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State of Montana

Third Biennial Report

OF THE

State Forester

TO

Hon. Samuel V. Stewart
GOVERNOR

1914



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1914



LETTER OF TRANSMITTAL.

December 1, 1913.

To His Excellency,
Honorable Samuel V. Stewart,
Governor of Montana.

Dear Sir:

In accordance with the provision of Section 10, Chapter 147, Laws of 1909, I have the honor to transmit herewith the third Biennial Report of State Forester for years 1913 and 1914.

Very respectfully,
JOHN C. VAN HOOK,
State Forester.

STATE BOARD OF LAND COMMISSIONERS.

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Office of State Forester.

JOHN C. VAN HOOK.....State Forester
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LUMBER INDUSTRY IN MONTANA.

Lumbering is second only to mining and agriculture as the principal industry of Montana. Montana is, of course, pre-eminently an agricultural state and while agriculture is an important industry in all parts of the State and forms practically the only industry in the larger area of eastern Montana, the lumbering and mining industries are confined principally to the western mountainous section of the state.

A continual and plentiful supply of timber is essential to the agricultural prosperity of the state and is particularly necessary to the mining industry. If we combine the lumbering and wood-using industries of the state and consider with them such parts of the agricultural and mining industries as have to do with the use of wood and lumber, it may be fairly said that the lumbering and wood-using industries of the state are second only to the agricultural and also that the value of their products exceeds the values produced in Montana's mining industry.

The mines at Butte, Montana, annually consume approximately 70,000,000 ft. board measure of lumber, more than 12,000,000 ft. board measure of mining stulls and nearly 200,000 poles. It is estimated that there are now under ground in the mines of Butte nearly one billion seven hundred and fifty million board feet of sawed timber, stulls and lagging, or an amount nearly equal to 3% of the present stand of living merchantable timber in the state of Montana.

The amount of Montana's standing timber has been variously estimated at from 65,600,000,000 ft. board measure to 75,000,000,000 ft. board measure of living merchantable timber. If with this are combined the areas of young growing timber which have not yet reached merchantable size, it is probable that the forests of Montana produce an annual growth equal to 700,000,000 ft. board measure, or an annual growth which could produce nearly 2,000 ft. board measure of lumber for every man, woman and child in Montana.

The per capita consumption of lumber in European countries varies from 25 ft. board measure to 100 ft. board measure per person, so that it may be seen that Montana's forests are as yet producing an annual growth of timber far in excess of the immediate needs of her population.

It has been estimated by the National Forest Service that Montana contains about three per cent of all the standing timber in the United States. Montana's annual production of manufactured lumber represents almost exactly one per cent of all the lumber manufactured annually in the United States. Thus it may be seen that, as compared with the other states, Montana's lumber production is making inroads upon her capital stock of growing timber only about one-third as rapidly as the average state.

The estimates which are probably most correct, approximate Montana's standing timber at 70,000,000,000 ft. board measure of which nearly 25,000,000,000 ft. are privately owned, about 40,000,000,000 ft. are found in the National Forests and a little more than 5,000,000,000 ft. are contained on other Government lands, including Indian and Military reservations.

There are about two hundred mills for the manufacture of lumber in the state of Montana, one hundred and fifty of which were in active operation at least a part of the year 1914. Twenty-four of these are sawmills capable of manufacturing 40,000 ft. B. M., or more of lumber per day, while the larger part of the remainder are small mills which manufacture lumber principally for local consumption.

The 1910 census gives the last accurate figures for the lumber cut, of Montana, by species.

The lumber cut of Montana, in 1910, was made up of ten species, and each contributed the following amounts of sawed lumber:

Species	Cut M. ft.
Western yellow pine	135,817
Western larch	99,283
Douglas Fir.....	53,070
White Fir	13,589
Engleman spruce	10,273
Western white pine	3,090
Lodgepole pine	2,380
Mountain hemlock	1,201
Cottonwood	260
Western cedar	126
	<hr/>
Total	319,089

This by no means represents the total capacity of Montana's mills. The five largest mills in the state, could without the others, manufacture this much lumber in a year. During the past four or five years which have been years of dull, slack business in the lumber trade, several large new mills have been built in Montana and some of the previously existing mills have been considerably enlarged.

It is probable that any coming of greater prosperity and the resumption of favorable market conditions in the lumber business will be quickly marked by a material increase over any previous years in the amount of lumber manufactured by Montana's mills. Many of Montana's largest lumber manufacturers are now running their mills at little less than half capacity and are only waiting for better trade conditions for a marked increase in their output.

In addition to lumber, the mills of this state in 1910 produced over 40,000,000 lath and more than 500,000 shingles, and it is probable that this quantity of production was only slightly exceeded in 1914. To get the full value of Montana's annual production of timber, there must be added to these amounts an annual consumption of stulls and round timbers in the mining industry which, if reduced to feet board measure would amount to more than 15,000,000 feet and an annual consumption in the agricultural industries of Montana of posts and poles and other materials for farm and ranch improvements which are the equivalent of nearly another 15,000,000 feet. Precise figures are not available for the annual production of telephone and telegraph poles, hewed railroad ties, and other wood materials except sawed lumber which are used in railroad consumption, but it is probable that they are the equivalent of not less than 10,000,000 feet board measure annually.

To these figures are yet to be added the large amount of wood taken directly from the forest and used for fuel purposes.

At the present time less than fifty per cent of the lumber which is manufactured within the state is used or marketed within the state. The principal market outside of the state for Montana's manufacture of wood products is found in the prairie states west of the Mississippi river, the larger part of the products being marketed relatively not far beyond the eastern boundary of the state.

The location of market points outside of the state which are reached by Montana's wood products is controlled principally by the rates for railroad transportation of lumber. The Montana manufacturer is able to ship into all the eastern parts of the state at a rate somewhat lower than the rate from northern Idaho and eastern Washington or the Spokane rate; but although this differential in favor of the Montana operator is quite marked to points in western Montana, it decreases rapidly as the eastern boundary of the state is approached, and to the principal market points in North and South Dakota the rates are nearly equal to or the same as the Spokane rate. Montana operators enjoy no advantages in freight rates over the manufacturers of northern Idaho and eastern Washington to points in Kansas or points in the eastern part of North and South Dakota or to any points farther east.

An advantage in freight rates is enjoyed by Montana's lumber manufacturers, and shared with the manufacturers who ship at the Spokane rate, over the manufacturers from Coast points only to points west of St. Paul and Minneapolis, Chicago, Kansas City and Omaha. To these points, just named, and to points farther east, the Coast rates, the Spokane rate, and the Montana rate, are in nearly all cases the same.

Nine different species of conifers and one broadleaf deciduous species are of commercial importance in Montana. The occurrence of these various commercial species in the forests of the state depend principally upon climate and soil and especially upon moisture conditions. Mixed forests of white pine, engelmann spruce, white fir, and western red cedar are found only in the more moist locations on the west side of the Rocky Mountains and reach their best development along the western boundary of the state in the Bitter Root Mountains.

