SD 421

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We
Must
Stop

FOREST FIRES

IN MASSACHUSETTS

F. W. RANE

STATE FORESTER

WE MUST STOP FOREST FIRES

IN

MASSACHUSETTS.

- I. A WORD FROM THE STATE FORESTER.
- II. WHAT HAPPENED DURING THE PAST YEAR.
- III. LETTERS FROM TOWNS THAT ARE DOING SOMETHING (READ THEM AND SEE IF YOUR TOWN IS THERE).
- IV. SUGGESTIONS AND EQUIPMENT FOR ALL TOWNS (FOREST WARDENS TAKE NOTICE, AND LET YOUR TOWNS KNOW WHAT THEY SHOULD DO).
- V. OFFICIAL LIST OF MASSACHUSETTS FOREST WARDENS.

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CONTENTS.

	PAGE
A word from the State Forester,	5
Massachusetts forest fires of 1908,	6
Table on damage by causes,	7
Table on causes by months,	9
Table on acreage and damage by months,	10
Summary of fires by months,	9-13
Fire fighting and protection as carried on by enterprising towns,	14
Forest wardens' letters,	14-23
On forest fire protection and apparatus,	23
Organization and fire lines,	24
Fire patrol,	25-27
Damage by forest fires,	28
Miscellaneous points — extracts from wardens' letters,	29-31
Address list of forest wardens,	32-43

KINGSTON FIRE, JULY, 1908.

FOREST FIRES IN MASSACHUSETTS.

I. A WORD FROM THE STATE FORESTER.

Do you know, good people of this grand old Bay State, that annually we are allowing fires to run rampant over Massachusetts? We talk about putting out shade trees along our roadsides, in our public squares and about our homes, which is all very good; but forestry or the lumber crop is the only thing that will fill in the background of the painting, that will produce the ideal Massachusetts of the future.

Forest fires have destroyed and are continuing to deplete the very birthright of town after town, and hence the Commonwealth. Take a trip with me throughout the State and see the utter wanton waste and destructiveness of man on every hand. Lands by the thousands of acres are to-day standing idle that but yesterday bore magnificent primeval forests from which it is said the graceful spars of the English navy were cut. These same soils, whether barren, rocky, sandy, hilly or mountainous, the veritable eyesores of the State, are as capable as ever of producing noble forests at our bidding, provided we, as people, rise to the occasion by stifling the fire demon, and educating our present and coming generations to the importance of so grand and beneficial a work as the practice of modern forestry.

The time has come, as a business proposition alone, leaving out the great æsthetic value, when we can ill afford not to establish definite fundamental principles of constructive forestry in this State. Two and one-half million acres of non-agricultural lands, producing a thousand feet board measure of white pine per acre, for example, per year, at stumpage value of \$5 to \$10, would mean an income of \$12,000,000 to \$25,000,000 a year. Is this not worth thinking of?

Was there ever a State more worthy of our endeavors? The eastern part of the State presents one aspect, the beautiful Berkshires another and the grand old Cape country is pathetically in need of our special attention. Every part of Massachusetts is a

natural forest country, and were we to move out of the State, nature would reclothe the whole territory in a relatively short time. This fact alone is suggestive enough, and if we will but stop fires and assist nature we must succeed.

This bulletin on the subject of forest fires is published that our people may realize more fully the exact condition, and especially for the benefit of our forest wardens and their deputies, that they may know what other towns in the State are doing, thereby gaining new ideas and being enabled more intelligently to accomplish good results in their own communities.

The State Forester is proud of the showing that the forest wardens have made in their first year of service, and desires in every way possible to assist and further their public-spirited endeavors.

It certainly is hoped that this bulletin will be made use of and that some good will result therefrom.

II. MASSACHUSETTS FOREST FIRES OF 1908.

The past year has been one of great interest to any one interested in the forest fire situation in Massachusetts.

In the first place, it is the first and trial year of the new system of forest fire fighting. Forest fire work in each town is in charge of an officer called a forest warden, who is appointed by the local authorities, their choice being confirmed by the State Forester. In cities and towns having an organized fire department, the chief is usually the forest warden, or a deputy. The warden does his fire fighting in the interest of and at the expense of the town, but reports the fires, with their extent and damage, to the State Forester. The reports which were sent in this year form the material out of which the following tables were made, and make a valuable contribution to the knowledge of forest fires, concerning their causes and extent, etc.

In the second place, the season of 1908 was one of extraordinary drought,—a condition extremely favorable to the spread of forest fires and to increasing their damage, for when the ground is dry, the fire burns deeply into the soil. This drought, caused by a deficiency of 17 per cent. in the annual rainfall, was intensified at times by more than the usual number of high winds.

We have, then, a new system of fire protection and of collecting the data, started in a year calling for unusual activity. Let us examine the results.

TABLE 1. — *General Table on Damage and Acreage, by Causes.*

	Unknown.	Locomotive.	Burning Brush.	Smokers.	Boys.	Hunters.	Berry Pickers.	Miscellaneous.	Totals.
Number of fires reported.	337	539	96	111	58	18	11	209	1,379
Reports having damage estimated.	\$72,936	\$27,938	\$18,000	\$28,000	\$3,500	\$7,000	\$2,500	\$49,874	\$209,748
Damage on burned acreage not given in reports, estimated.	\$7,749	\$4,369	\$2,913	\$5,040	\$800	\$1,603	\$700	\$7,492	\$40,396
Total damage, . .	\$90,415	\$32,307	\$20,913	\$33,040	\$4,300	\$8,603	\$3,200	\$57,366	\$250,144
Burned area on which damage was reported (acres), .	6,491	3,840	3,958	5,163	957	957	1,796	4,578	27,740
Burned area on which damage was reported (per cent.).	23.4	13.8	14.2	18.6	3.4	3.4	6.4	16.8	—
Burned area for which no damage was given (acres).	1,638	966	994	1,302	238	238	448	1,176	7,002
Burned area not tabulated by months (acres).	—	—	—	—	—	—	—	—	4,596
Total area reported as not damaged (acres).	—	—	—	—	—	—	—	—	991
Total acreage burned (acres).	—	—	—	—	—	—	—	—	40,327

There are 342 towns and cities in the Commonwealth which have forest wardens, out of which, 234, or 68 per cent., reported that they had 1,379 fires; 15, or 5 per cent., reported that they had no fires; 93, or 27 per cent., sent in no reports. Just how many of this last class had fires to report and neglected to do so it is impossible to state, but it must have been many, because we cannot believe that all these towns were without fires when their neighbors were reporting many. Probably about 20 per cent. should be added to the figures in the table for the number, acreage and damage of fires, to allow for the negligence of these wardens.

The number of acres reported as burned over was 40,327. Estimating the forest area of the State at 2,500,000 acres, — and to do this we have to include all the scrub growth and thinly stocked pasture, — we find that 1 acre in 62 has been burned. Looking at it in another way, it means that the entire forest area of the State might be burned over every sixty-two years. Taking the entire land area of the State, it is 1 acre in 123. On the United States national forests it is 1 in 10,000 acres, and in Germany 1 in 15,000 acres which are annually burned.

The average damage per acre was \$6.20, and the total damage \$250,000. To this should be added 20 per cent., or \$50,000, for towns not reporting, making a total estimated damage caused by forest fires in 1908 of \$300,000. Even with the allowances made we do not arrive at the true damage caused by forest fires, because, for reasons which will be discussed in another chapter, it is exceedingly difficult to reduce the damage to terms of dollars and cents, and, indeed, some of it cannot be so estimated. The damage caused by fire in woodlands is in the long run greatly underrated.

In the following table, which is not quite complete, because it was made up before all the reports came in, we have the number of fires arranged by causes and months. We find a great variety of causes, 26 in all, not including the large number in the column headed unknown.

Railroads are the largest producers of forest fires, with nearly 40 per cent. of the total. Next comes the unknown, with 25 per cent. Then there is 8 per cent. caused by smokers and 7 per cent. from burning brush. If some of the unknown fires could be traced out, probably smokers would figure more heavily in the total. Incendiary and boys setting fires maliciously, which we imagine is much the same thing, together make 11 per cent.

It ought to be noted that of all the 1,299 fires, 5, or .3 per cent., which were set by lightning, were the only ones which were absolutely not preventable. The rest in large part could have been prevented if people would go to the same lengths that they do in cities. A small city of 25,000 population, with a property valuation of \$20,000,000, spends about \$30,000 a year on its fire department, or an expenditure of \$1.50 per \$1,000 of the valuation. Information collected in 1906 by the State Forester showed that in 1905 311 towns spent \$30,000 for fighting fires. The forested area of the State can be roughly valued at \$50,000,000, which makes the expenditure on forest fires about 60 cents per \$1,000 of their valuation. With proper care and safeguards we could attain such a condition as that in Prussia, where in twenty-five years only 1,400 acres were burned over on the average each year, or .02 of 1 per cent. In Bavaria, during five years it averaged only .007 of 1 per cent. of the total forest area. Compare this with an enlightened Commonwealth of Massachusetts, with an average of 1 per cent. or more.

