918. In the spring and fall of 1919 the shipment of trees was resumed both for State land planting and for planting by private owners. Not until the spring of 1920 had anything like normal conditions returned with reference to planting work. The difficulty in securing labor and the cost and inefficiency of labor available have made work at the State nursery very difficult and expensive. This is also true of the work of tree planting by the State and private owners. Planting on State forests has been of necessity greatly curtailed. The past spring 237,138 trees were shipped from the State nursery, 75% of which were planted by private owners. This indicates a distinct desire on the part of land owners to plant trees in spite of the cost and the labor difficulties. There is considerable demand for trees to be planted another year. Several parties have placed tentative orders from 25,000 to 50,000 each and with the easing up of labor conditions the demand for trees will soon be greater than before the war. Table XII is the record of planting from the State nursery during the past two years.

Table XII.

### PLANTING RECORD 1919 AND 1920.

Period.	Trees Planted on State Forests.	Trees Planted on Ten- Year Tracts.	Trees Sold for Private Planting.	Totals.
Fall, 1918.....				none
Spring, 1919...	74,975		38,525	113,500
Fall, 1919.....	43,500	3,500	23,356	75,356
Spring, 1920...	40,000	19,500	177,638	237,138
Total .....	158,475	23,000	244,519	425,994



White Pine Plantation near Concord.  
Photograph taken in 1915.



Same Plantation in 1920.



Trees are sold from the State nursery at \$8.00 per thousand, which is close to the actual cost of growing them. It is expected that this price will be increased somewhat another spring. Early last spring a brief planting circular was issued, describing the relative suitability of the four kinds of trees supplied from the State nursery and giving directions for handling the trees and the methods of setting them out. Of the four species supplied white pine is the best for general planting but is not adapted to high elevations, swampy places or very light sands without shade. Red pine is a fair substitute for white pine generally and grows somewhat better on light sands or gravelly soils without shade. Scotch pine is rapid growing and although inferior as a timber tree it is well adapted to sand plains and the poorest soils. Norway spruce grows fast and may be planted at high elevations or on low, poorly drained soils. It is not believed that the planting of white pine should be discouraged on account of the blister rust disease, but currant and gooseberry bushes should be completely removed from the vicinity of areas to be planted to white pine.

Two men work together to the best advantage in planting trees. A heavy spade or mattock and a pail are the only tools necessary. The standard spacing is six feet apart each way which requires about 1,200 trees to the acre. As a rule it is seldom necessary to plant over 1,000 trees to the acre. When the grass and vines make a heavy cover it is better to use a mattock to turn back a large turf and then set the trees in the center of the bare spot. By this method one man prepares the hole, while the second man follows with a pail containing enough water to cover the roots and sets a tree in each hole and carefully tamps the soil around it. The mattock man should not get far enough ahead of the planter for the holes to become dry.

In spade planting, the spade is stuck vertically in the ground, worked forward and back until a hole is opened large enough for the roots to be placed in the bottom. The planter working closely with the spade man, inserts the roots either before or after the spade is removed, as the soil may require. As soon as the roots are in place the spade man stamps beside the opening once and steps ahead to make the next hole. By so doing the tree is held in position until the planter can rise to his feet and thoroughly tamp the soil about the tree. Two men can easily plant an average acre of land in a day.

The present area of the State nursery including the farm and woodlands is 142 acres. Of this, 24 acres are tillable but 16 acres are unfit for growing trees because of heavy or uneven soil conditions and poor drainage. For a number of years the Forestry Department has rented a boarding house and one and a half acres of good land adjoining the nursery which will not be available another year. The greatest yearly output from the nursery has been 443,000 trees, including trees grown on leased land. Without this land and eliminating areas unfit for growing trees there are only eight acres available for nursery use. The area of eight acres can produce perhaps 800,000 trees but to do this it will be necessary to spend \$1,700 for an improved water supply in addition to considerable expense for building up the soil with crops and fertilizer.