Lodgepole pine seems to thrive better than any other of Montana's commercial species in the drier situations on the east side of the Rocky Mountains and forms nearly pure forests or mixed with Douglas fir on the more exposed situations and with Englemann spruce along the streams. Cottonwood, which is the only broad-leaf deciduous tree of commercial importance in Montana, is found in all parts of the state, principally along the margins of streams or on low, moist ground.

By far the largest stands of commercial timber are those composed principally of larch or western tamarack, Douglas fir, and western yellow pine. These stands are found, together

with forests of lodgepole pine, on the western slopes of the Rocky Mountains, and from there west to the Bitter Root range. In the northwestern part of the state, particularly in Lincoln and Flathead counties, larch forms a nearly pure stand on the best soil. Yellow pine forms pure stands usually only on more dry situations and especially on the flat or gently sloping benchlands along the larger valleys. Over a large part of western Montana, larch, yellow pine and Douglas fir appear in mixed stands in which the larch predominates on the best soils, while yellow pine predominates on the lower, drier slopes, and the forests merge into almost pure stands of lodgepole pine on the higher slopes and summits of the mountain ranges.

Montana's commercial woods have been quite carefully studied by the Forest Service of the Federal Government and the descriptions which follow are taken from the Government's reports:

COMMERCIAL WOODS.

Western Yellow Pine.

Western yellow pine grows in all states west of the Great Plains. In Montana it reaches its best development in the Bitter Root and St. Regis valleys. The wood is soft, has a straight even grain, and works well under a cutting edge. In color it is light yellow, often almost white. Western yellow pine lumber shrinks and warps comparatively little in seasoning. The wood is resinous, but when properly dried little difficulty is experienced from exuding resin. In 1910 over one-third of the lumber cut of Montana was made up of western yellow pine.

Western Larch.

Western larch is the most abundant timber in Montana. The heaviest stands are located in the northwestern part of the state in the vicinity of Kalispell. The texture of the wood renders it less adaptable to general mill work than western yellow pine or western white pine, but on account of its comparative hardness it is preferred locally as a flooring material. The swelled butts common in western larch trees and the frequency of wind shakes cause considerable waste in logging operations, since it is common practice to "butt off" and discard the lower portion of the trunk. On this account the timber cuts a low proportion of uppers.

Douglas Fir.

The Douglas fir cut in Montana does not furnish as high a quality of lumber as that grown in Oregon and Washington. The better quality of Montana Douglas fir is used for flooring and finish, but most of it is used as rough lumber for construction purposes.

White Fir.

White fir is found in small quantities in mixture with other species in the mountains of western Montana. It is cut occasionally in logging other timber and manufactured into common boards and house framing, but contributes only about ten per cent of the total cut of lumber in the state. The wood is light in weight, soft and generally coarse grained, white or light brown in color and straight grained. It is practically free from pitch, works well with cutting tools and has prospects as a pulp wood.

Englemann Spruce.

Englemann spruce finds its best development in Northern Montana and Idaho. It forms extensive stands at high elevations, but has been little exploited thus far. In dense stands, a straight, slender, clear trunk is formed, which is admirable for lumber manufacture.

The wood is pale reddish yellow in color, light in weight, straight and close grained, but not strong or durable. It is practically odorless and contains no pitch. It furnishes less than 10 per cent of the lumber sawed in the state at the present time and is manufactured principally into boards.

Western White Pine.

The quantity of western white pine manufactured in Montana sawmills is small compared with the amount of this species manufactured in Idaho, where the largest stands of this species are found. The wood is generally manufactured into shop lumber and plain surfaced forms for supplying wood-working plants in Montana and elsewhere throughout the United States. Western white pine is one of the finest soft woods known to this country, and because of its high value it is not employed where the cheaper woods will serve.

The wood is almost free from resin and is fine grained and soft. It can be easily dried and has little tendency to shrink or warp. In color it is white or light yellow. It is neither

strong nor stiff as compared with Douglas fir or western yellow pine, and is very light in weight. For purposes where a light, soft, even-grained wood with little tendency to shrink or warp is required, the white pine of Montana and Idaho is the equal of the white pine of the Northeast and the Lake States, which has for so long supplied the demands of Eastern manufacturers.

Lodgepole Pine.

While lodgepole pine contributes little to the lumber cut of the state, this wood is probably the most important in its general uses. The species is found in quantities throughout the forested regions of Montana and is extensively employed for posts, poles, firewood and in the many mines. It is sawed into rough building material. This wood has excellent prospects of becoming highly serviceable as a pulp wood for use by the sulphite and mechanical processes of manufacture.

Lodgepole pine is slightly resinous and is not durable without preservative treatment, especially when in contact with the soil. It is fairly heavy in weight, close, straight grained and easily worked. In color it varies from light yellow to pale brown. The taper of the tree and its strength recommend it for poles, provided the butts are given a preservative treatment.

Hemlock.

Hemlock is found in small quantities at high elevations in Western Montana and is reported as contributing only 1,201,000 board feet, or less than one-half of one per cent of the lumber cut in the state in 1910.

It is a very fine grained wood, soft, not strong and pale brown or red in color. It is manufactured principally into common building lumber. It is not greatly dissimilar to the western hemlock of the coast, and could readily be substituted for that species in many products.

Cottonwood.

Cottonwood is of little importance to the lumbering industry of Montana. However, it serves numerous secondard wood-using industries. Considerable quantities of this species are found within the forests of the state, growing principally along the banks of streams. It is a light, soft, non-odorous wood of light color, and is admirably suited for boxes, butter tubs, slack cooperage, woodenware, excelsior and pulp.

The same species occurs in Western Oregon and Washington, and until the accessible supply was practically exhausted it was extensively used by pulp mills in that region.

Western Red Cedar.

Unlike the western red cedar of the coast, this species is of little importance to the lumbering interests of Montana. A small amount is cut into lumber products by local sawmills. Montana wood-working plants depend more largely on the cedar imported from the state of Washington where the trees grow to much larger size. The small trees of Montana yield excellent pole and post forms, and it is for these purposes that the local cedar serves its best use.

The wood is straight and rather coarse grained, light in weight and dark brown or almost red in color. It is fairly strong and very durable in contact with the soil or in exposed situations.

The western red cedar furnished the standard pole of the western United States. The natural taper of the tree and its durability combined with the reasonable strength of the wood, recommend it for this purpose. Its durability and easy splitting properties are its principal assets for use as posts. While extensively used in the manufacture of shingles in western Washington, the small size of the trees occurring in Montana and the quality of the wood prevent the development of the shingle industry in that state.

ORGANIZATION.

The present force of the State Forester's Office consists of three members, Forester, Assistant and Field Representative. The Forester and Assistant have their headquarters at the State capitol and alternately make trips into various parts of the state as timber sales, fire protection or other lines of work demand, the other member staying in the office and attending the various lines of work. The Field Representative is located at Kalispell, and from his headquarters attends to all work in that locality as well as other timber and protection work within the state when directed by the Forester.

