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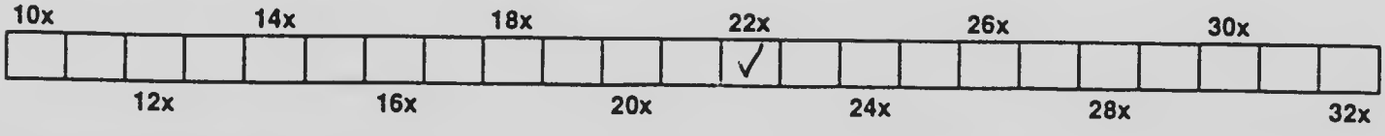

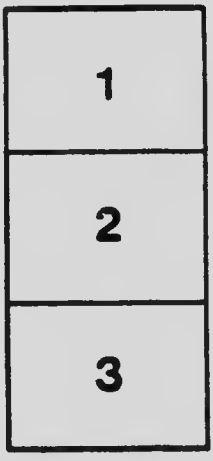

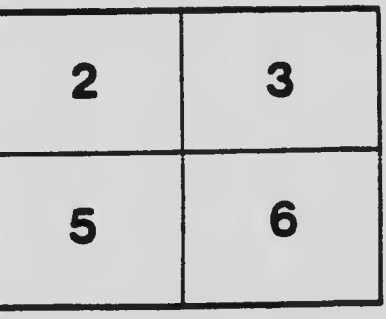

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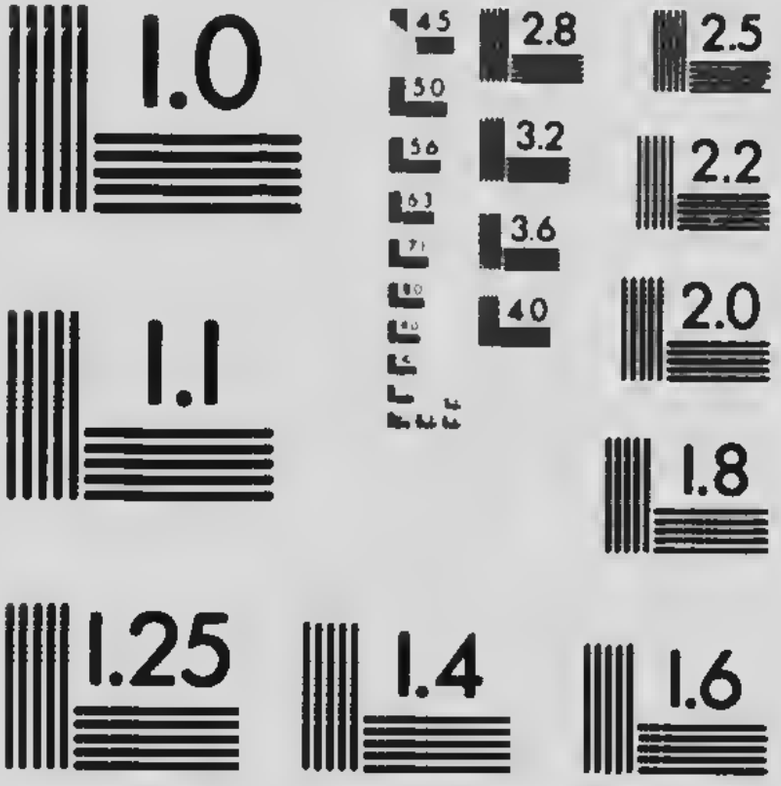

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TREATISE

ON

THE PROTECTION OF FORESTS FROM FIRE

BY

W. C. J. HALL and B. L. O'HARA

Supt. and Ass't Supt. of the
Bureau of Forestry of the Province
of Quebec

Published by authority of the Department of Lands and Forests, Quebec, P.Q., Canada