It is believed that the State should be able to supply trees in greatly increased quantities. There is a quarantine against the shipment of trees into New Hampshire from other states and there is only one commercial nursery in the State. People expect the Forestry Department to supply them with forest trees. We must look ahead many years to measure the possibilities of forest planting. An output of one million trees annually can easily be anticipated. Several years are required to build



up a State nursery since no trees are large enough to be shipped until they are at least three years old. A new nursery site including buildings should be purchased at a cost of not less than \$8,000. Such an area should be selected with special reference to an unlimited water supply and should be near a labor center so that the necessary help can be secured and boarded during busy periods at the nursery. With the purchase of a nursery site the Forestry Commission should be authorized to sell the present State nursery, farm and buildings as soon as the trees now growing there are disposed of and return the funds received to the State Treasury.

Roadside tree planting should be encouraged. The Forestry Department has in the past furnished many trees for planting along State highways and by towns and schools. Since the war started this practice has been largely discontinued, but should be revived. The suggestion has been made that each town plant one memorial tree for every person who went to the front from his town or who gave his life during the war. This has been done in many parts of the country. Tree wardens should be appointed by the mayors of cities and the selectmen of towns, as provided by law, to look after the welfare of shade trees and encourage the planting of new trees. Women might very properly be appointed to this position in many towns and school teachers among others should interest themselves in this field of work. As soon as there is a demand for shade trees by towns and municipalities the Forestry Department is authorized and will endeavor to supply the trees free of charge.



## SURVEY OF FOREST RESOURCES.

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There is a wide variation of opinion among persons well informed on forest conditions in New Hampshire as to the amount and condition of our forest resources.

Some think our forests are all but exhausted and that woodlands everywhere are in a deficient condition. Others insist that we have more merchantable timber today than half a century ago and point to thousands of acres of old pasture now in second growth forests to prove their contention, forgetting that sections remote from agricultural districts were then to a large degree composed of virgin timber. There have been many speculations, but no authentic information or basis for an intelligent answer to the question of what our forest resources really comprise. Many who were most familiar with conditions were loath to hazard opinions.

The Forestry Commission began a survey to determine the amount and character of our forest lands in the summer of 1919. Typical towns in Merrimack County were examined. The land areas were divided into four classes, namely, merchantable timber, young valuable growth, waste and inferior growth, and improved farm land and pastures. The amount of each kind of merchantable timber and a division of young growing timber into soft woods, hard woods and mixed growth were obtained. The tabulated figures were checked by various persons in each town who were familiar with local conditions and a map was prepared showing the various classes of land as a check on the figures obtained. In the spring of 1920 the work was modified to some extent, maps were abandoned and every available agency of the Forestry Department

came into use in order to cover as large a percent of the state as possible during the current season. Crews engaged in scouting for the blister rust disease, district fire chiefs and other field agents made this work an order of business in connection with their regular work. No special funds have been available. Mr. A. W. Gamash, formerly Assistant Professor of Forestry at New Hampshire College, worked during the summer months and alone gave his undivided attention to this project. The survey has not yet been completed, but 130 towns have been covered, making a total of 58% of the State. The importance of the results so far warrant a rather complete report on the subject.

The results are being shown under two groups. The northern consists of Coos, Grafton and Carroll counties and the southern is made up of the seven other counties. Table XIII gives for each group the various divisions of the actual area covered by the field men in this survey and also gives the results for the entire group, assuming that conditions for the entire group are proportionate to the area actually covered. It is hoped to complete the 42% of the State another year and then correct the estimates herein given.





In round numbers the total area of the state is 5,830,000 acres. This has been determined from maps of the Forestry Department in the absence of any uniform figures giving town areas elsewhere obtainable. Of the total area of the State 1,120,000 acres or 19% are classed as merchantable timber; 1,687,000 acres or 29% as young valuable growth; 1,745,000 acres or 30% as waste and inferior growth; 1,110,000 or 19% as improved land and good pastures; and 168,000 acres or 3% as water surface. It is interesting to note that the area of merchantable timber is about the same as the area of tillage and good pasture.

The area classed as merchantable contains approximately 7.8 billion feet of merchantable timber. Of this 25% is pine, 34% spruce, 4% hemlock and 37% hardwoods. Poplar, which is a valuable paper wood, is included with the hardwoods and could not be separated.

The area classed as young valuable growth is divided into soft wood, spruce and fir, 30%; mixed soft woods and hard woods 32%, and hard woods 38%.