Other work done by the Forester consists of selection, appraisements, and reappraisements of state timber lands, carry on a continuous publicity campaign to create sentiment in

favor of protection from forest fires, post notices in all post offices of the state warning the public against carelessness with fire, and against trespass; prevent trespass on state timbered lands and collect damages from trespass committed. By law, the Forester is required to deliver a course of six lectures at the different state educational institutions during the year, but up to the present time this has not been done owing to the urgency of administrative work.

DISPOSAL OF STATE TIMBER.

At the present time the State has fourteen open contracts for the sale of green timber. Most of this timber is sold at the minimum price allowed by law, which is three dollars per thousand, but however, several contracts have been entered into with parties in the heavily timbered portions of the State, allowing them to cut the timber on the rights of way for county roads. For this timber, a price of one dollar per thousand is received. Many of these contracts will be closed as soon as the brush resulting from cutting is disposed of, which will be in the early spring. The most important contract in force at the present time is contract number 93. All of the merchantable timber on section 36, township 13 north of range 16 west, estimated to be 9,006,000, was sold at the rate of \$3.50 per thousand feet. This timber will be removed by November 26, 1915, bringing to the State the sum of \$31,500.00.

There are four contracts open at present for the sale of dead timber. This timber is sold at the best possible price obtainable per thousand feet, and ranges from 40 cents to 75 cents per thousand. Since December 1, 1912, seventy-three permits have been issued for the removal of dead down timber for domestic purposes, for which no charge is made by the State. These permits are issued by the Forester, and notice of the action taken is made to the State Board of Land Commissioners. During the past two years forty-two permits have been issued to ranchers and settlers for the cutting of green timber for domestic use. A charge of approximately \$1.50 per thousand is made for this timber, or one-half the price charged for the same class of timber when cut for commercial purposes.

FINANCIAL STATEMENT.

The receipts for 1913 for all classes of timber were \$4,688.44. The receipts for 1914 amount to \$22,689.88, making a total of \$27,378.32 for the past two years.

EXPENDITURES FOR 1913.

Forester's Salary	\$1,458.31
Acting Deputy Forester's salary	500.00
Administration	3,035.88
Forester's expense	149.60
Timber estimating	1,585.91
Fire protection	1,693.32
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Total	\$8,693.02

EXPENDITURES FOR 1914.

General Expense.....	
Salary	\$5,874.36
Travel	1,376.88
Office	377.61
Field	134.29
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Total	\$7,763.14
Fire.....	
Salary Co-operative men.....	\$1,471.76
Temporary labor	632.23
Travel	189.50
Subsistence supplies	65.70
Equipment	40.33
North Montana Forest Ass'n.	1,374.44
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Total	\$3,773.96
Total expense for 1914	\$11,537.10
Total expense for 1913 and 1914	\$20,230.12

FIRES HANDLED BY STATE 1914.

The season of 1914 was a very dangerous one for fires, the most dangerous since 1910.

The Federal Forest Service and the Northern Montana Forestry Association were taxed to the limit of their resources to cope with the situation. The State as well could have done no more than it did with the force of men connected with the office.

Early in the spring letters were printed and forwarded to all Deputy Fish and Game Wardens with a request that one copy be given to each purchaser of a hunting and fishing license; a stub attached to the letter acknowledged that the signer accepted the appointment as a Volunteer Fire Warden. Up to the present time 5,217 acknowledgments have been received, showing that there are at least that number of public-spirited hunters and fishermen, citizens in the State, who are willing to co-operate with the State in fire prevention.

The law provides that all Supervisors and Rangers of the Federal Forest Service when they formally accept the duties will be appointed State Fire Wardens. All Forest Service men were requested to accept the appointment and nearly all accepted; those who did not were not located by this office on account of change of addresses. In all, two hundred forty-five men were appointed.

The Volunteer Fire Wardens were requested to "Report all fires to State Forester," and many were reported. As soon as a fire was reported that was not on a National Forest or within the limits of a Protective Association, a representative of this office was at once sent to the fire and remained on the ground until the fire was out. Supplies were purchased, men hired and taken out to the fire and paid off when their work was done.

Experiences with forest fires on the national forests this year, and our own experiences show that automobiles, where they can be used, furnish the quickest and cheapest transportation for crews of fire fighters. Motor rates are higher than those for teams for actual time employed, but the total cost per distance traveled and in wages paid to men in getting to fires is much less. The time-saving is self-evident, trips which ordinarily require two days' time by team have been made by automobile in a few hours.

Not only Forest fires were handled but prairie fires as well were extinguished. Fires in the Blackfoot country near Lincoln were put out, on the Big Hole River, in the Ruby Mountain on the Missouri River near the mouth of the Musselshell River, and several small fires near Helena. This plan would be very successful had the State several paid fire wardens scattered through the most dangerous districts.

EXCHANGE OF TIMBERED LAND.

The exchange of timber land between the Federal Government and the State of Montana, of unsurveyed school sections within the National Forest of Montana, for land of equivalent acreage and value which is to be selected in two large tracts, and subsequently by Act of Congress eliminated from within the National Forests boundaries, and become subject to the exclusive jurisdiction and control of the State, comprising practically 105,000 acres is now nearing completion.

All field work having been satisfactorily done, the necessary data for the final exchange is now being compiled. One area of this exchange, comprising 65,000 acres, is located in the Blackfoot National Forest, in the Whitefish and Stillwater water sheds. The other area, comprising 40,000 acres, is to be taken out of the Flathead National Forest in the Swan River District; both areas are embraced within the County of Flathead.

ORGANIZATION FOR STATE FOREST.

As soon as the lands are received by the State, from the U. S. Department of Agriculture, under the agreement for the exchange of unsurveyed school sections, 16 and 36, within national forests, for a compact body of timber, it will be necessary for the state to have an organization to properly protect the area from fire and trespass, build roads and trails, telephone lines, administer the sale of timber, and do what other work may be found necessary.

There should be at least two rangers who would have their headquarters on the state forests located at some convenient place and they should be assisted by as many men as are necessary to properly administer this forest area, usually only through the fire season months, June, July, August and September, will assistance be needed. These rangers should be furnished with suitable quarters for use the year round, and provision should be made for pasturage and barns for such horses as they would be required to keep.

As soon as possible after the lands are received, they should be carefully examined, and it should be determined which lands are chiefly valuable for agriculture, and which are chiefly valuable for timber production. Lands that are chiefly valuable for agriculture should be clean-cut, that is, all merchantable timber should be removed as soon as the market

is right for the disposal of the timber, and these lands should be placed on the market for sale and disposed of in the regular manner pertaining to state land, in order that they may be put to their highest use, the production of farm crops.