A. Pelland Esq.

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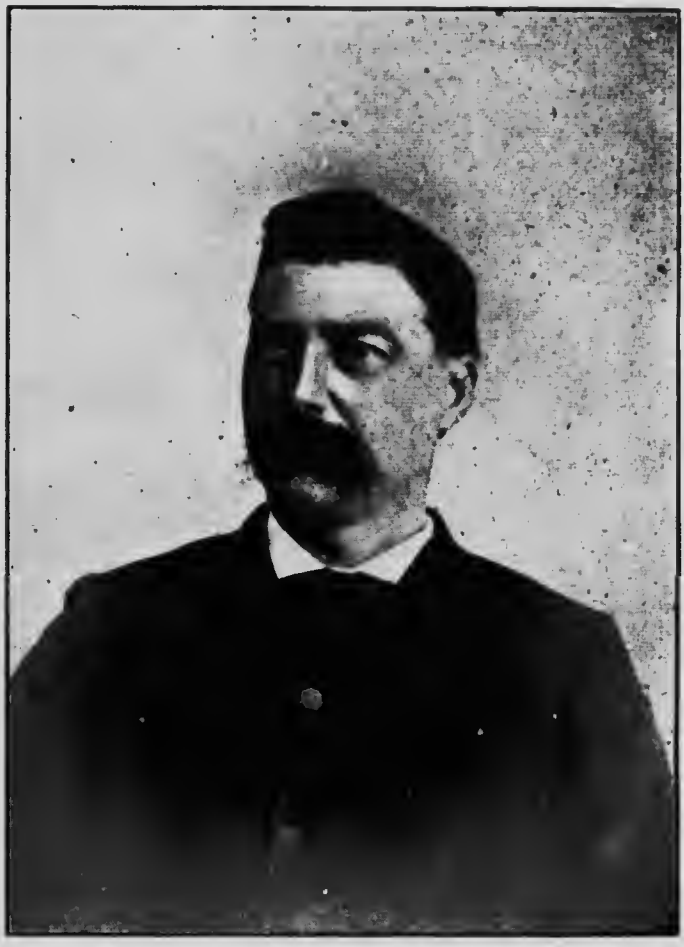
1909



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Minister of Department of Lands and Forests.

W. C. J. HALL,
Sup't. Bureau Forestry

B. L. O'HARA,
Ass't. Sup't. Bureau of Forestry

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THE FOREST—After Logging

THE FOREST BURNT—Note the contrast

TREATISE ON THE PROTECTION OF FORESTS FROM FIRE

GENERAL ADVICE AND FACTS

The forests of Canada are an *absolute necessity* to its inhabitants. Let every Canadian, therefore, assist in the protection and perpetuation of them. It is good sound patriotism to extinguish a smouldering fire and thus, perhaps, save Canada from a serious conflagration.

What can be more depressing than going through a country which has been chopped over, and through which fire has afterwards run, leaving unsightly charred trees—reminding one of a huge cemetery? Nothing can possibly convey a worse impression to the mind of a stranger, and the people of such a region need never expect to derive any benefit from the tourist travel—for such places are necessarily devoid of game, as well as beauty, so that there is nothing to attract those in search of rest and pleasant change from the cities, or who are out for a hunting trip. Let all good Canadians join forces, to prevent in the future, such a term as "dreary" being applied to our beautiful country, by saving our forests from the devouring flames.

If you ever meet any one who says that "it does not matter, the forests are inexhaustible," just spend an hour with that person and get him to read the pamphlet, posters and other literature furnished you by the Forest Protection Service, and he will probably be convinced of his mistake before he has finished the matter in your possession.

There is absolutely no doubt about one thing and that is "The amount of wood cut every twelve months, throughout the world, is greater than the amount which grows each year in forests which are near enough to be worked profitably."

Every one who reads this carefully, will see for himself, the serious state of affairs which will result, if we do not take good care of our forests.

If the present generation does not do something for posterity and insist upon the proper protection of the forests, especially on the head waters of our streams, our rivers will soon be nothing but a system of sewers and it will only be a question of but a few years until the older and more densely populated portions of this Province, will have great difficulty to obtain the necessary quantity of pure water, for the use of the population, as has already been experienced in other places, notably Greater New York, which has during the last few years spent an enormous amount, in the effort to secure this necessity to health and life.

Still another phase of this subject is that the question of fuel in the older settled districts is to-day a very live one, and it is safe to infer that within a few years electricity will, in many sections, replace wood and coal, not for lighting and power only, but also for heating and for culinary purposes.