TABLE 2. — *Fires by Causes and Months.*

CAUSES OF FOREST FIRES.	March.	April.	May.	June.	July.	August.	September.	October.	November.	Totals.	Per Cent.
Berry pickers,	-	-	-	-	9	1	-	1	-	11	-
Blasting fuse,	-	-	-	-	-	1	-	-	-	1	-
Boys setting fires maliciously, .	1	28	11	3	-	-	1	12	2	58	4.0
Burning brush,	-	53	21	3	3	12	6	6	-	90	7.0
Campers' fires,	-	1	-	-	-	-	-	-	-	1	-
Carelessness,	1	3	2	6	-	-	1	2	1	16	-
Children playing with matches,	1	2	3	1	-	-	1	4	1	13	1.0
Coals dumped by locomotives and others,	-	2	-	2	-	-	-	-	-	4	-
Cranberry pickers,	-	-	-	-	-	-	1	-	-	1	-
Fire balloons,	-	-	-	-	2	-	-	-	-	2	-
Firecrackers,	-	-	-	-	3	-	-	-	-	3	-
Grass fires,	1	6	-	-	-	-	-	4	-	11	-
Gypsy Moth Commission men, .	2	1	1	-	1	-	2	-	-	7	-
Hunters,	-	-	-	-	-	-	1	16	1	18	1.5
Incendiary,	-	48	16	5	4	-	-	16	3	92	7.0
Lightning,	-	-	-	1	4	-	-	-	-	5	.3
Locomotive sparks,	8	199	93	29	65	2	5	68	21	490	38.0
Picnic and May parties,	-	2	-	-	-	-	-	2	-	4	-
Rubbish fire,	-	7	5	1	1	-	-	1	1	16	-
Section men burning railroad ties and brush,	-	3	-	-	-	-	-	-	-	3	-
Smokers' pipes, cigars, cigar- ettes and matches,	3	39	23	10	13	1	5	14	3	111	8.0
Steam portable sawmill,	-	-	6	4	1	-	1	-	-	12	1.0
Tramps setting fire,	-	1	-	-	1	-	-	1	-	3	-
Unknown,	4	105	39	28	35	3	21	74	5	314	25.0
Sparks from burning buildings,	-	-	-	-	3	-	-	2	-	5	-
Sparks from forest fires,	-	-	-	-	2	-	-	3	-	5	-
Wood choppers cooking,	-	-	-	-	-	-	-	2	1	3	-
Totals,	21	500	220	93	147	10	41	228	39	1,299	-

SUMMARY BY MONTHS.

The following is a brief summary of the fires for each month, the object being to show the effect of different seasons on the frequency of forest fires. It may be said in passing that ordinarily the danger season runs from the 15th of March to the 1st of June and from the 15th of September to the 1st of December, but on account of the drought conditions which existed last year the summer season was little different from the spring and fall in its liability to fire.

The following table gives the acreage burned and the resulting damage for each month. It is not quite complete, as some of the wardens withheld their reports until the close of the year, too late to be included with the others, but their number is small and they do not materially affect the comparison. .

TABLE 3.—*Acreage and Damage by Months.*

MONTHS.	Acres.	Damage.	Damage per Acre.
March,	236	\$420	\$1 78
April,	16,262	52,731	3 25
May,	5,856	48,506	8 28
June,	1,195	17,824	14 91
July,	6,109	28,783	4 71
August,	1,567	22,320	14 25
September,	1,062	3,140	2 95
October,	7,084	29,960	4 22
November,	301	1,468	4 88
Totals,	39,672	\$205,152	—

March.

Many towns failed to make reports of forest fires during the early days of March, because the new system of appointing forest wardens did not become established in smooth running order until the latter part of the month. The figures for this month are not, therefore, worth analyzing.

April.

During this month woodland conditions were extremely favorable to the spread of forest fires. Not only was the rainfall light, but a succession of strong winds from the northwest blew much of the time. The consequence was that the moisture in the upper soil was quickly dried, leaving the débris on the forest floor in an inflammable condition.

The wardens' reports for Sunday the 26th and Thursday the 23d amounted to 40 fires for each day, the record for the year. Sunday the 5th and the 12th, the latter the date of the Chelsea fire, were next in order. Three Sundays in April show a total of 148 fires, almost one-third the total for the month.

Prominent among the causes were locomotives, equal to 39.8 per cent., and burning brush, 10.6 per cent. Next in order came fires caused by discarded smoking material, equal to 7.8 per cent.

Wardens' returns in April show the largest area burned and the greatest estimated damage for the whole season. As compared with some other months the per acre damage was less, but this may have

been accounted for by the fact that more moisture lay near the surface than later in the season, which prevented the fire burning very deep or long enough in one place to do much damage.

May.

The largest number of fires for any one day in this month came on the 19th, being 25 in all, or 11 per cent. of the total. The principal causes were locomotives, 41 per cent., smokers, 10.4 per cent., and burning brush, 9.5 per cent. Fires set deliberately were 5 per cent. of the total, while the remaining 25 per cent. were due to unknown or scattering causes.

Most of the spring rains this year came in May and gave the grass and verdure a good start, nevertheless it did not prevent the fires in May from being more destructive than those in April, their per acre damage being \$8.28, as against \$3.25 for the previous month.

June.

According to expectations June reveals a marked reduction in point of number of fires. May showed a falling off over April, and June has 127 less fires than May.

The dry weather continued, with a showing of 31.2 per cent. for locomotive fires, a reduction from May and April of nearly one-fourth, due probably to the infrequency of high winds. Smokers with 11 per cent. and 5 per cent. for boys are about the same as the average of the previous months.

The acreage burned in June was 4,661 less than that of May and the damage \$30,682 smaller.

July.

The lack of rain in June produced a drought in July, which dried up the growing vegetation so that fire ran through the green leaves almost as freely as through the dead débris of previous years.

Forest warden reports reveal an increase of 54 fires over June, whereas a decrease in the number would ordinarily be expected.

The most prolific source of fires was again the railroads, with 44.2 per cent., an increase of 13 per cent. over the figures for the previous month. Smokers maintain their average with 8.8 per cent. Fires escaping from persons burning up brush while clearing land, either because insufficient aid was at hand to keep them in check or because they were left overnight unattended, amounted to only 2

per cent. of the whole number, while in April, which is the brush-burning season, such fires were the second largest cause.

It may be here remarked that fires from this cause are exceedingly reprehensible, because they are quite unnecessary when proper precautions are observed. Such fires cannot be classed as purely accidental.

August.

Fires in August were the least in point of numbers of any month of the season. To offset this advantage, however, they proved quite destructive and burned over a large area.

Locomotives lead the list of causes, with 20 per cent. of the month's total. Burning brush also foots up to 20 per cent., which points to a complete disregard of responsibility on the part of persons starting such fires at an unseasonable time of the year and in the face of a severe drought. Smokers furnished 10 per cent.

The fires of August were more extensive than usual, for although July had fourteen times as many fires, their area was only three times as great. The reason for this is not apparent.

September.

A marked increase in the number of fires appears for September over August, the numbers being as 41 is to 10. August was unique in having more than its normal rainfall, but September was not so blessed.

An examination of the prominent causes shows that locomotive fires drop to 12.2 per cent., which is far below the average. Smokers were responsible for a like amount. The reports which gave cause unknown made up 51 per cent., far too great an amount.

The estimated damage and acreage of the fires were small considering the conditions, which were as favorable to the spread of fires as were those of some other months that show greater totals. It is probable that much of the land particularly liable to fire, especially along the railroads, had by this time been burned over, and was immune for the rest of the year.

October.

The second drought of the year 1908, which commenced in September, was by this time in full swing, so that the woodlands were again abnormally dry. Fires of considerable extent raged, particularly in the Berkshires, which up to this time had not suffered a great deal. The acreage burned was the second largest of the sea-

son, although it was less than half as great as the record month of April.

A greater loss was prevented by the timely arrival of rain during the latter part of the month.

Locomotives, with 30 per cent. of the fires to their credit or discredit, still lead, although below their yearly average. Hunters appear, as we might expect at this time, and are the cause of 7.7 per cent. of the fires. Smokers, whom we imagine are often hunters, fall a little below their average, and into third place, 6 per cent. Mischievous boys were responsible for 5.3 per cent., which indicates that the young generation need some sharp lessons to instil in them a decent regard for other people's property and the value of forest land.

November.

This is the tenth and last month of the season of 1908, and the number of fires and their damage falls abruptly. The figures for this month are not quite complete on account of delayed reports, but they give some clew to the fire damage which we should expect under ordinary conditions. The figures for November are below those of the summer months. When given average conditions, we should expect more and serious fires in the fall, when the ground is covered with fallen leaves.

Locomotives run high this month, with 54 per cent. of the fires, and smokers hold to their usual average, with 7.6 per cent. Fires set by boys amounted to 5.1 per cent.

ADDENDA.

There were three fires resulting in a severe financial loss so much greater than the average that they are worthy of mention. On May 19 sparks from a portable sawmill set fire to a stack of lumber valued at \$10,000. A similar loss of lumber was reported from Carlisle June 28, caused by a lightning bolt. The heaviest single loss was reported from Orleans, July 15, which amounted to \$15,000. Dwellers in large cities are accustomed to fires causing far greater loss than these, but in small country towns such sums are very considerable.

During the present season no less than nine men have been arrested for unlawfully starting fires, which arrests resulted in the payment of a fine or imprisonment or both.

At Clinton one forest fire fighter was burned to death and in Franklin a man died of heart disease while fighting fire. So far as known these were the only casualties.

III. FIRE FIGHTING AND PROTECTION AS CARRIED ON BY ENTERPRISING TOWNS.

The best information on forest fire fighting should logically come from those men who are doing this work, and we have therefore included abstracts from letters of various wardens who have kindly contributed their ideas. It is recognized that conditions vary over the State, and that a method of forest fire fighting used in one town may not be feasible in another. Again, this office, by publishing these letters, does not by that act endorse the ideas and views contained therein, but offers them so that the readers may draw their own conclusions. The selection of reports has been made so as to include some from towns with an organized fire department as well as some without.

EXTRACTS FROM LETTERS OF FOREST WARDENS.

James W. Cutting, Forest Warden, Braintree.