The land found chiefly valuable for the production of timber should not be open for sale, and in no case should land classified as such be sold. These lands should be permanently held by the state for timber production. Many of the older states are now purchasing cut-over land to be used for forestry purposes, and are expending large sums of money which are appropriated by their legislative assemblies for this purpose. Would it not be well for this State to profit by their experiences and retain our non-agricultural timbered lands?

On these non-agricultural lands the timber should be allowed to be cut, according to some well planned rotation or as the market demands, but in no case, excepting in the lodge pole pine species, should a clean cut be allowed.

Ordinarily about ten per cent of the stand should be left on the ground to insure the seeding up of the area and hence the future crop. Attention should be paid in leaving the seed trees, as this ten per cent is called, to see that trees of the more desirable species are left standing, in order that the area may be seeded up to the more desirable species. Theoretically the different trees will seed up an area as soon as it has been cut-over and another crop will be forthcoming; but in case of fire, not only all the timber is destroyed but in many cases all the seed as well. In some cases it will be found necessary in order to get another crop started to resort to artificial planting.

To raise seedlings, to carry out planting operations, it will be necessary to have a nursery. This nursery should be located on the State Reserve near the ranger's headquarters, and a sufficient number of seedlings should be raised each year to plant up several acres. This planting could be done by the ranger in the spring of each year with very little help.

As there is estimated to be 618,857,000 board feet of timber on these two areas, valued at the minimum price of \$3.00 per thousand, will make a total valuation of \$1,856,571.

It is to be seen that the State will be forced to take every precaution in the preservation and protection of this valuable piece of State holdings.

FIRE PROTECTION.

Previously, I have mentioned a few ideas on cutting and planting, but all this work should be secondary to fire protection. It is absolutely necessary that we should protect what we have before we do anything else. In order to properly protect our forests, it is necessary to have some means of travel and communication. Trails and roads suitable for horse or horse and wagon travel are considered ample means of transportation, but for communication they are insufficient. A net work of trails should be constructed, making accessible every part of the forest, to be used for patrol, which will expedite matters in case of fire.

The telephone is the only efficient means of communication. Lines should be constructed to connect the principal town in the vicinity with the ranger's headquarters. Lines should also be constructed to various headquarters of patrolmen throughout the forest and to prominent look-out points where men could be stationed during the fire season. The look-out station which is in communication with the central point by telephone is considered to be one of the most efficient means of fire protection. The idea being to get to the fire when it is small. One man can often put out a small fire, when, if work is delayed for half an hour it would take five men to handle it. This example is of the ordinary case. Although, a fire will often smoulder for days before breaking out, and again it may break out within a few minutes after it has been started.

The fire line is used as the best and practically the only means of fighting fire on a large scale. This fire line is constructed around a fire or in front of the direction in which the fire is traveling, and the interior is either back fired or the fire is allowed to come up to the fire line. It might be well to build a few fire lines before the fires start. Of course, the fire lines would not be exactly in the right place, but it would be there and should a forest be cut into numerous small tracts it would be one of the best forms of preventing the spreading of fire. Roads and trails of course would be used as fire lines, and the fire lines would in turn be used as a means of travel. These two areas should have a well defined fire line constructed around their exterior boundaries, thereby protecting the timber from fire which may have its origin outside of its boundaries,

and at the same time preventing any unintentional trespass.

I respectfully recommend that your excellency take immediate action with the Secretary of the Interior to the effect that these two areas be surveyed this coming season under the direction of the Commissioner of the General Land Office which will prevent any misunderstanding that may arise in the future as to the correct boundaries, and will also materially aid this office in locating and establishing boundaries of legal subdivisions of areas to be cut over.

Co-operation in the protection of our forests is the aim of this office. Heretofore, we have co-operated in every way with the Forest Service, Protective Associations, Railways and Lumber Companies and private individuals, and it is our intention to continue to do so. Further it has been the disposition of, the Government, Protective Associations, Companies and individuals to co-operate with this office to the greatest possible extent, and we appreciate this feeling and trust that this sentiment will continue to prevail throughout the State.

The Superintendent of Public Instruction has willingly offered his co-operation in what I deem one of the most essential points in the protection and preservation of our forests.

If every teacher in our public schools was instructed to give one hour a week or one-half hour twice a week to teaching and instructing their pupils as to the necessity of the care of plants and trees, and to be cautioned as to the danger to our forests on account of careless handling of fires, an untold amount of good would be accomplished.

Printed forms could be placed in the hands of each instructor giving an outline of the care and protection of plants and trees as well as instructions as to their duties in case of fire.

FOREST FIRES.

Area to Be Protected.

Timber lands in the State are located almost entirely in the western part of the State. Draw a line from Red Lodge in the southern part of Montana, extending it through Great Falls, Chouteau, Midvale and the east boundary of the Glacier National Park, and practically all of the timbered lands of the State will lie west of this line. East of this line is mostly

grazing and farm land. West of it is the main range of the Rocky Mountains and numerous spurs. The Continental Divide extends in a northwesterly and southeasterly direction in this part of the State.

Of the total area of Montana of approximately 90,000,000 acres, only about 30,000,000 acres, or one-third lie west of this line. Approximately 10,000,000 out of the 30,000,000 is agricultural or grazing land and the other 20,000,000 acres are covered with timber, most of it mountainous and entirely unfit for agriculture. Within this western timbered belt, occur such valleys as the Bitter Root, Gallatin, Big Hole, Flathead, Tobacco Plains, Madison River and Prickly Pear. These valleys are interspersed throughout the region but after all they are comparatively small in proportion to the total area. Within this western timbered belt are nearly all of the 19,000,000 acres of National Forest's gross area included within the State of Montana and all of the private timber holdings. The agricultural valleys are exceedingly important and contain rich farm lands but of equal importance are the timbered areas. The State must recognize that a large proportion of the western part of the State can never be made into farm lands. They will either be timber producing lands or waste lands. The experience of Michigan and other Lake States should be a sufficient warning to Montana not to imagine that all of its lands are agricultural. Thousands of acres in Michigan are now lying waste because the State has not recognized the fact that they have slight value, if any, for farming purposes.

Timber is an exceedingly valuable crop as the statistics of the State will show and well worth preserving, not only the timber actually merchantable but the young growth as well.

The Interests Which Suffer by Forest Destruction.

Farmers, merchants, miners, railroads, in fact everybody, men, women and children in the State suffer through the destruction of forests. If the forests which are destroyed are on lands which are non-agricultural, the loss is more far reaching than if located on the possible farm lands. The uses for wood are increasing in spite of the growth of substitutes, and no other product is so generally and universally associated with our daily life.

The owner of the standing timber receives for it \$1, or possibly \$2 per M. feet for stumpage. The community receives in labor, supplies and equipment about \$10 per M. feet. The de-

struction of a thousand feet of timber is, therefore, at least five times greater concern to the State as a commonwealth than to the individual owner. Besides the actual value of the timber, its destruction means the loss of many permanent industries, such as sawmills and the exclusion of wood working plants, pulp factories and other industries which will undoubtedly come into the State if the timber remains.