It should be understood that young valuable growth means unmerchantable growing timber of various species ranging from areas of reproduction to areas approaching the merchantable stage, with the ground well stocked with trees and promising to furnish our supply of timber when the present merchantable timber is exhausted. It was found to be impossible to divide this, except roughly into soft woods, mixed growth and hard woods, or to express the amount in terms of board feet. Much of this growth will not be merchantable for 50 years; some of it under present methods of logging small timber will come into the market in a much shorter time.

The term waste land is intended to represent recent burns not reproducing to valuable species, rock out-crops and steep slopes with deficient soil covering and absence of seeding trees and other areas reforesting to worthless

scrub oak or such species as gray birch, which has only a fuel wood value. Considerable of the so called waste area can supply wood for fuel but it is not likely to become restocked with growth of higher merchantable value, except by planting. No figures are given to show the amount of fuel wood in the State.

A consideration of these figures gives much food for reflection. The average yearly production of lumber and pulpwood during the last ten years in New Hampshire is about 650 million feet. If this were all cut within the state, which is not true, our present estimated stand of merchantable timber would last about twelve years. To be conservative it may last fifteen years, after which we will have to draw largely, if not entirely, upon the area of young valuable timber. This area of 1,687,000 acres, large as it may appear to be and important as it is, cannot begin to supply the needs of our State, even assuming there is no loss to our valuable growing timber in the years to come through fire and disease. There will inevitably be a falling off of lumber and pulp production far below the present output, although there is every likelihood that hardwoods not now of high value will be used for pulpwood with spruce, fir and poplar. With even higher prices and values than now prevail no timber will be too inaccessible to reach the market. It is needless to emphasize the importance of protecting from fire and disease our young valuable timber lands as well as the merchantable timber areas upon which our future supplies depend.

The waste land area represented by 1,745,000 acres, which is approximately the same as the area of young valuable growth, is not now producing timber of value for future use. This is idle land, made so largely by cutting and fire, which if reforested to valuable species would enable us eventually to double the output of timber and to supply our local needs indefinitely. Approximately

two thirds of this waste land area lies in the southern counties of the state. It is most abundant where population and market for timber are greatest. The reforestation of this vast area is the most difficult problem to solve in our whole scheme to make lands continuously productive. There is no question but some means of reforesting these lands will have to be worked out in the future.





Logging White Pine in Southern New Hampshire.  
This area was an old field 37 years ago.



Forest Fire Trailer.  
Supplied to towns at half price—\$70.

## GENERAL SUBJECTS.

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### Work of Forestry Department on Private Lands.

One of the most interesting developments of the Forestry Department during the past two years is the work done for owners of private land, towns, and public institutions without expense to the State. While every effort has always been made to assist parties in improving their land it has not been until recently that actual work by agents of the Department was possible. An effort has been made to secure such work during the period between fall and spring in order to retain trained and experienced foremen of the blister rust crews who handle the field work for the State and Government during the summer period. It is most undesirable to lose the services of these men after they have been on the work for a season or more. This is avoided in part by building up a demand for private work which these men can handle in the winter time. Last winter they were engaged in various kinds of outside work such as pruning shade and ornamental trees, preparing maps and surveys of private lands, thinning woodlands and gypsy moth work. The total amount of work paid for last winter without expense to the State amounted to \$7,193.00. The following is a list of the principal operations carried on:

E. B. Dane, Center Harbor, type mapping 2,200 acres, pruning 2,000 apple trees, gypsy moth work and surveying 3,500 acres.

Walter M. Parker, Manchester, type mapping 800 acres.

Perry Dow, Manchester, type mapping 350 acres.

George Blanchard, Moultonboro. pruning 1,800 apple trees.



New Hampshire State Hospital, Concord, pruning shade and ornamental trees and gypsy moth work.

New Hampshire State Home for Feeble Minded, Laconia, pruning 500 apple trees.

Town of Meredith, pruning street trees.

Guy W. Currier, Peterboro, surveying, thinning, and general improvement work in woodlands.

Mrs. J. A. Tracy, New London, surveying, thinning woodlands and making trails.

Miss Caroline Fox, Hillsboro, improvement thinning of woodland and brush burning.