Fire fighting here depends largely on general conditions and extent of the territory, the topography and the wind. Fires are usually discovered by a lookout on the cliff or the mill tower.

A wagon is at once driven as near the scene as possible. One man takes an extinguisher and goes along the line, deadening the flames, while three others follow, one of whom carries the soda pail and acid box while the other two carry a can of water each. As soon as the cans are emptied they are returned to the wagon and full ones are taken to the front by one of the men, while the other takes the five empty cans for a new supply. Men with shovels and rakes follow after the extinguisher to beat out any remaining fire. Back fires are only resorted to in cases of particular emergency.

The town of Braintree owns an express wagon, 6 extinguishers, an acid box containing 100 charges, 30 water cans and 18 rakes and brooms. The soda pails are provided with hinged covers, to keep out the dirt. The water cans have covers which prevent slopping over and pitcher mouths for ease in filling extinguishers and to stop waste. The Star extinguishers have been used with good results. The soda is not added to the water until reaching the fire. In case the fire is very hot an extra charge of soda is used, to throw the stream further. The Star will stand this extra pressure. Soda should be sifted if lumpy, because it will not dissolve quickly otherwise. A copper wire should be carried with each extinguisher, to clean out the tube. To prevent the brooms from taking fire they should be saturated with salt water. The hose should be covered with a covering of electric tape, to prevent its being shrivelled by the heat.

On an alarm of fire our wagon picks up the men along the way. If more men are needed than the warden's force, the fire alarm is rung, but no man receives pay unless put to work by the warden. The rate prescribed by the town is 30 cents per hour.

BRAINTREE WAGON.

Those communities provided with an electric alarm system are in a position of advantage, as they can use a special call for forest fires, with a resulting economy of time which is of great importance.

Experience in Braintree has shown that 6 extinguishers are sufficient for a small crew. This would be on a basis of four men to a crew. The supplies needed consist of 2 pails of soda and 1 of acid, in addition to 50 bottles in the carrier, 12 cans of water and 4 shovels.

The town uses the Star and Holloway extinguishers. Any reversible extinguisher is unreliable, according to Mr. Cutting, after having been shaken about in the wagon. Those charged by refilling the acid bottles take up too much time. The Holloway works by the breaking of the bottle. The water cans have proved very handy, rendering good service. They are made of galvanized iron, cover attached with a chain, and with a bail handle for ease in carrying in the woods.

John Breagy, Forest Warden, Dover.

Sometime ago the town purchased a fire wagon. As Dover has no water system, the wagon was equipped with ladders, two or three dozen milk cans, 18 Briet hand pumps and 6 hand chemical extinguishers.

The cans cost \$9 per dozen, while the pumps were \$54 per dozen and the extinguishers were \$14 apiece. The wagon without equipment cost \$500. Two 54-gallon barrels filled with water were also placed on the wagon. The force pumps threw a stream 30 feet.

*E. A. White, Chief of Fire Department and Forest Warden,
Foxborough.*

The town has its own horses and a regular wagon equipped for forest fires. The outfit consists of 8 extinguishers, 20 4-gallon milk cans, 2 tanks holding 50 gallons, and 12 shovels. A 50-pound keg of soda and 100 bottles of acid are carried along to recharge the extinguishers. The Holloway extinguisher is used.

Foxborough has an alarm system, and when the warden or one of the engineers is notified of a woods fire he sounds an alarm, which consists of three strokes three times repeated. This calls out twelve men, picked for forest fire work. If the required number do not appear within five minutes a second alarm is given which calls the entire department.

At the fire four men use the extinguishers and four men follow with a couple of cans of water each, and two men bring the soda and the acid. Other men armed with shovels come behind to finish all remaining blaze. In times of necessity a back fire is set, but only rarely.

Forty cents an hour is the rate prescribed by the town, and no one outside of the regular force is hired unless the fire is extremely severe, and then they must be well-known, good men.

The new law in regard to setting fire without a permit between April and December was adopted by the town last year and has proved a great

success. A printed form is used for the permits, and no one receives one unless he can satisfy the warden that he can protect himself and others against the spread of fire.

Edward R. Farrar, Forest Warden, Lincoln.

In Lincoln, whoever sees a forest fire notifies the nearest fire company by telephone. There are three wagons, located in separate districts.

Besides the above-mentioned apparatus, Mr. Chas. Francis Adams has a light express wagon which he keeps loaded with 8 extinguishers and 20 milk cans filled with water, which is always offered when needed.

On the estate of Major Higginson, near by, 12 extinguishers are kept for a similar purpose, and 12 more may be obtained if necessary. Many other citizens have extinguishers to be had in time of need.

When fighting forest fires we send men ahead with extinguishers and cans of water, and behind these follow careful men with shovels, to put out the remaining fire.

Jas. J. Shepard, Forest Warden, Pembroke.

A definite plan of operation at forest fires is followed in Pembroke. When the apparatus arrives at the fire a man starts along the blaze with an extinguisher. He does not stop to extinguish everything, as another man or more follow on to put out the fire left by the first. Generally a man or two with extinguishers can deaden the fire so that men with shovels can complete the job. Meanwhile I set one man at work refilling extinguishers and bringing supplies of water. Cans are preferred to tanks, as they can be carried into the woods, whereas a tank must remain in one place and the extinguishers be carried to it.

During the drought this year I issued an order through our local paper stating that permits for fires would not be issued until rain came. A request was also published asking for the co-operation of the people. Fortunately we escaped the infliction of the severe fires which some of our neighbors suffered from.

One of our wagons went to a fire located in a large house, while directly across the road were three more buildings with the wind blowing towards them. Our men went out on the roofs with the extinguishers, and as fast as the shingles caught put them out. All the buildings were saved. It was three miles from the place where the wagon was kept to the fire, but the driver got there in eighteen minutes from the time the telephone message was received. The above merely shows that the wagons serve the town in more than one capacity.

The cost of our three wagons and equipment, consisting for each wagon of 14 Standard extinguishers supplied with extra heavy cover and a patent shutoff, 2 axes, 9 shovels, 2 lanterns, a large gong, 10 water cans, each holding enough for two charges, a brass rail along the sides, and under the driver's seat 60 charges of acid and soda, was about \$400 each.

Doubtless this is a more expensive wagon than others rendering similar service. The bare wagon, fitted with pole, nicely painted and lettered, cost without freight in Indiana \$135. The outfitting was done here by local men. Each extinguisher stands by itself in a case, so that there

LINCOLN WAGON.

PEMBROKE FOREST WARDEN APPARATUS.

WILMINGTON FOREST FIRE WAGON.

can be no chafing against each other. The water cans are also inside a wooden case, where their slop will not wet the chemicals.

I presume a wagon might be fitted up, less the price of the extinguishers and water cans, for \$150.

*Thomas Maher, Chief of Fire Department and Forest Warden,
Milford.*

The regular supply wagon of the department is used to carry the forest fire apparatus, which consists of 6 extinguishers, shovels and brooms. The forest fire alarm consists of 5 strokes, and all the men report at the station. From six to ten men are taken along on the wagon and they are paid 25 cents per hour.

Mr. Maher also says that back fires may be required in some instances, but they are often more disastrous than the original ones.

S. T. Parker, Forest Warden, Wakefield.

Wakefield has furnished apparatus for forest fires valued at \$1,400. This apparatus consists of 268 Johnson pumps of the double acting variety, 500 buckets and a few cans. Forty oil barrels were purchased and sunk in the ground in the woods, at a cost of \$1 each, for a reserve supply of water.

When a man receives a pump he signs a receipt for it, agreeing to report at any fire within half a mile. Failing in this he gives up the pump. The pumps may be used for other purposes, but they must be kept in condition for immediate use.

Very little time is lost before men are working at the fire, and it seldom burns more than three or four hours. When the fire is too hot in front work is confined to the flanks, and the fire is gradually narrowed down until put out. In a dry season a trench is dug and water turned in to prevent the fire from running under ground.

Water for the pumps is found in brooks and ponds, with which Wakefield is well supplied, and from the water barrels mentioned before.

Every fire is investigated and the cause is usually discovered. If boys set fire their parents are notified, and if they are caught again they are brought before the Board. The warden keeps a record of every fire, its extent, cause and damage.

J. M. Hill, Chief Fire Department and Forest Warden, Wilmington.

The town has two single express wagons which are equipped with 20 10-quart cans with stoppers attached, 6 Johnson pumps, 6 shovels and 3 brooms each. The wagons are kept at opposite ends of the town.

Men report voluntarily, and if the fire is a small one the warden or deputy takes the wagon with two or three men and goes to it. If more men are needed the fire alarm is sounded. The signal is one blast followed by the box number sounded thrice.

Mr. Hill thinks that good results are obtained with water and hand pumps, especially in his section, where on account of the rocky soil there is little chance of using a shovel. Quickness in reaching the fire he considers is paramount. He resorts to back fires when a large number of men are at hand, and then only when necessary.

Herbert Morrissey, Forest Warden, Plymouth.

Fires are controlled by chemical extinguishers, and after the flames have been deadened, men with shovels finish the work by throwing on sand. Close watch is kept on fires, the men remaining overnight if necessary. The area burned is patrolled at least once the next day. When the fires are too hot to combat from the front this work is carried on at the flanks, gradually narrowing in the line until it is all put out by the men meeting in the middle of the line.

The town owns about 100 extinguishers and has three especially equipped wagons. Two of these wagons carry 12 extinguishers each and the other 14. The wagons are also equipped with tanks holding 50 gallons and covers holding an equal amount, which are put on the ground and the tanks emptied into them, the wagons then going for a new supply. Compartments of acid and soda are fitted into the wagon, and shovels, hoes and brooms are provided.