At the present time this may seem a little far fetched, but when one considers the tremendous strides made during the last few years, both in our knowledge and use of this fluid, it seems but reasonable to expect it to be the cheapest means of heat for the future, and wherever there is money in such a venture, we may be sure some promoter will be on hand to avail himself of the opportunity offered.

By working on the proper lines, a Ranger can soon interest everyone he meets in protecting the forests, and then, when necessity arises, he will find ready and willing hands to help in overcoming and extinguishing the common enemy.

If there is a settlement on the borders of his district, the Ranger should occasionally visit the church authorities, and, in them, he will find strong advocates of forest protection, as in the Province of Quebec the churches of all de-

nominations are doing splendid work, the Bishops having, one and all, signified their approval of forest protection, and the pastor of every church is empowered by them to preach from the pulpit the "Gospel of Protection."

In the Province of Quebec there are a great many Fish and Game Clubs; wherever such clubs exist, the interests of the Government, the Club, and the Timber Limit-Holder, are identical, viz:—they all need the forest, otherwise there is no revenue to the Government, no profit for the lumberman, no sport for the angler or hunter. Let the ranger then, keep in close touch with the Club Guardian and the members; see that on every club-house, camp, or shelter hut, placards are posted, and on meeting members or guests of the clubs, request them to warn their guides, cooks and other employees, to be careful of fire and to see to it *themselves* that every camp fire and smudge is thoroughly drenched and completely quenched, before leaving the spot.

Always bear in mind that it is policy on the Ranger's part, to keep on the best terms possible with every person frequenting his district, to reason with them and to remind them of the deplorable results of neglecting to take proper precautions, results which every one regrets, and, sometimes most of all, the originator of a fire. Some people, of course, will not listen to reason or take advice. In such cases, and after due warning has been given, let the Ranger set to work in grim earnest to secure convicting evidence of violation of the law and report it without fear or favor. Under such conditions it is well to have a witness who has no personal interest in the case.

When on duty endeavor to spend a good deal of the time on the most elevated points in your district, so that you can get the most extended view possible. In the valleys, keep away from the foot of the hills for the same reason.

Forest fires originate from many and various causes. Probably fewer fires are started

by lightning than anything else—that is to say, lightning strikes often in a forest, but the fire thus started is nearly always quenched by following or accompanying rain, in quantity. Men on the drive, settlers burning a slash or brush heaps, sportsmen neglecting their camp fires, people roaming about in the woods, smoking, prospectors searching for minerals, locomotives ejecting sparks, broken glass or bottles (the "bubbles" of which concentrate the rays of the sun and form a regular burning-glass), matches which have got wet and have been thrown away as useless, gum-gatherers, berry-pickers—sometimes by accident, but frequently with the object of improving subsequent crops—trees rubbing against each other, etc., are some of the most frequent causes of bush fires.

In any Ranger's district, he may have to contend with fires from all or any of these causes. Is it not, therefore, very clear and evident that he must be constantly on the move, scanning his beat from every high place, warning every person he meets to be careful of fire, posting up placards on all trails, at the junction of roads and rivers, at the end of each portage, etc. In short, losing no opportunity of advertising the fact that forest fires are disastrous and are in every possible way to be avoided.

The railway locomotive is a very frequent source of fire, and special attention is necessary on every line of road which traverses any timbered lands.

Sir Wilfrid Laurier, in his speech in 1906, at the Canadian Forestry Convention, stated that anyone travelling by rail from Halifax to Vancouver, cannot fail to remark on each side of the roadbed, large areas of burnt timber lands, in most cases the result of sparks and cinders coming out of the locomotives. The exact words used by Sir Wilfrid at one stage of his speech are as follows: "What was once beautiful forest, is now nothing but parched and blackened timber, A MONUMENT TO THE

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FIRES SET BY A LOCOMOTIVE—Fifteen minutes after the passing of a train.

DESTRUCTIVE POWER OF THE RAILWAY LOCOMOTIVE."

Many have worked hard to devise some means of preventing glowing cinders and sparks from coming out of the railway locomotives; so far, none of these devices have been pronounced satisfactory and thoroughly efficient. If a complete stoppage of the sparks is made, then the engine cannot steam; if it is not complete, sparks issue from the locomotive.