A large amount of work of this nature can be handled during the winter period and the demand appears to be very great. Plans for next winter are under way and promise to at least duplicate the amount and extent of work performed last winter. If the Forestry Department is to become an agency for actual coöperation with towns, institutions and private individuals there is no reason why a further step toward giving assistance in actual operating and marketing of timber products should not be made eventually. Many private owners of woodland in New Hampshire are anxious to practice forestry on their lands, but are unable to personally supervise the work. There is a possibility of operating woodlands under forestry principles if the state can find the way to take charge of the work for private owners. The value to the state at present is in being able to keep the men needed on State work from one season to another without expense during the winter. In time it may be possible to handle more important operations for individuals and by so doing, help to encourage private forestry practice to a degree not now foreseen.

#### Conway Common Lands.

The General Court of 1915 passed a resolution



authorizing the Forestry Commission to investigate and examine the forest conditions, titles and boundaries and the possibilities of reforestation and proper management pertaining to the transfer of the Conway Common Lands to the State. The Commission has made such investigations up to the present time as could be carried on without special funds for the purpose.

These lands are situated in the eastern part of the town of Conway and include the slopes of the Rattlesnake range. As a result of promiscuous and extensive cutting over a period of many years together with forest fires, the area is almost entirely bare of forest growth and in poor productive condition.

There were originally 69 town proprietors each holding a right to 100 acres of these common lands. During the intervening years these rights came to be widely scattered and the area regarded more or less as common property by those living in the vicinity. At the present time the Maine and New Hampshire Granite Company, which owns and operates a quarry at the southern end of the range, claims to have purchased 61 of the original rights. There are valid acquired rights, which have been passed on by the Courts, amounting to 600 acres more. The Forestry Commission has acquired about 260 acres. There are five, and possibly more outstanding claimants, to satisfy all of which the area would have to be much larger than was originally laid out.

Investigations by the Forestry Department show that it will be necessary to make a careful and complete search of title of all the claimants in order to determine which titles are valid before any final settlement can be brought about. It is the purpose of the Commission to continue the investigations so that a settlement or allotment of lands within the area can be made and a plan worked out for future reforestation and management.

### The Christmas Tree Industry.

The cutting of spruces and firs for Christmas trees is a subject of considerable comment throughout the country, particularly with reference to its effect upon the forests. Many persons are outspoken against the slaughter of trees for this purpose and in some states like Vermont there has been legislation to prevent it. Investigations by the Forestry Department have been made from time to time to determine the extent of shipments of Christmas trees being made from the State. In the fall of 1910 there were 216,000 trees shipped away and in 1912 the number was 360,000. No figures were obtained from 1912 until the fall of 1919 and it is probable that during the war the number of trees shipped fell off considerably. During the past fall there have been approximately 500,000 trees shipped from New Hampshire chiefly from Coos and Grafton counties. The towns of North Stratford, Colebrook, West Stewartstown, Stark, Littleton and Sugar Hill furnish the bulk of the output and shipments were made to points outside of New England as far as Pittsburg and Milwaukee.

Since a carload contains about 2,000 trees the present output requires some 250 cars. This is one of the most serious objections to this traffic in Christmas trees, since the cars would otherwise be available for transporting pulp wood, lumber and other commodities from the same locality, and owing to the distance to which the trees are shipped the cars are slow to return where they are needed.

As a rule the trees are cut from old pastures which are chiefly owned by farmers. Jobbers from the cities approach the owners and either offer them a very small sum for the trees they wish to buy standing or offer to purchase the trees delivered to the railroad. In either case the farmers do not get what the little trees are worth. In some instances where the farmers wish to keep their



pastures clear of trees they are willing to get little or nothing for them. Usually the jobber scatters brush over the pasture, cutting only the best small trees and the tops of larger ones, and leaves the pasture covered with slash and in a dangerous and anything but improved condition. Lumber and paper companies owning young spruce and fir will not as a rule permit the cutting of Christmas trees. They realize the future value for paper and lumber if these trees are left to grow. Pasture trees are more shapely and more readily purchased by jobbers than forest grown trees.

The Christmas tree industry is legitimate and not objectionable if the land owner receives a fair value for his trees and the cutting is spread out in the form of a thinning and confined to trees of the right size for Christmas trees when cut near the ground. Turning a second growth forest of spruce and fir into a slash pile by using only the tops of trees and cutting nearly every tree in sight is not legitimate and should not be countenanced by the owners of land. It is not fair to the farmer to receive only a few cents for trees which may bring several dollars when sold at retail in the city. The land owner should receive a fair value and the cutting should be done with consideration for what is left and what the trees would be worth if left to grow.