Two men remain at the wagon to refill the empty extinguishers as they are brought in. Besides the extinguishers on the wagons, each of the twenty deputy wardens have 4, which they bring to the fire with them. All the extinguishers have straps, so that they may be slung on a man's back. One extinguisher will deaden the fire on a line from 50 to 100 yards in length on one charge.

Plymouth is, we believe, unique in having an iron watch tower on one of the highest hills in the town, for the detection of forest fires. The tower is of steel lattice work construction, similar to that of a windmill, and with a sheet-iron cabin at the top. The tower is 85 feet tall, the hill 165 feet above the sea, so that gives the watchman a total elevation of 250 feet. It is connected by telephone with Mr. Morrissey's house. The watchman who stays up here during the dry seasons has a strong glass and thus is given a clear view over many miles of country.

When fires are severe and the situation critical Mr. Morrissey does not hesitate to use back fires, which are handled as follows:—

The warden places his men along a road, if convenient, or along a line of freshly dug earth extending across the face of the fire. A man with a torch goes along the road setting the back fire. Men with shovels are stationed at short intervals along the road, ready to deaden the flames or to stop them from jumping the road to the

ONE OF THE WAGONS OF THE PLYMOUTH FOREST WARDEN.

OBSERVATION POST OF FOREST FIRE DEPARTMENT ON RESER-
VOIR HILL, PLYMOUTH, 248 FEET ABOVE MEAN SEA LEVEL.

woods behind. Within these woods are stationed men with extinguishers, indicated in the diagram by large black dots. These men stand ready to put out all incipient fires lighted by flying sparks, and hasten forward to the aid of the men on the line when called.

In Plymouth fires set by locomotives are usually put out by the section men, but when the forest warden is called the railway company reimburses the town for the expense.

Permission to build fires in the open must be obtained from the warden. Cranberry bog owners are treated with leniency when obliged to build smudge fires to protect their crops from frost. All fires for clearing up brush are guarded by a wagon and crew, the owner of the property paying the charge for the protection.

C. H. Trowbridge, Forest Warden, Oakham.

When a forest fire breaks out the warden telephones all persons having fire extinguishers to turn out, and then, taking what men and extinguishers he can muster, he hastens to the fire at once.

At the fire it is the custom of the warden to have three or four men follow him along the line to pass forward loaded extinguishers and take back empty ones for recharging.

Water for recharging the extinguishers is brought in cans from the nearest supply. Much of the advantage of extinguishers over a chemical wagon is that they may be carried with their cans to inaccessible places in the woods.

Oakham owns 34 extinguishers, which have been placed in private houses throughout the town. Many more persons applied for them than could be supplied. Next year the town intends to buy enough to supply the demand. The first ones cost \$18, but a substantial reduction was obtained by ordering a large quantity. While there are many kinds of extinguishers, those most effective at woods fires are provided with an arrangement which cuts off the stream by means of a valve which stops the flow of acid. Such a device saves the remainder of the soda charge, so that it may be used at intervals when needed. Those chemicals using the whole charge are useful in buildings. Every small town should have some such protection as this of Oakham. Many houses have been saved here by extinguishers when a bad fire seemed inevitable.

J. A. Healy, Forest Warden, Westford.

I will give you the list of the fire tools of the town of Westford: 30 shovels, 30 hand pumps, 12 extinguishers, 60 pails.

Enclosed find picture of fire wagon.

F. B. Knapp, Forest Warden, Duxbury.

Our woodland area covers about two-thirds that of the town, and produces cord wood, box boards and some better lumber. It forms part of a continuous forest extending into adjoining towns, but is split up by roads, ponds and open spaces. There are numerous isolated farms liable to damage from forest fires.

Our liability to fire is considerable. A railroad runs the length of the town, many strangers come for mayflowers in the spring and cranberry bogs are in process of construction. The soil is light and the woods get very dry.

The town is liberal in its appropriation and appreciates our efforts. Telephones are pretty common, and the men turn out well. We are in close touch with the railroad people and co-operate with them.

The forest warden and fire departments are technically distinct, but work together. I am chief of the fire department, and all of the engineers are deputy wardens. One commissary looks after all of the apparatus.

We have 2 60-gallon hand combination fire engines (used for forest fires when specially called out), 4 forest fire wagons, and several private ones used at times, 100 3-gallon Standard extinguishers scattered throughout the town, shovels, mattocks, etc.

The fire wagons vary, but this one is typical: A light, one-horse express wagon, 4 extinguishers, 6 boxes, each with 6 charges of chemicals, 16 3-gallon Marshfield cans, not completely filled (on account of weight), 10 shovels, 2 mattocks, 2 axes, 2 lanterns, torches.

We spread the alarm of fire by direct telephoning and by bells. In times of great danger a man is stationed in a church belfry.

We are inaugurating a system of outlooks in conjunction with the Plymouth fire tower. Our tower is the Standish monument, on Captain's Hill. From these two points the compass bearings of an incipient fire can be read and telephoned to a central station. These lines are then run out on the United States geological survey map, allowance being

WESTFORD FIRE WAGON.

made for the difference between the true and magnetic north. If the compass readings are correct the intersection of the two lines gives the position of the fire.

At a small fire we do not attempt any thorough organization, but we organize at serious fires as follows. All are familiar with the organization, either through experience or printed instructions.

Chief.—The forest warden or deputy of the district. Does not stay at any one point, but overlooks the whole line. Informs himself carefully as to the extent of the fire and picks out the critical points. If the attack on one line is unsuccessful he draws the men back to another.

Aids.—Messengers for the chief.

Deputy Wardens.—Act for section as chief does for whole, or, at smaller fires, are simply foremen.

Foremen.—Each has from four to six men, who stay with him until the fire is out. Each foreman and his crew form the units for fighting. As, for instance, one crew might be put to work refilling extinguishers, another at carrying them, another at guard duty, to prevent fresh outbreaks after the fire is apparently out.

Commissary.—Takes care of the apparatus, and at the fires sees that the men are supplied with food and other supplies.

[The diagram on page 22 gives this organization in graphic form and is remodelled from one sent in by Mr. Knapp.]

It is essential that the work of forest fire fighting should be done as systematically as possible, and that the directions of the leaders should be faithfully carried out. The failure of a single man to do the part assigned to him may make useless a whole lot of hard work and cause a new start to be made.

If the force is too small to attempt to stop it across its whole front, we start to windward and work down both flanks, narrowing to the front. One crew with extinguishers pushes ahead and deadens the flames, and is followed by a second crew consisting of one man with a mattock and

four with shovels, and a reserve man. If very dry a second shovelling crew follows this one. Then come the guards with shovels and extinguishers, who patrol the whole line.

With a force strong enough to attack in front, back firing is used. A back fire must be set on a natural line, such as a road, but, falling in this,

INTERIOR OF WELL-EQUIPPED WAGON.

one can be plowed. For this purpose use a strong plow drawing a narrow furrow and pulled by two horses set tandem. Set a back fire as rapidly and continually as possible, the men with torches being followed by shovellers to put out fire spreading on the leeward side of the line. Other shovellers and extinguisher men are stationed some distance back in the woods to put out sparks as they fly over.

Our work is still in the experimental stage and just at present we are trying to get the fire fighters more systematic, and are getting into closer relations with neighboring towns.

The preceding letters were selected so as to give as wide a range of conditions as possible. There are letters from wardens who are at the same time the chiefs of organized fire departments, letters from wardens who have an organization distinct from the fire department and letters from wardens in towns which have no fire department. The apparatus used varies in value from \$300 to \$3,000. There are towns which have done as much or more than some of those mentioned above, but the fact remains that a large majority have made no provision for fighting forest fires. The cities also are as indifferent as the towns. It is not to be supposed that all the towns represented by the letters have done the best thing possible under the circumstances, but they have done something.

IV. WHAT IS YOUR TOWN DOING ?

ON FOREST FIRE PROTECTION.

Apparatus.

Every town having 1,000 acres or more of forest land should have some form of apparatus, its amount depending, of course, on the financial ability of the town, the acreage of forest land and the value the inhabitants set upon it. Cities and towns having organized departments should see that special provision is made for combating forest fires, whether the warden is a member of the fire department or not.

The equipment best suited to various localities will, of course, vary in detail, but a practical outfit will include the following essential things:—

1. A stout express wagon. Gold paint and brass work are not necessary to its practicability, and a second-hand wagon in good condition would fulfill all requirements.

2. Five or 6 chemical extinguishers of a reputable make, and costing from \$12 to \$20 each.

3. A dozen or more cans, with attached covers, and filled with

water in which soda has been dissolved ready to recharge the extinguishers. Large milk cans are often used, but cannot as a rule withstand hard service.

4. Extra charges of soda and acid carried in proper receptacles.

5. Shovels, mattocks, axes, rakes, hoes and brooms, as many as the wagon will conveniently carry.

Such an outfit will cost from \$300 up.

Organization.

Each warden should have some kind of organization, although the exact form will depend a good deal on local circumstances. The warden and each deputy should have a small crew of men whom he can call quickly and upon whom he can rely. No others should be taken to the fire unless its size makes it imperative. Such a plan will stop irresponsible people from setting fires in the woods merely to get a job at putting them out.

Fire Lines.

This subject is a rather unsatisfactory one to discuss, because although more or less has been written on it, there have never any real tests been made.

A fire line as ordinarily described is a strip through the woods from which all the growth has been removed. Some people acting on this description have made fire lines which were veritable traps. They cleaned out all the trees and undergrowth and there left it. Consequently during the next year it came up to sprouts and brambles. To keep such a line clear it must be mowed and burned over every year, although of course as time goes on grass will take the place of brambles and sprouts, and this can be easily burned over. The cost of such a line made for the Metropolitan Water Board at the Wachusett Reservoir was \$150 a mile.