The streams of Montana contain water power possibilities, most of them undeveloped, representing about 500,000 horse power. The preservation of the timber on the headwaters of these streams is of tremendous importance in retaining a regular flow in the streams. The importance of watershed protection for both water power and irrigation purposes has been well established.

Public Sentiment.

The disastrous forest fires of 1910 have not been forgotten. While the losses in forest wealth were tremendous, the value of the lesson in awakening a favorable public sentiment for fire protection was perhaps in the long run just as valuable. The people are alive to the danger of forest fires in all parts of the State. The great majority in any community is entirely friendly to all efforts towards protecting the forests from fire. The necessity for extreme care in the woods is, however, rather difficult to impress on the average citizen. To the average man it seems perfectly ridiculous to carry a bucket or a hat full of water several hundred yards in order to absolutely extinguish a small and harmless looking camp fire. Besides, it takes some additional time and effort. Not realizing the possibilities of the smouldering camp fire, the chances are at least even that the necessary effort to absolutely extinguish the fire will not be made. From just such harmless little camp fires originated a great many of the big 1910 fires. One apparently harmless camp fire last season started a forest fire which burned over 17,000 acres of land.

The record of fires in Montana shows that on the average, fires have been caused in about the following proportion: Railroads, 50%; lightning, 30%; campers, travelers, smokers, and other miscellaneous causes, 20%. In other words, 70% of the of the total number of fires which have occurred during the years of record in Montana, are caused by human carelessness in one form or another. Until the average citizen realizes the

possibilities of danger in every match, in every cigar stub, in every pipe, or in every spark of fire of whatever nature makes the necessary effort to extinguish it, the number of forest fires resulting from carelessness will not materially decrease.

The Duty of the State.

Because of the much greater interest in fire protection by the State than any individual owner, it is the duty of the State to take the lead in all fire protective work. Fire protection is commonly divided into three different divisions known as prevention, detection, and control. It will be shown later that the interests of the Federal Government in Montana are great enough to justify the State in taking rather a secondary place in the work of detection and control. The equipment, the experience and the unquestioned ability of the Federal Government to handle this part of the work has been proven. The work of fire prevention is one of the principal phases of the work in which the State can do the maximum amount of good. Prevention is largely an organized system of education. The importance of fire prevention and the interests of the State in forest protection should be taught in all the public schools. Enough of forestry should be taught to arouse an interest in the forest wealth of the State and the children should be not merely warned to be careful but they should be taught **how** to be careful. The State can well afford to spend any amount of money which may be necessary in order to insure that such courses of instruction are maintained in every public school in the State. The school children of today are the men in control of affairs tomorrow. The number of years elapsing from one stage to the other is comparatively small. Hunters, automobilists, and boy scouts can be reached in a great many different ways which the State should definitely undertake.

Wherever the private owners of timber lands show a disposition to protect their own holdings, the State should be in a position to take hold of an organization and pay more than its pro rata share of the expenses of protection. The State should pay the salary of a fire warden who will direct the fire protective work of private owners of timber lands when desired by them and should in addition pay its pro rata share on an acreage basis of the cost of fighting fires, and carry any other protective measures, such as the construction of trails, telephone lines, lookout houses, etc., which may be neces-

sary. The present fire laws of the State are antiquated and entirely inadequate. One of the first duties of the legislature should be to prepare and pass new legislation which will give the State adequate fire and forest laws. Detailed recommendations are included in another chapter in this report.

How the Problem Is Handled.

One glance at the map of Montana on which is pictured the National Forests under the control of the Federal Government will indicate the proper method of handling the fire problem. Ninety per cent of the forest land in the western portion of the State is included within the boundaries of the National Forests. Within these National Forests, however, are large areas of land under State and private ownership. Probably only about 75% of the timbered area of western Montana is actually owned by the Federal Government and only 58% of the merchantable timber is owned by the Federal Government.

According to the report of the Bureau of Corporations, Montana has a total stand of timber of 65,600,000,000 feet B. M. Thirty-three per cent of this timber is in private ownership; sixty-one per cent is owned by the Federal Government as National Forests and National Parks, and six per cent is owned by the State.

The Federal Government is the largest owner of timber in the State and as such has naturally taken the lead in the work of forest protection. The State has looked to the National Government to set the example and outline the plan of protection. The State and private owners of timber land are taking advantage of the big organization developed by the National Government in order to give the whole State adequate fire protection. The lands owned by the State are scattered all over its area. The timbered holdings are largely scattered through the National Forests and other private holdings. This position will be slightly changed through the exchange of lands which is now in process of completion and which has been touched upon in another portion of this report.

The problem of fire protection with the conditions existing in Montana can not be handled by any one owner. Every principle of good business and good administration shows that it is necessary to combine and form one organization to carry

on the big work of fire protection. That is largely what has been done. The Federal Government assumes the burden in a large measure and the State and private owners contribute their share of the expenses. The details by which this scheme is carried out will be indicated later on.

What It Costs to Protect Forests From Fire.

Experience so far in Montana indicates that an expenditure of from 1c to 4c per acre is necessary in order to carry proper fire protection and insure a reasonably small percentage of loss. The cost necessarily varies, depending upon the character of the season. The Federal Government spends in Montana between \$300,000 and \$500,000 annually, the primary purpose of which is fire protection. The State can not protect its own lands at any reasonable cost without some co-operative arrangement with the other owners in the State. As it is, the Federal Government assumes the burden and the State gets all the benefit by simply paying its pro rata share. In addition, the State for practically no expenditure at all, receives 35% of the receipts from the National Forests. This amounts to between \$85,000 and \$90,000 annually, besides the direct benefit which the people of the State derive through the construction of trails, telephone lines and cabins in the hills.

Is It Worth Protecting?

The stumpage value of all the timber in Montana at present market prices is worth approximately \$150,000,000. It costs from one-tenth to four-tenths of one per cent of its value annually to carry fire protection. Is it worth it? Compare this with any other insurance costs and decide for yourself. Its value in community wealth is at least \$600,000,000. The cost of protection compared with this total valuation is very, very small indeed. Is it worth saving?

Season of 1914.

The average length of the fire season in Montana is about four months, from June 1 to September 30. Some years more, some less. The past season the danger period began in May and finally closed by heavy rains about September 10. The highest temperatures occurred the month of August. The records of the Weather Bureau show that these temperatures were about as high as in 1910 and continued for a longer period. Practically no rain occurred during the season until August 17 and then the rainfall was limited in area covered.

The southern part of the State received almost no rain until the beginning of the second week in September. It should not be necessary to go into further details with regard to the character of the fire season which has just passed. It is only necessary for you to recall to mind the smoke and haze, the red glow of the sun and the newspaper reports of fires in order to realize that the season of 1914 was an unusually dry period, not as bad as 1910, when all of these conditions were intensified. The past season was, however, as dry; there was as little rainfall, the maximum temperatures were about the same, the number of fires was greater, and there was more wind than in the disastrous season of 1910. The result, however, was vastly different. The amount of timber destroyed was the smallest in any season of anything like equal dangers. Every fire which occurred was fought to a finish by some organization, the State doing its full share. The largest single area burned in Montana was about 17,000 acres, **started from a camp fire.** Very little damage was done to any of the timber belonging to the State.