To supply the present output of Christmas trees would require an area of approximately 500 acres planted annually and spaced from six to eight feet apart each way. It is believed that at no distant date the growing of trees for this purpose near large centers of consumption will become the practice.

#### **Chestnut Bark Disease.**

The first investigation by the Forestry Commission was made in 1912 in coöperation with the U. S. Department of Agriculture. The disease had then become very



destructive throughout southern New England, New York and Pennsylvania and had gained a foothold in many border towns in this state. An annual appropriation of \$500.00 for two years was made in 1913. After the first season's work it was found that the disease was widespread over the chestnut areas in New Hampshire and no practical means were in sight for stopping its progress. The work of the Forestry Department after that was directed towards gathering information on markets for chestnut and helping woodland owners to dispose of their diseased trees. A bulletin was prepared on the subject in 1914 and upon the advice of the Forestry Commission further appropriations were discontinued.

The rapid spread of the chestnut bark disease is due to its power to pass directly from one tree to another without an alternating host as in the case of the pine blister rust disease. At the present time chestnut trees throughout their range are generally diseased. Trees in a healthy condition and without infection are rare. Young sprouts are destroyed almost as quickly as they develop, while of course older trees succumb more slowly. Most areas of chestnut growth now look as though they had been swept by fire. We are likely to witness the almost complete passing of chestnut from our woodlands, roadsides and pastures. A like fate may come to our white pines eventually if we do not destroy currant and gooseberry bushes wherever the white pine occurs.

### **Taxation of Forest Land.**

The question of the general property tax as applied to growing timber has been under discussion and investigation in New Hampshire, as in other states, for many years. A number of states have passed laws which aim to afford relief to owners of young, growing timber, but no clean-cut, satisfactory substitute for the general property tax as applied to the class of property has yet

been devised. In New Hampshire amendment to the Constitution is necessary before any legislation on the subject is possible. Several amendments have been proposed at various conventions within recent years but have either failed of passage in convention or of ratification by the people. At the convention of 1920 the following resolution to amend Article 5 of the Constitution was proposed, but failed to pass: "That the General Court may provide for such special tax valuation of growing wood and timber upon such conditions and restrictions as will tend to prevent the premature cutting thereof, to assure a continuous supply of forest products and to protect the sources of our streams; and may also provide for taxation of the value of such growing wood and timber when cut at a special rate in excess of rates on other classes of property; and for these purposes may define growing wood and timber and classify the same."

Whether or not a similar proposal will ever again be considered, the fact remains that when timber lots are assessed at near their full valuation the owners will not as a rule continue to hold them and if they do, they are subjected to loss.

The report of the Forestry Commission for 1915 and 1916 analyzes this feature of the subject, and shows also that there is a distinct financial loss to the towns when the valuations are raised to the point where the owners will not continue to hold the timber. Where the assessed valuation exceeds 50 per cent of the actual value on poorly growing lots or exceeds 75 per cent on good growing lots, the owner will generally lose unless he cuts the timber at once and the town will always lose when he does cut.

The problem of forest taxation is not equally acute throughout the State on all classes of forest land. The hardship is most apparent in the white pine sections where growing pine lots are approaching the merchant-



able stage and the question of whether to cut them or to hold them is more likely to be decided by the owner on the basis of what his taxes amount to. It is shameful to see the number of young pine lots which are being cut and thrown on the market prematurely, often when they are in the best of growing condition and should continue to grow for some years longer.

If some simple, easily understood and workable method can be devised for taxing growing timber such as legalizing a lower valuation or a lower rate applied on full valuation when the constitutional objections are removed, it is believed that great relief may be secured to owners without any loss to the towns.

Methods of appraisal should be more systematic and forest lands of the same value should be more uniformly assessed in the same towns, and in different towns. There is also great need for land surveys in most towns in order to check up the areas assessed with the total areas of the towns.

#### **Forestry Work at New Hampshire College.**

The following statement of forestry work at the State College was prepared by Karl W. Woodward, Professor of Forestry, Durham, N. H.