What appears to be a very efficient fire guard is to be found on the estate of Mr. Charles Francis Adams, Esq., in Lincoln. It consists of a trench 6 feet wide and dug down to mineral soil (about 2 feet), paralleling the railroad track at a distance averaging 60 feet from the center of the right of way. We are of the opinion that if the distance had been 100 feet there would be less likelihood of cinders blowing over it. Between this ditch and the track the underbrush has been cut and the dead leaves are annually burned. The large trees are left undisturbed, and serve as a screen to catch the flying sparks. Except in the case of a very high wind this line is fireproof. It is two miles long.

FIRE LINE, METROPOLITAN WATER BOARD RESERVATION,
BOYLSTON.

FIRE LINE. ADAMS ESTATE, LINCOLN
(WINTER SCENE).

A similar but cheaper line could be made by running a few furrows with a plow instead of digging a trench. Mr. Knapp contemplates the use of a rotary disk plow followed by a drag to smooth over the ground. A plowed line of this sort would not be sure to keep a fire from running under ground while the trench would.

Just a word of protest should be inserted here against the common practice of cutting brush along the side of country roads, where it lies, making fuel for the first match that is thrown into it.

One of the best natural fire lines is the old wood road. These roads are more or less common, and often ground fires run up and skirt them and there terminate. Were these old roads kept cleaned and widened, with an idea of usefulness as a fire line as well as for getting out forest products, they could be made to serve both purposes.

Forest wardens will do well to emphasize the importance of having all large forest tracts and even relatively small areas subdivided by fire lines, and thus be able to concentrate forces on definite units. System and forethought will put out many fires before they even occur.

Old stone walls relieved of débris, as leaves, brush, etc., also may be utilized as splendid fire protectors. Fires will run up to and skirt these old walls without crossing them if these walls are cared for.

Patrol.

The old saw concerning the stitch in time which saves nine ought to be changed to nine thousand when applied to fire. The quickest and surest way to handle a forest fire is to be on the watch for it. We have seen in the report of Warden Morrissey of Plymouth how that town handles the situation with its tower. This idea is worthy of wider application. Where the topography admits it, several towns could combine to maintain such a station. The Forest Commissioner of Maine maintains several watchmen, who are stationed on some of the highest mountains in the forest region of the State.

The first place to start a patrol would be along the railroads, for, relative to the territory covered, far more fires are started there than elsewhere. Imagine a small car mounted on the rails, run by gasoline, capable of carrying one man, a couple of extinguishers and other tools and geared to a speed of 35 miles an hour. A man so provided could cover a 50-mile stretch of track five times a day. The dangerous season for which a patrol would be needed usually extends from the 15th of March to the 1st of June and from the 15th of September to the 1st of December, — 150 days in all.

The expense for wages and supplies would be \$500 per man. The machines might cost \$500 each. Let us imagine ten such patrols distributed as follows and see how well they cover the danger points. We do not mean by this that ten men are adequate; but they are enough for an experiment.

NEW HAVEN RAILROAD.

Plymouth Division.

Brockton to Provincetown, 100 miles, two men, \$1,000.

Braintree to Plymouth (main line) and Middleborough Branch, 40 miles, one man, \$500.

Midland Division.

Norwood Central to Douglas, 40 miles, one man, \$500.

BOSTON & ALBANY RAILROAD.

Main Line.

Westfield to Pittsfield, 40 miles, one man, \$500.

Ware River Branch, 50 miles, one man, \$500.

BOSTON & MAINE RAILROAD.

Fitchburg to Greenfield, 65 miles, two men, \$1,000.

Central Massachusetts, Hudson to Belchertown, 50 miles, \$500.

CENTRAL VERMONT RAILROAD.

Miller's Falls to Monson, 50 miles, one man, \$500.

Total cost: New Haven, \$2,000; Boston & Albany Railroad, \$1,000; Boston & Maine Railroad, \$1,500; Central Vermont Railroad, \$500.

These figures do not allow for the cost of the machines, which would double them for the first year. No allowance is made for patrols at night, for as a rule comparatively few forest fires start at night, as there is little wind and the ground is covered with dew.

Another scheme is suggested which would make it compulsory along certain sections of track for the section men to detail one of their crew to follow all trains over their section. A crew of five men near Marshfield is said to have spent 50 per cent. of its time during certain weeks of last summer in fighting fire. It would have been real economy for the railroad if one man, or 20 per cent. of the force, had been detailed to patrol the track and put out the fires when they first started.

The advantage of this last scheme is that it is more elastic than the first one, because it can be put in operation when needed and drawn off when not, regardless of months. It also fits into

the ordinary manner of administering the right of way. It would take five men to cover the ground which one could under the first plan, so the annual cost would undoubtedly average more.

That the railroads can afford to expend something on the patrolling of their tracks will be plain from the following list of damage claims paid by railroads in Massachusetts. If the figures of 1908 were at hand it is probable that increases of 200 per cent. would be found. It will be seen that the patrol only has to stop about 10 per cent. of the fires in order to justify the expense.

TABLE 4.—*Forest Fire Damages paid by Railroads in Massachusetts.*

New London Northern:

For three years ending June 30, 1906,	\$8,339 36
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Boston & Albany:

Nov. 1, 1903, to Nov. 1, 1904,	4,699 33
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Nov. 1, 1904, to Nov. 1, 1905,	8,450 60
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Nov. 1, 1905, to July 20, 1906,	7,244 62
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Boston & Maine:

1903,	34,859 15
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1904,	19,426 36
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1905,	35,560 89
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New York, New Haven & Hartford:

Year ending June 30, 1902,	13,658 49
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Year ending June 30, 1903,	19,107 79
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Year ending June 30, 1904,	19,395 55
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Year ending June 30, 1905,	26,311 20
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Year ending June 30, 1906,	45,112 96
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In addition to patrolling by the railroads along their line, the State should be ready in emergencies to put on a patrol in other sections. The Forest Commissioner of Maine has an emergency appropriation of \$20,000 which he can use for such means. His average annual expenditure from this fund has been \$9,000, but last year he exhausted the entire amount before the 1st of September. For a State of the area of Massachusetts probably \$5,000 would constitute an ample emergency fund. The burden of patrol work is put not on the towns but on the State, because the saving of the forests is a problem which the State as a whole is interested in, and the expense of it should not be borne by the towns, which are forced now to pay the entire cost of fire fighting. As a rule, those towns having the largest area of forest land are the least able, from the financial standpoint, to protect it. In the States of New York and Minnesota one-half the expense of fighting fires is borne by the State; in Michigan it is one-third; in New Jersey one-half, and in Connecticut one-fourth is paid by the State and

one-fourth by the county. Massachusetts is one of the few States having an organized forest fire fighting force in which the Commonwealth is not specifically obliged to assume part of the expense.

ON DAMAGE BY FOREST FIRES.

There are many ways in which a fire injures the woods, some of which are well known and fully appreciated, but several of the most important are not usually considered when the cost of a fire is estimated.

First. — A fire may kill the standing timber. This is always the case when a top or crown fire occurs. In some cases such fire-killed timber can be utilized, but it does not bring a good sale value on the market and only a part of the loss can be recovered.

Second. — A light fire may run through a stand and kill a tree here and there. In this case the damage is not so apparent as when all the trees are killed, but a close examination of the woodlot through which surface fire has gone reveals the fact that other trees do not escape without injury. It may be a slight scorching of the bark, or the roots near the surface of the ground may be damaged. Such trees die later on, because in this weakened condition they are no longer able to withstand the attacks of insects and fungi. Chestnut is a tree peculiarly susceptible to fire scorch.

Third. — The vegetable part of the soil, or humus, as it is called, is consumed by a fire as well as the leaves and other litter which would make a future supply of humus. The destruction of the humus affects the fertility of the soil in a marked degree. The elements which tend to conserve the soil moisture are thus destroyed.

Fourth. — A forest fire may result in a change in the composition of the stand of trees. It is often followed by a growth of poplars, birches, scrub oak and blueberry, which growth has little or no value and is hard to get rid of.

Fifth. — Owing to the moisture-conserving elements which have been destroyed and the rank new growth which succeeds the fire, land which has been burned over is made more liable to fire, so that each successive fire means danger of another.

Sixth. — The young growth or reproduction is nearly always killed. In the long run this is probably the greatest injury of all, although it is seldom counted when the loss through a forest fire is being reckoned.

When one comes to estimate the damage caused by fire in terms

of money he finds it a hard proposition. Allowance must be made for all injuries that can possibly be expressed in dollars and cents, which, except in case of mature growth which has been entirely destroyed, a rare case, calls for a lot of judgment. By mature growth we do not mean that the trees have stopped growing in volume, but that their rate of increase does not keep pace with the interest on their value. For a pine stand this age would be from fifty to sixty years: chestnut sprouts, forty to fifty years; sprout oak, thirty to forty years. To find the value of these stands before they are mature, their expectation value at that age should be discounted to the present date at 6 per cent. The expectation value of these three types of stands at maturity could be averaged as follows, although of course a great deal would depend on the situation of the stand. Pine, \$250 per acre; sprout chestnut, \$60 per acre; and mixed sprout hardwoods, \$30 per acre. At ten years of age, and discounted at 6 per cent., the value per acre would be as follows:—

TYPE.	Mature Age (Years).	Expecta- tion Value.	Taxes and Interest.	Value at Ten Years.
White pine,	50	\$250	\$50	\$19 40
Sprout chestnut,	40	75	25	8 70
Sprout hardwoods,	30	30	15	1 70
Gray birch,	20	20	10	55

The above values, it must be remembered, take no account of the injury to the soil. It must also be remembered that a severe injury to a young tree amounts to total destruction, since there would be little chance of its reaching merchantable size and much less financial maturity.