Take the largest scale map of Montana available and stick a pin, representing one fire at each point where a fire occurred, and the result will resemble a porcupine. The complete statistics are not yet available but something over 1600 fires occurred in the State; 90% of the number were held to very small areas. The record this year demonstrates the practicability of protection at reasonable cost and indicates that the method followed by the State in lending all assistance to the Federal Government in the work of fire protection is the right one to follow. The total cost of fire fighting in the State amounted to something like \$200,000, of which the Federal Government paid \$180,000. The actual expenditures made by the State for fire fighting were \$2,399.52. These figures do not include the salary and expense of the regular State Protective and Administrative force nor assessment of Northern Montana Forestry Association.

Two Important Fire Problems.

The two problems which stand out above all others in the State from a fire protective standpoint are brush burning by settlers and railroads. Brush on farm lands must necessarily be burned. It must be burned at a time when weather conditions are right. That time is during the season of usual fire

danger. It is natural that the settlers will take the first opportunity to burn the accumulated brush and it is also natural that they do not always realize the danger and that a great many of the fires set for legitimate purposes are scattered by the wind and do tremendous damage to the forest lands of the State. It is the duty of the State to recognize the fact that settlers must burn brush and must do it during the dry season. The State should, however, also recognize the fact that such action on the part of the settlers endangers the property and sometimes the lives of others and, therefore, the privilege can not be enjoyed by the settlers except under restrictions. These restrictions should be a closed season during which no brush can be burned except under permit during the period from June 1 to September 30. Permits should be issued by the State Forester, by the fire wardens appointed by the State, and through co-operation with the Federal Government.

The railroads for several years past have set at least 50% of the forest fires in the State.

During the dry season of 1914, it was necessary to put in some cases, as high as one patrolman to a mile of track in order to control the forest fires originating from this source. Those railroads in the State burning oil have reduced the danger to a minimum. Two great transcontinental railroads in the State, however, burn coal. There is only one way by which fire originating along the railroads can be controlled, and that is by requiring the railroad to clean up all inflammable debris for at least fifty feet on each side of the track and to require in certain localities and under certain conditions, which should be prescribed by the State Forester, the construction of a fire break which shall be a line through the timber at least ten feet wide, and a trench at least three feet wide cut to mineral soil. This would make it possible to burn the accumulated debris along the railroad tracks safely, and at the same time would provide a fire guard which will form a base from which to fight any fire which may be set by the railroads. Such a fire break will be necessary only in certain places, which would perhaps on the whole not involve more than 30% of the actual mileage of the road. The railroads have been free for many years, to work out their own fire protective problem. The tonnage which they expect to haul in the future depends a great deal on the amount of

protection which they give to the timber lands along their right of way. The railroads have made some spasmodic efforts to clean up their rights of way and to assume part of the burden of patrol. They have not, however, made the progress which the importance of the risk demands.

I believe that laws, which will require right of way clearing; a closed season, and the construction of fire breaks are essential to forest protection in Montana.

FIRE CO-OPERATION.

Reasons for Co-Operation.

In the preceding chapter, I have discussed the reasons why the fire work in Montana can be most conveniently and most efficiently handled through co-operation of all owners of timber. The areas are so intermixed and the ownership so scattered and so numerous that any other plan must necessarily fail. I have also shown why from the standpoint of public benefit and the economic welfare of the State, it seems advisable for the Federal Government and the State to take the lead in fire protective work. The interest of the government, representing the whole people in fire protective work, is at least five times greater than the interest of any individual owner. As a rule, unless the State or Federal Government is willing to take the initiative and provide the machinery for the co-operative organization, no action is taken by private owners. Fortunately in Montana the Federal Government has up to this time provided this organization and has largely made possible and stimulated the co-operative fire protective work. There remains certain areas in the State which, because of their distance from the National Forests, the Federal Government is not authorized to take any action in protecting.

I have previously stated that, in my opinion the chief function of the State in the co-operative plan is to carry on the work of fire prevention by continually carrying on a campaign of education and publicity, while the chief function of the Federal Government is in carrying a sufficient organization for fire detection and fire control. The exchange of areas between the State and the Federal Government will give the State two segregated blocks of timber upon which it will be advisable for the State to carry the work of protection and control, provided the State Forester is authorized through the State Land Board to do this work.

The Federal Government assumes the supervision of the Patrolmen furnished by all organizations with the exception of the Northern Montana Forestry Association. This organization has a chief fire warden and employs whatever patrolmen are necessary independently of the Federal Government. The State, as well as practically all of the private owners of timber in the vicinity of Kalispell, are members of this association and contribute to its expenses.

Likewise the supervision of the fire fighting is largely borne by the organization financed by the Federal Government, and the expenses of fire fighting are borne by each of the private owners on a pro rata acreage basis as determined by the area threatened by the fires. For example, the Northern Montana Forestry Association territory is divided into three districts which include lands belonging to both private owners and to the Federal Government. The districts are so outlined that the Federal Government and the members of the Northern Montana Forestry Association own practically equal areas so that the expense of any fire which may occur in any of the districts, is borne one-half by the Federal Government and one-half by the Association to which the State contributes its pro rata share. The assessment for patrol and fire fighting in this Association this past season was 2c per acre. The State ownership of lands within the Association is 68,722 acres. Therefore, the State has paid to this Association the sum of \$1,374.44.

Patrolmen Employed.

The number of patrolmen employed for an average fire season for the timbered area of Montana is as follows:

Federal Government	243
State of Montana on the basis of its proportionate area	7
State of Montana—appropriation under Weeks law	12
Northern Pacific Railroad as land owner.....	8
Julius Neills Lumber Company	2
A. C. M. Company	4
Bonnors Ferry Lumber Company	1
Northern Montana Forestry Association	5
Total	282

With this number of patrolmen each man must cover an average territory of 63,000 acres, or approximately 3 townships per man. Whether or not this is a sufficient patrol force can not be definitely stated. Experience indicates that it is far inadequate. Experiments are now contemplated by the Federal Government which will in the course of time actually demonstrate the number of patrolmen which are necessary in the different portion of the State on the basis of some standard to be decided upon.

Weeks Law.