The Forestry Department at New Hampshire College has three main functions. In the first place, a course in woodlot forestry is given to all agricultural students. In addition special training is given to those men who wish to prepare for graduate forest schools and for those who wish to go into the forest industries of New Hampshire.

The second duty of this Department is the prosecution of forest research. Only a beginning has been made in this because of lack of funds.

Likewise, the third function has only been developed to a minor degree because of lack of funds. This is extension work in woodlot forestry. Through the



County Agents it is possible to reach the owners of farm woodlots throughout the State.

### **Society for Protection of New Hampshire Forests.**

It would be remiss to close this report without acknowledging the service performed by the Society for Protection of New Hampshire Forests in developing an interest in forestry among the people of New Hampshire, in shaping and helping to build up our State Forestry organization, and in encouraging the passage by Congress of the Weeks Law, under which the establishment of the White Mountain National Forest was made possible and financial aid was furnished the State in forest fire protection.

In addition to lectures, publication of leaflets and circulars about forestry, and general educational work, the Society holds a summer meeting each year within the State which calls together prominent timberland and woodlot owners, foresters and many other persons interested in forestry within the State and from other States. The Society owns twelve reservations to protect places of unusual importance and natural scenic value for the benefit of the general public, the total area being 2,400 acres. Perhaps the best known of these is the Lost River Reservation in Woodstock. For much of the excellent work done, the Society and the people of New Hampshire are indebted to Philip W. Ayres, who has given the better part of his life to the activities of the Society as its forester.

# FINANCIAL STATEMENT.

## YEAR ENDING AUGUST 31, 1919.

	Appropriations.	Expended.	Balance Unexpended.
Salary of Forester.....	\$3,000.00	\$3,000.00	\$0.00
Field Assistance .....	2,000.00	2,000.00	0.00
Clerical Expense .....	2,000.00	2,000.00	0.00
Traveling Expense .....	1,000.00	1,000.00	0.00
Incidentals .....	1,500.00	1,500.00	0.00
Printing Blanks .....	900.00	900.00	0.00
Printing Report .....	500.00	500.00	0.00
District Chiefs .....	4,800.00	4,800.00	0.00
Lookout Stations .....	7,000.00	7,000.00	0.00
Fire Wardens' Conferences...	800.00	799.10	0.90
Prevention of Fires .....	2,700.00	2,699.30	0.70
Nursery .....\$2,000.00 }	2,970.10	2,969.80	0.30
From Sale of stock 970.10 }			
Care and acquisition of State Lands .....	5,000.00	5,000.00	0.00
Forest Fire Bills to Towns..	7,500.00	7,499.92	0.08
Reforestation .....	2,500.00	2,500.00	0.00
White Pine Blister Rust .....	10,000.00	9,999.70	0.30
Fines .....	20.00	20.00	0.00
	<u>\$54,190.10</u>	<u>\$54,187.82</u>	<u>\$2.28</u>

## YEAR ENDING AUGUST 31, 1920.

Salary of Forester .....	\$3,000.00	\$3,000.00	\$0.00
Field Assistance .....	2,000.00	2,000.00	0.00
Clerical Expense .....	3,000.00	3,000.00	0.00
Traveling Expense .....	1,200.00	1,200.00	0.00
Incidentals .....	1,600.00	1,600.00	0.00
Printing Blanks .....	900.00	900.00	0.00
District Chiefs .....	5,400.00	5,400.00	0.00
Lookout Stations .....	8,000.00	7,999.10	0.90
Fire Wardens' Conferences ..	1,000.00	1,000.00	0.00
Prevention of Fires .....	3,000.00	3,000.00	0.00
Nursery .....\$4,000.00 }	5,606.83	5,606.83	0.00
From sale of Stock 1,606.83 }			
Care and acquisition of State Lands .....	5,000.00	5,000.00	0.00
Forest Fire Bills to Towns ..	7,500.00	4,290.76	3,209.24
Reforestation .....	2,500.00	2,500.00	0.00
White Pine Blister Rust.....	10,000.00	10,000.00	0.00
Fines .....	5.00	5.00	0.00
	<u>\$59,711.83</u>	<u>\$56,501.69</u>	<u>\$3,210.14</u>