EXTRACTS FROM WARDENS' LETTERS.

These paragraphs from wardens' letters were selected because they contained miscellaneous points of interest. Most of the letters which contained information on fire fighting have been given under that heading.

A. E. Travis, Deputy Forest Warden, Barre.

The fires of the 24th were set by a locomotive. The two larger fires were set at 9.30 A.M. between mile posts 29 and 30; the smaller fire was started at 2.30 P.M. on the return trip, near mile post 29.

No section men came to any of these fires and as far as I can make out no fire call was sounded by the locomotive.

Our fire department was called, but all that saved us from a severe loss was the wind.

T. B. Tubman, Warden, Brewster.

I write you this letter hoping that you will do something about these abominable railway fires. The railroad will not give the section foreman a man to follow the trains, nor does it seem possible that they inspect their screens as they should. Can you not influence the company to remedy this evil so their engines will run over the road without burning up all the woodland?

I have been a fire warden for about ten years, but have never known anything like the number of locomotive fires during April, except one day last summer when the Boston train set thirteen fires.

A. P. Baker, Forest Warden, Dennis.

Woods fires reported from South Dennis are set by locomotives. As the same engines do not pass over the road every day, it is impossible to report them for the inspection of their spark arresters.

Fires are of almost daily occurrence some weeks. Thus far I have been able to get to them very soon after they start, thus preventing much damage.

Ralph Earle, Forest Warden, Dighton.

I am reporting the only fire which the town has had this year. This I feel is due to our excellent fire laws being well advertised among the people.

E. E. Chapman, Forest Warden, Ludlow.

I have issued to fourteen different persons permits to set fire.

I have had two fires to date where I called out a large number of men. They were extinguished by back firing from a plowed furrow across the face of the fire.

H. J. Montgomery, Forest Warden, North Adams.

The warning notices printed on cloth, calling attention to the fire laws, and sent out by the State Forester, have been a very effective check on forest fires here this season.

A. F. Howlett, Forest Warden, Spencer.

The selectmen think that the railroad company should at least pay half the expense that it costs this town to fight the numerous brush fires set by locomotives.

A. C. Warner, Forest Warden, Sunderland.

We have been for the past two days fighting the worst fire that we have ever had in Sunderland. It was started by a locomotive of the Central Vermont Railroad. I believe the fire covered more than 200 acres

of valuable timber land. I have had 125 men out and think that it is under control, but shall maintain a watch on it for a few days.

This fire is only one of a number set in the same locality by the Central Vermont.

Alvarado Henry, Forest Warden, Upton.

Please send me more blue books with the forest laws as I have appointed nine deputies.

I have had extracts of the forest laws printed on postal cards, which I sent to every voter in the town, so that all may know its mandates.

E. A. Young, Forest Warden, Hubbardston.

There have been many small fires along the railroad which have been taken care of by the section men and of which I have no account. No timber of consequence has been destroyed.

In this unusually dry year adjoining towns have all suffered severely from fires. I believe that the small loss and light cost of fighting fires in Hubbardston have been due to:—

First.—The enforcement of the law against setting fires without a permit.

Second.—The co-operation of citizens with the forest warden and his deputies to prevent fires of careless origin, and the prompt reporting of fires where observed.

During the danger period of the past year special warnings were posted and all citizens were requested to extinguish or report small fires.

ON THE WORK OF GAME WARDENS.

This book may well close with a short tribute to the work of the deputies of the Fish and Game Commission. Of the nine arrests and convictions made for violations of the fire laws, seven were brought about by these two men, Deputy H. A. Bent of Franklin, four men, and Deputy T. L. Burney of Lynn, three cases. The Lynn offenders were boys. Twelve other deputies reported to the commission that they had seen and aided in extinguishing nearly fifty fires. The reports of a few of them are here appended.

Walter A. Larkin, Andover.

I have put out three fires since I have been here; one in Haverhill, set by fishermen; one at Foster Pond, Andover, and one recently in Bedford. The fishermen at Foster Pond set the fire to drive away mosquitoes. I have spoken to them and no more have been set.

Allen A. David, Taunton.

As to forest fires, I have put out ten of them last year. Nine out of ten were along the railroad track and the other in the woods. Three fires did not do much damage, on account of being put out before they got much headway.

Irving O. Converse, Fitchburg.

Fires found and extinguished alone, 2; fires found and department called out, 3; fires found and section hands notified, 3; fires found and farmers called upon.

William H. Leonard, East Foxborough.

I have, with the assistance of one man, put out two woods fires, one in North Attleborough and one in Foxborough. I called out the fire department in the latter town and also notified the chief in Blackstone of a forest fire.

Strange to say, many of the towns in the district have been quite immune compared with former years.

In travelling along the railroad line in Bellingham and Blackstone one is astounded at the vast acreage of woodland forever destroyed by fires.

While in Kingston in October I was told that a fire there in July last cost the town hundreds of dollars just to fight it (\$1,500).

D. E. Wansey, Montague City.

Sunday I saw a forest fire and went out with my son and fought it all the afternoon.

Francis B. Osborne, Hingham.

Number of forest fires extinguished, 5. All of these were in the first stages and help was required only in one. I think that the cause of them was in at least two cases locomotives.

V. LIST OF FOREST WARDENS.

TOWN OR CITY.	Badge No.	Warden.
Abington, . . .	287	B. Ernest Wilkes, chief fire department.
Acton,	181	William H. Kingsley.
Acushnet, . . .	275	Geo. T. Parker, selectman.
Adams,	7	John Clancy.
Agawam,	93	Edward M. Hitchcock.
Alford,	24	John H. Wilcox.
Amesbury, . . .	228	James E. Feltham, chief fire department.
Amherst,	67	G. E. Stone, tree warden.
Andover,	212	J. H. Playdon, tree warden.
Arlington, . . .	193	Walter H. Pierce, chief fire department.
Ashburnham, . .	104	William D. Miller.
Ashby,	158	Henry A. Lawrence.

V. LIST OF FOREST WARDENS — Continued.

TOWN OR CITY.	Badge No.	Warden.
Ashfield, . . .	50	Chas. A. Hall.
Ashland, . . .	200	H. H. Piper.
Athol,	105	Jas. A. Dunbar.
Attleborough, . .	265	Hiram Packard, 3 Hope Street, chief fire department.
Auburn,	123	J. Fred Searle.
Avon,	259	E. Walter Packard, constable.
Ayer,	169	Henry E. Sanderson.
Barnstable, . . .	315	Henry C. Bacon, P. O. Hyannis.
Barre,	142	D. H. Rice.
Becket,	23	Elmer D. Ballou.
Bedford,	179	Chas. E. Williams.
Belchertown, . . .	73	James A. Peeso, constable.
Bellingham, . . .	326	L. F. Thayer, town treasurer.
Belmont,	194	John F. Leonard, chief fire department.
Berkley,	271	Gideon H. Babbitt.
Berlin,	139	Walter Cole, constable.
Bernardston, . . .	39	E. E. Benjamin.
Beverly,	220	Levi K. Goodhue, chief fire department.
Billerica,	173	Geo. C. Crosby, chief engineer fire department.
Blackstone, . . .	114	Thomas Reilly.
Blandford,	81	Stephen Bodurtha.
Bolton,	146	Frank A. Powers, tree warden.
Bourne,	311	Emory A. Ellis, P. O. Bournedale.
Boxborough, . . .	182	M. L. Wetherbee, selectman.
Boxford,	218	Harry L. Cole, selectman.
Boylston,	138	Chas. S. Knight, metropolitan watchman.
Braintree,	244	James M. Cutting, special police, P. O. South Braintree.
Brewster,	318	T. B. Tubman, highway surveyor, P. O. North Brewster.
Bridgewater, . . .	293	Edwin S. Rhoades.
Brimfield,	99	Edward J. Prindle.
Brockton,	286	Harry C. Marston, chief fire department.
Brookfield,	120	David N. Hunter.

V. LIST OF FOREST WARDENS—Continued.

TOWN OR CITY.	Badge No.	Warden.
Brookline, . . .	237	Geo. H. Johnson, chief fire department.
Buckland, . . .	49	William Sauer, P. O. Shelburne Falls.
Burlington, . . .	178	Walter L. Skelton, tree warden.
Canton, . . .	249	Laurence Horton, fire engineer, P. O. Ponkapoag.
Carlisle, . . .	171	Herbert P. Dutton, selectman.
Carver, . . .	304	Eugene E. Shaw.
Charlemont, . . .	42	Fred D. Legate.
Charlton, . . .	115	Carlos Bond.
Chatham, . . .	320	Geo. H. Eldredge.
Chelmsford, . . .	172	Ralph P. Adams.
Cheshire, . . .	11	Chas. D. Cummings.
Chester, . . .	80	William H. Babb.
Chesterfield, . . .	63	Chas. A. Bisbee, P. O. Bisbee.
Chicopee, . . .	87	John H. Pomphret, chief fire department.
Chilmark, . . .	308	Ernest C. Mayhew.
Clarksburg, . . .	3	Robert Lanfair, R. F. D. No. 1, P. O. North Adams.
Clinton, . . .	145	Daniel W. Goss, 40 East Street.
Cohasset, . . .	246	Wm. J. Brennock, captain fire department.
Colrain, . . .	37	Wm. H. Davenport.
Concord, . . .	180	G. E. Morrell, chief fire department.
Conway, . . .	51	Chas. Parsons, tree warden.
Cummington, . . .	60	W. S. Gabb, ¹ P. O. Swift River.
Dalton, . . .	14	William M. Colton, forester, Flint Stone Farm.
Dana, . . .	147	Elmer A. Collier, chief fire department, P. O. North Dana.
Danvers, . . .	210	Thos. E. Tinsley, tree warden.
Dartmouth, . . .	278	John W. Howland, P. O. North Dartmouth.
Dedham, . . .	241	Everett J. Winn, chief fire department, P. O. Box 96.
Deerfield, . . .	52	Wm. L. Harris, selectman.
Dennis, . . .	317	Alpheus P. Baker, constable, P. O. South Dennis.
Dighton, . . .	272	Ralph Earle.
Douglas, . . .	112	W. L. Church, county commissioner.
Dover, . . .	240	John Breagy.