As an additional contribution to the co-operative fire protection, Montana receives from the Federal Government an annual appropriation of \$3,500 for the employment of patrolmen for the protection of the forested watersheds of navigable streams. A law was passed by the National Congress several years ago authorizing the Federal Government to co-operate with States in the protection of the headwaters of navigable streams for the purpose of stimulating greater interest in fire protection and to raise the standard of this work as carried out by the States. Under this law, Montana under a co-operative agreement signed by the Secretary of Agriculture and the State Board of Land Commissioners, has been receiving the sum of \$3,500 on condition that the State spend at least an equal amount. The State of Montana makes no appropriation for fire protection. Therefore, in order to secure the benefit of the Weeks Law money, a portion of the salary and expenses of the State Forester and the seven patrolmen above mentioned and paid directly by the State are added together in order to make up the sum of \$3,500. The proper place to use the Weeks Law money is on the outside areas which are not now being protected under the co-operative plan but the State has no organization and no authority to assume supervision over these areas.

Areas Unprotected.

It is estimated that between 3,500,000 and 4,000,000 acres of timber lands in Montana are without any organized protection. Most of these areas are located about as follows:

Territory in the vicinity of Ovando, the south fork of the Blackfoot River, and the Continental Divide north and west of Wolf Creek; Phillipsburg country; Clarks Fork Valley, and the Kootenai Valley.

Some of these areas are partially protected under the present plan, but most of them are either entirely unprotected or the protection given is entirely inadequate. The State Board of Land Commissioners have used their discretionary powers in providing money for the co-operative work in a very liberal and business-like way but the authority of the State Board is not sufficiently broad. Some of the States which are appropriating money and the amounts, are shown in the following table:

Pennsylvania	\$273,000
New York	225,000
Wisconsin, direct	95,000
(And almost as much more from the sale of forest produce.)	
Minnesota	88,400
Maryland	42,250
Maine	67,900
Oregon	30,000
Washington	37,500
Massachusetts	49,000
Michigan	25,000
Idaho	15,000
(And more if needed)	
New Jersey	25,500
New Hampshire	18,500
Connecticut	12,000
Kentucky	15,000
Vermont	10,500

besides other states.

Montana is sorely in need of a definite appropriation which will authorize the State Forester to appoint and pay fire wardens for the unorganized territory in co-operation with the private owners. I do not believe the State should go to the extent of forcing any private owner to pay for fire protection unless a majority of the owners in any district are willing to do so. In that case, the State should have the authority to force the minority to pay their proportionate share. Experience indicates that the State cannot afford to go very much faster than public opinion. I believe, however, that if the State is authorized to take the initiative and to assume a proper share of the burden, the private owners in the unorganized territory will be glad to contribute towards the general scheme a reasonable sum in accordance with the proportionate areas.

NORTHERN MONTANA FORESTRY ASSOCIATION, FLATHEAD AND LINCOLN COUNTY.

The handling of the fire situation in Northwestern Montana this year on the lands controlled by the Northern Montana Forestry Association taxed the efficiency of the association to the utmost; yet the situation was handled on a practical and economical basis, and in a manner that gave entire satisfaction to the members and to the state and federal officials with whom the association is affiliated, and demonstrated to the public that the protection of the forests from fires can be handled through association efforts to better advantage than through the individual.

Publicity work along educational lines, such as has been carried on by practically all the forest protective associations of the Pacific Northwest during the past few years, has done much to create public sentiment favoring forest protection in all its phases, so that today the association is receiving a great deal of public co-operation in handling the fire situation and other matters pertaining to the conservation of our natural resources.

The Northern Montana Forestry Association has done a great deal of publicity work since its organization in the way of supplying the schools throughout the co-operative fire districts with appropriate matter for the purpose of impressing upon the coming generation the importance of forest protection. Thousands of fire warning notices have been posted at conspicuous places in Hotels, Garages, Livery Barns, and along public highways, and trails. The newspapers have also aided materially in keeping the matter of forest fire prevention before the public, so that there are but few within the co-operative fire districts who do not realize the result of forest fires upon a community.

This year, as in the past, the work of the association was carried on under a co-operative agreement with the State and Federal government, the State co-operating on the basis that they be allowed to furnish their own patrolmen, separate and distinct from any joint arrangement, paying their share of all expenses of fighting fire within the co-operative district on an acreage basis. Work under the co-operative agreement has given perfect satisfaction to all interested and without question the agreement will be renewed next year.

CO-OPERATIVE DISTRICT.

The co-operative district embraces approximately one million acres, 800,000 acres of which are listed under the cooperative agreement, the balance being farm and pasture lands, upon which there is practically no risk during the fire season. The entire acreage within the cooperative districts is under the direct supervision of the association and government.

CLIMATIC CONDITIONS.

During the month of May, this year, there was but sixteenths of an inch of rainfall, which came during the first few days of the month. The month as a whole was extremely dry and several fires occurred which had to be handled with cost. A considerable amount of moisture fell during the month of June, the precipitation for that month being 2.51 inches, as compared with 4.8 inches last year. From July 7th to August 17th a period of 42 days there was but .69 of an inch of rainfall recorded by the Kalispell Weather Bureau, during which time there were a number of exceedingly hot and windy days. On the night of August 17th conditions were somewhat relieved by a shower which practically put out all fires and lessened the danger of serious fires for the remainder of the season.

FIRES.

During the year of 1914, there occurred 104 fires within the co-operative fire districts, burning over practically 1,847 acres, as compared with 31 fires burning over 182 acres last year. The total cost of handling fires this year was \$12,289.92 and half of this cost was paid by the government, leaving a net cost of \$6,144.96 to the association for handling fires in 1914.

DAMAGES.

The total damage resulting from fires this year was \$9,724.50. With the exception of \$267.00 the loss was wholly on government land, and in a remote section so inaccessible that it cannot be logged to advantage during the life of burned timber, and will have to be classed as a total loss.

CAUSES.

The causes of these 104 fires follow: 37 by sparks from Great Northern locomotives; 16 by lightning; 13 by campers; 13 by parties clearing land; 3 by incendiary; 8 miscellaneous, and 14 unknown.

In order to defray the expense of handling the fire situation this year, it was necessary to levy a special assessment against the members of $1\frac{1}{2}$ cents per acre in addition to the regular assessment of $\frac{1}{2}$ cent per acre levied at the beginning of the fire season. Said assesment provided a fund of \$7,562.00, which was equivalent to \$15,126.00 in handling fires under the co-operative agreement. The assesment of 2 cents per acre provided sufficient funds with which to meet all bills contracted this year, which included the cost of handling fires and operating expenses.