¹ Proprietor of the Elm Tree Inn.

V. LIST OF FOREST WARDENS — Continued.

TOWN OR CITY.	Badge No.	Warden.
Dracut, . . .	163	Adelbert P. Bryant, 790 Pleasant Street.
Dudley, . . .	110	F. A. Putnam.
Dunstable, . . .	161	Dexter Butterfield.
Duxbury, . . .	303	Fred B. Knapp, master Powder Point School.
East Bridgewater, .	298	Loren A. Flagg, chief fire department, P. O. Elmwood.
Eastham, . . .	322	W. Horton Nickerson, road surveyor.
Easthampton, . . .	77	Frank P. Newkirk, tree warden.
East Longmeadow, .	95	Henry Ashley.
Easton, . . .	264	John Baldwin, chief fire department, P. O. North Easton.
Egremont, . . .	29	Frank W. Bradford, Great Barrington, R. F. D. No. 3.
Enfield, . . .	74	Chas. W. Felton.
Erving, . . .	46	Ch. H. Holmes, selectman, P. O. Farley.
Essex, . . .	233	Otis O. Story, tree warden.
Fairhaven, . . .	276	Henry T. Howard.
Fall River, . . .	280	William Bayard, tree warden.
Falmouth, . . .	312	J. M. Watson.
Fitchburg, . . .	157	Geo. H. Hastings, superintendent, local superintendent gypsy moth.
Florida, . . .	5	Fred R. Whitcomb, P. O. Hoosac Tunnel.
Foxborough, . . .	261	Ernest A. White, chief fire department and constable.
Framingham, . . .	197	James Stalker, P. O. South Framingham, assistant tree warden.
Franklin, . . .	255	Edward S. Cook, dealer in wood and lumber.
Freetown, . . .	274	Andrew M. Hathaway, P. O. Assonet.
Gardner, . . .	153	Theodore W. Danforth.
Gay Head, . . .	343	Leander B. Smally, Menemsha, Mass.
Georgetown, . . .	224	Clinton J. Eaton.
Gill, . . .	45	Lewis C. Muun.
Gloucester, . . .	234	M. A. Walton.
Goshen, . . .	61	Sidney F. Packard, P. O. R. F. D. No. 2, Williamsburg.
Gosnold, . . .	344	Harold S. Veeder, P. O. Cuttyhunk.
Grafton, . . .	125	Sumner F. Leonard, overseer of the poor.
Granby, . . .	79	C. N. Rust, P. O. South Hadley.
Granville, . . .	91	Laurence F. Henry, selectman.

V. LIST OF FOREST WARDENS—Continued.

TOWN OR CITY.	Badge No.	Warden.
Great Barrington, . . .	25	Daniel W. Flynn.
Greenfield, . . .	44	William A. Ames, tree warden.
Greenwich, . . .	327	William H. Walker, P. O. Greenwich Village.
Groton, . . .	167	James B. Harrington, chief fire department.
Groveland, . . .	225	Sidney E. Johnson, 311 Center Street,
Hadley, . . .	66	Edward P. West, tree warden.
Halifax, . . .	299	Edwin H. Vaughan, assessor.
Hamilton, . . .	222	Fred Berry, P. O. Essex, R. F. D.
Hampden, . . .	97	John S. Swenson.
Hancock, . . .	9	Chas. F. Tucker.
Hanson, . . .	296	Albert L. Dame, tree warden, P. O. South Han- son.
Hanover, . . .	295	Chas. E. Damon, P. O. Box 113, North Hanover.
Hardwick, . . .	141	Myron N. Ayers, constable.
Harvard, . . .	152	Benjamin Priest.
Harwich, . . .	319	John Condon.
Hatfield, . . .	65	John M. Strong, P. O. West Hatfield.
Haverhill, . . .	216	John B. Gordon, chief fire department.
Hawley, . . .	48	Ernest R. Seare, tree warden, P. O. Charlemont.
Heath, . . .	36	S. G. Benson.
Hingham, . . .	289	Geo. Cushing, chief fire department.
Hinsdale, . . .	15	Lewis B. Brague, tree warden.
Holbrook, . . .	247	E. W. Austin.
Holden, . . .	136	J. W. Rice.
Holland, . . .	101	O. F. Howlett, P. O. Southbridge, R. F. D. No. 2.
Holliston, . . .	202	Waldo A. Collins.
Holyoke, . . .	85	Chas. C. Hastings.
Hopedale, . . .	328	Walter F. Durgin, constable, superintendent of parks.
Hopkinton, . . .	201	R. D. Frail.
Hubbardston, . . .	149	Ernest A. Young, tree warden.
Hudson, . . .	199	Fred W. Trowbridge, chief fire department.
Hull, . . .	329	Smith F. Sturges, tree warden, P. O. Allerton.
Huntington, . . .	70	Daniel B. Mack, constable.

V. LIST OF FOREST WARDENS — Continued.

TOWN OR CITY.	Badge No.	Warden.
Hyde Park, . . .	330	Harry Higbee.
Ipswich, . . .	223	Augustus J. Barton.
Kingston, . . .	301	Thos. W. Bailey, selectman.
Lakeville, . . .	283	Nathan F. Washburn, P. O. Middleborough.
Lancaster, . . .	151	Everett M. Hawkins, chief fire department.
Lanesborough, . . .	10	King D. Keeler, constable.
Lawrence, . . .	214	Chas. G. Rutter, chief fire department.
Lee, . . .	22	James W. Bossidy.
Leicester, . . .	122	Walter E. Sprague.
Lenox, . . .	18	Geo. W. Fitch.
Leominster, . . .	155	William K. Morse, chief fire department, P. O. North Leominster.
Leverett, . . .	57	Orman C. Marvel, assessor.
Lexington, . . .	188	Azor P. Howe.
Leyden, . . .	38	Herman W. Severance, Bernardston.
Lincoln, . . .	187	Edward R. Farrer, tree warden.
Littleton, . . .	170	Chas. F. Johnson, town clerk.
Longmeadow, . . .	94	Oscar C. Pomeroy.
Lowell, . . .	165	Edward S. Hosmer, chief fire department.
Ludlow, . . .	88	Edward E. Chapman, constable.
Lunenburg, . . .	156	Clayton E. Stone.
Lynn, . . .	331	Nathan M. Hawkes, park commissioner.
Lynnfield, . . .	209	Thos. E. Cox, P. O. Wakefield R. F. D.
Malden, . . .	191	Frank Turner.
Manchester, . . .	236	Frederick Burnham.
Mansfield, . . .	263	Herbert E. King.
Marblehead, . . .	332	William H. Stevens.
Marion, . . .	306	Isaac E. Hiller.
Marlborough, . . .	198	Chas. H. Andrews, chief fire department.
Marshfield, . . .	292	Edward E. Ames.
Mashpee, . . .	313	Joseph A. Peters.
Mattapoissett, . . .	281	Everet C. Stetson.
Maynard, . . .	184	Arthur J. Coughlan, room 17, Maynard's block.

V. LIST OF FOREST WARDENS — Continued.

TOWN OR CITY.	Badge No.	Warden.
Medfield, . . .	252	Waldo E. Kingsley, chief fire department.
Medford, . . .	192	Chas. Bacon, chief fire department.
Medway, . . .	254	Clyde C. Hunt, captain fire department.
Mendon, . . .	119	Albert W. Gaskell.
Merrimac, . . .	227	Edgar P. Sargent.
Methuen, . . .	213	Alfred H. Wagland, tree warden.
Middleborough, . . .	234	C. W. Weston.
Middlefield, . . .	342	Thos. H. Fleming, P. O. Bancroft.
Middleton, . . .	211	William W. Richardson.
Milford, . . .	127	Thos. F. Maher, chief fire department.
Millbury, . . .	124	William E. Horn.
Millis, . . .	253	Chas. La Croix.
Milton, . . .	242	Nathaniel T. Kidder, park commissioner.
Monroe, . . .	34	S. R. Tower.
Monson, . . .	98	Omer E. Broadway.
Montague, . . .	53	Fred W. Lyman, lumber dealer.
Monterey, . . .	28	Andrew J. Hall.
Montgomery, . . .	82	Frank C. Preston, P. O. Huntington.
Mount Washington, . . .	30	Fred Porter.
Nantucket, . . .	333	Albert R. Coffin.
Natick, . . .	204	William E. Daniels.
Needham, . . .	238	Howard H. Upham, captain fire department.
New Ashford, . . .	6	Henry B. Baxter.
New Bedford, . . .	277	Edward F. Dahill, chief fire department.
New Braintree, . . .	131	E. L. Haven.
Newbury, . . .	231	William P. Bailey.
Newburyport, . . .	230	David Kent, 26 Arlington Street.
New Marlborough, . . .	32	Dennis Hayes, P. O. Mill River.
New Salem, . . .	55	Ransen King, P. O. Cooleyville.
Newton, . . .	205	Walter B. Randlett, chief fire department, P. O. West Newton.
Norfolk, . . .	256	C. Albert Murphy.
North Adams, . . .	4	H. J. Montgomery, chief fire department.