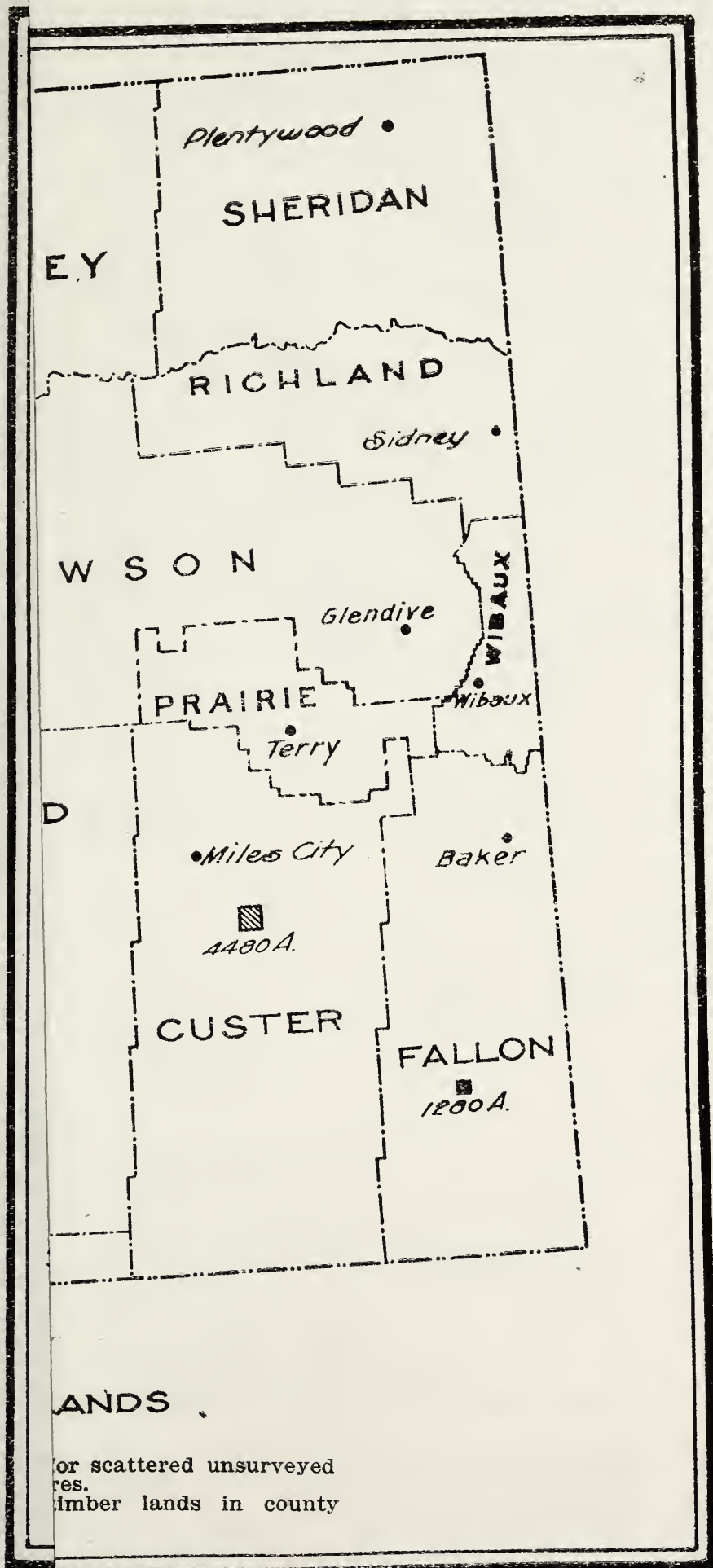
This year there were 30 patrolmen in the field. The following statements show the efficiency of their work.

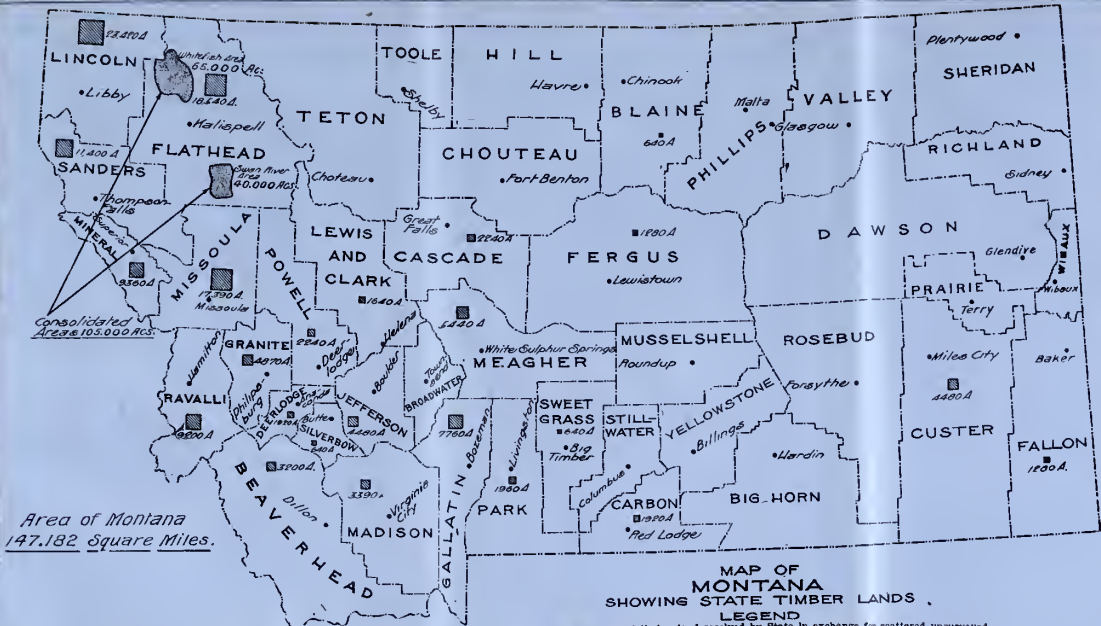
1st. From the records of the Blackfeet National Forests, with headquarters at Kalispell, they have shown that there was a greater number of fires handled within the co-operative district this year than in 1910, and that the cost of handling the fires this year was but 1-6 of the total cost that year.

2nd. Of the 104 fires handled, but 2 got beyond control, and they were located in remote sections that required several hours of difficult traveling to reach.

3rd. The average area of fires handled this year was approximately 16 acres, and fully 75 per cent of the total fires were extinguished before reaching an area of 5 acres. The government lands within the co-operative district is well supplied with trails, look-outs and telephone lines, while the private lands are well opened up by public highways and supplied with private and government telephones which enables the patrolmen to report fires promptly and assisted us materially in getting a crew of men to the scene of the fire in the shortest possible time. Each patrolman is supplied with government badge which gives him full authority to make arrests without a warrant. The efficiency of our patrol service is increased by the assistance of members scattered throughout the district, who, owing to their individual interests, report all violators of the law promptly, as well as fires.

The membership now numbers 184 and the association is planning to extend its boundary lines so that next season we will have a much larger acreage and membership, which will place fully 65 per cent of the standing timber in Northwestern Montana under the supervision and protection of the association and government.





Area of Montana
147,182 Square Miles.

MAP OF MONTANA
SHOWING STATE TIMBER LANDS
LEGEND

■ Area of timber land received by State in exchange for scattered unsurveyed holdings in National Forests—Total 195,000 acres.
■ Comparative areas of scattered surveyed state timber lands in county within National Forest boundaries.

State timber lands within National Forests 218,690 Acres.
" " " " outside 173,310 " "
Total Area 392,000 "