V. LIST OF FOREST WARDENS—Continued.

TOWN OR CITY.	Badge No.	Warden.
Northampton, . . .	72	Fredrick E. Chase.
North Andover, . . .	215	Geo. A. Rea.
North Attleborough, . . .	262	Harvey W. Tufts, chief fire department.
Northborough, . . .	140	T. P. Haskell.
Northbridge, . . .	117	W. E. Beemap, P. O. Whitinsville.
North Brookfield, . . .	129	H. S. Lytle, chief fire department.
Northfield, . . .	40	Fred W. Doane.
North Reading, . . .	175	Irviug F. Batchelder.
Norton, . . .	266	Alden G. Walker.
Norwell, . . .	290	John Wahlen.
Norwood, . . .	250	J. Fred Boyden, chief fire department.
Oak Bluffs, . . .	334	Samuel N. Kidder.
Oakham, . . .	135	Chas. H. Trowbridge.
Orange, . . .	47	Chas. E. Lane.
Orleans, . . .	321	Chas. F. Poor.
Otis, . . .	27	Wilbur L. Strickland.
Oxford, . . .	335	A. W. Stafford, North Oxford.
Palmer, . . .	89	James Summers, chief fire department.
Paxton, . . .	130	Geo. W. Van Wyke.
Peabody, . . .	219	Michael V. McCarthy, Forest Street.
Pelham, . . .	68	E. P. Bartlett, P. O. Amherst.
Pembroke, . . .	294	Jos. J. Shepard.
Pepperell, . . .	160	Geo. G. Tarbell, P. O. East Pepperell, Room 17, Aldine block.
Peru, . . .	16	Clarence W. Hathaway.
Petersham, . . .	148	George P. Marsh.
Phillipston, . . .	106	William C. Goddard.
Pittsfield, . . .	13	Lucien D. Hazard.
Plainville, . . .	59	Harlie E. Thompson.
Plainfield, . . .	309	Lestan E. Parker.
Plymouth, . . .	302	Herbert Morrissey.
Plympton, . . .	300	Thomas W. Blanchard.
Prescott, . . .	69	Waldo H. Pierce, P. O. Greenwich Village.

V. LIST OF FOREST WARDENS—Continued.

TOWN OR CITY.	Badge No.	Warden.
Princeton, . . .	150	J. Heyden Stimpson.
Provincetown, . .	325	James H. Barnett.
Quincy, . . .	243	Peter J. Williams, chief fire department.
Randolph, . . .	248	Chas. A. Wales, chief fire department.
Raynham, . . .	270	John V. Festing.
Reading, . . .	176	Herbert E. McIntire.
Rehoboth, . . .	258	Silas A. Pierce.
Richmond, . . .	17	T. B. Salmon.
Rochester, . . .	282	William N. Smellie.
Rockland, . . .	288	John H. Burke, water commissioner.
Rockport, . . .	235	A. J. McFarland, P. O. Box 91.
Rowe, . . .	35	Solomon Granger, P. O. Zoar.
Rowley, . . .	232	Daniel O'Brien, agent Gypsy Moth Commission.
Royalston, . . .	102	Willard W. White, P. O. South Royalston.
Russell, . . .	83	Sidney F. Shurtleff, highway surveyor.
Rutland, . . .	143	Henry Converse, chief fire department.
Salisbury, . . .	229	Wm. H. Evans.
Sandisfield, . . .	33	Lyman H. Clark, P. O. New Boston.
Sandwich, . . .	314	John F. Carlton, P. O. Spring Hill.
Sangus, . . .	207	Eugene Stephens.
Savoy, . . .	8	Herbert H. Fitzroy, ¹ P. O. Savoy Center.
Scituate, . . .	291	Percival S. Brown, tree warden.
Seekonk, . . .	267	John L. Barker, P. O. Attleborough, R. F. D. No. 4.
Sharon, . . .	251	John G. Phillips.
Sheffield, . . .	31	Geo. G. Peck.
Shelburne, . . .	43	Samuel Oates, P. O. Shelburne Falls.
Sherborn, . . .	203	Milo F. Campbell, constable, South Sherborn.
Shirley, . . .	168	Melvin W. Longley, assessor.
Shrewsbury, . . .	132	Wm. E. Rice.
Shutesbury, . . .	58	Emmons J. Spear.
Somerset, . . .	336	James Wilson, fish and game warden.
Southampton, . .	76	Geo. W. Tyler.

¹ Proprietor Grand View Farm.

V. LIST OF FOREST WARDENS — Continued.

TOWN OR CITY.	Badge No.	Warden.
Southborough, . .	337	Harry Burnett, tree warden.
Southbridge, . .	109	Aimee Langevin, Olney Avenue.
South Hadley, . .	78	Joseph Beach, P. O. South Hadley Falls.
Southwick, . . .	92	Edward Gillett, tree warden.
Spencer,	121	A. F. Howlett.
Springfield, . .	86	Burton Steere, assistant fire chief.
Sterling,	144	G. F. Herbert, assessor.
Stockbridge, . .	21	Geo. Schneyer, selectman, P. O. Glendale.
Stoneham,	190	Geo. E. Sturtevant, chief fire department.
Stoughton, . . .	258	Jesse E. Smith.
Stow,	183	William H. Parker, P. O. Gleasondale.
Sturbridge, . . .	108	Chas. M. Clark, P. O. Fiskdale.
Sudbury,	185	F. E. Bent.
Sunderland, . . .	338	A. C. Warner.
Sutton,	116	Ransom W. Richardson.
Swampscott, . . .	339	Geo. P. Caboon, chief fire department.
Swansea,	273	Thos. L. Mason, constable, P. O. R. F. D. No. 2.
Taunton,	269	Fred A. Leonard, chief fire department.
Templeton, . . .	107	Henry H. Seaver, P. O. Baldwinville.
Tewksbury, . . .	164	Herbert W. Pillsbury.
Tisbury,	310	Albert Rotch, P. O. Vineyard Haven.
Tolland,	90	Eugene M. Moore.
Topsfield,	218	Isaac B. Young, selectman.
Townsend,	159	F. J. Piper, chief fire department.
Truro,	324	Manuel F. Corey.
Tyngsborough, . .	162	Otis L. Wright.
Tyringham, . . .	26	H. E. Moore.
Upton,	126	Alvarado Henry, chief fire department.
Uxbridge,	113	Arnold S. Allen, constable and chief fire department.
Wakefield,	208	Samuel T. Parker
Wales,	100	W. W. Eager.
Walpole,	340	N. Emmons Winslow, chief fire department.

V. LIST OF FOREST WARDENS—Continued.

TOWN OR CITY.	Badge No.	Warden.
Waltham, . . .	195	Geo. L. Johnson, chief fire department.
Ware, . . .	75	L. S. Charbonneau, P. O. Box No. 25.
Wareham, . . .	305	Arthur B. Savary.
Warren, . . .	119	Joseph St. George, constable.
Warwick, . . .	41	Chas. H. Williams.
Washington, . .	19	John B. Watson, R. F. D., Becket.
Watertown, . . .	206	John C. Ford, tree warden.
Wayland, . . .	196	Clarence S. Williams, Cochituate.
Webster, . . .	111	Arthur B. Patterson.
Wellesley, . . .	239	Fletcher M. Abbott, tree warden.
Wellfleet, . . .	323	Edwin P. Cook.
Wendell, . . .	54	Geo. A. Lewis.
Wenham, . . .	221	Jacob D. Barnes, tree warden.
Westborough, . .	133	James H. McDonald, chief fire department.
West Boylston, . .	137	Frank H. Baldwin, agent Metropolitan Water Board.
West Bridgewater, .	285	Octave Belmore, tree warden.
West Brookfield, .	128	Robert M. Carter, P. O. Box 135.
Westfield, . . .	84	Geo. H. Byers, chief fire department, P. O. address, Arnold Street.
Westford, . . .	166	John A. Healey, P. O. Graniteville.
Westhampton, . .	71	Levi Burt.
Westminster, . .	154	John C. Goodridge, chief fire department.
West Newbury, . .	226	Silas M. Titcomb, P. O. Byfield.
Weston, . . .	186	Edward P. Ripley.
Westport, . . .	279	Frank Whalon, North Westport.
West Springfield, .	341	A. A. Sibley.
West Stockbridge, .	20	Bernard Manning.
West Tisbury, . .	307	William J. Rotch.
Westwood, . . .	251	Chas. Dean, P. O. Islington.
Weymouth, . . .	245	J. Rupert Walsh, P. O. East Weymouth.
Whately, . . .	56	James A. Wood.
Whitman, . . .	297	Clarence A. Randall, tree warden.
Wilbraham, . . .	96	Henry I. Edson, P. O. North Wilbraham.

V. LIST OF FOREST WARDENS — Concluded.

TOWN OR CITY.	Badge No.	Warden.
Williamsburg, . . .	64	C. S. Damon.
Williamstown, . . .	2	Daniel Russell.
Wilmington, . . .	174	Jos. M. Hill, chief fire department, P. O. North Wilmington.
Winchendon, . . .	103	Arthur L. Brown, chief fire department.
Winchester, . . .	189	Irving L. Symmes, chief fire department.
Windsor, . . .	12	H. Ward Ford, tax collector.
Woburn, . . .	177	Frank E. Tracy, chief fire department.
Worcester, . . .	131	H. Ward Moore, Winnefred Avenue.
Worthington, . . .	62	Chas. E. Clark.
Wrentham, . . .	260	Chas. E. Brown, chief fire department.
Yarmouth, . . .	316	Seth Taylor, constable.

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