The law obliges all railways to place a heavy wire screen in front of the smoke box, and this, WHEN IN ORDER, stops a great many sparks, but this screen has a life of only about 30 days before the wire becomes worn, so tremendous is the draft of a modern engine. The vibration of the engine is so great that often the nuts and bolts by which the screen is held, work loose. As soon as this occurs and a small opening exists, the draft is concentrated to that point and there is a regular stream of cinders and sparks.

Something more than this wire screen is, therefore, *very necessary*.

No railroad should allow the ash pans to be emptied, except in a station yard. The shaking of the grates should be done as much as possible at stations, and not while the train is running at speed. The overflow of the injector should, in *every* case, be directed by a small conduit pipe, into the ash pan, so that any live cinders getting into the pan, will be quenched. The back and front damper doors of the engine should never be opened except when the engine is at rest.

The brakesman on every train should keep a sharp lookout to the rear and if he notices any fire along the line, inform the conductor, who should at once wire back to the station last left.

The windows in smoking cars should be screened, to prevent passengers throwing lighted matches, glowing cigar butts, or live ashes from their pipes, out of the windows.

Barrels filled with water should be at each end of every bridge and culvert and at different points on all steep grades in the forest.

Spades, picks and axes should be provided by the railway companies at every station; also a supply of pails, in a box labelled "FOR FOREST FIRES ONLY."

In some engines the fire-box door is flush with the foot-plate of the cab and the grate is shallow in the fire-box. In such case, if a metal strap—say 3 inches wide—were attached, it would prevent the escape of large pieces of live coal. If one of these large pieces happens to fall on one of the wheels, it is broken into fragments, which are projected to long distances on one side or the other.

All these things, and probably some others, the railway companies should attend to. The duty of the Railway Fire-Ranger in short form, is as follows:—

We will presume, of course, that the Ranger is provided with a light 3-wheeled velocipide, so that he can traverse his beat in a short space of time; he should follow every train, keeping a sharp lookout on each side of the roadbed. On observing any smoke, he should stop, take his machine off the rails, and at once proceed to snuff out the incipient fire, then continue on until he reaches the end of his beat.

The railway ranger should be equipped with the same tools as the ordinary ranger. If he finds himself unable to extinguish the fire, he should proceed with all despatch to the nearest point where help is procurable and call out as many men as are needed. All railways are bound to supply men on the demand of a ranger.

The Ranger should work hard to post himself thoroughly on the lands in his section; he should know where every brook, river or stream is located: the places where sand or loose soil are obtainable (in case of lack of water during a drought), thus he will be able to work to the greatest advantage, in case of necessity arising, and be able to direct the men

under his control, with intelligence. If any roads or trails cross his beat, he can make use of them as fire-breaks, if a fire occurs.

The Ranger should be able to detect any engine which empties its ash pan between stations, and it is his imperative duty to report such neglect of precautions at once.

Tramps, though sometimes harmless in other respects, are frequently a serious cause of danger to the forests, and it is the duty of a Ranger to see that none of this fraternity are allowed to camp in the woods in his district. Avoid all harshness in dealing with them, as far as circumstances will allow, and endeavor to induce them to move on to the nearest town or village. The Ranger should enlist the aid of the section men of his district in this work, and they, by offering Mr. Tramp a "lift," can frequently remove him from the vicinity of the woods without arousing in him any desire of revenge for a fancied grievance—in fact, if given such assistance, he will leave the section with kindly feelings. Where, however, it is necessary, the Ranger must be firm and insist that he moves on, as they are, as a rule, far too careless in their handling of fire, to allow them to remain in the forest.

FIRE-RANGERS SHOULD KNOW their district thoroughly and should know the location of every slashing and camp in it, as well as the quickest way of getting from one point to another. They should make it a duty to become acquainted with as many of the settlers and other residents and also the Club Guardians, as possible, in their district, and should endeavor to get them all interested in the protection of the forests, not through menacing them, but by appealing to their common sense and patriotism. The average settler is, as a rule, quick to see, when the matter is explained to him, how easy it is to do irreparable injury, not only to his neighbors, but to himself, by carelessness on his part, in burning his slash or brush heaps, and having once grasped this truth, he generally becomes much more careful in hand-

ling his fires; he also talks the matter over with those in his vicinity and warns them of the danger. Whilst the club guardian realizes that if the forests are destroyed, his occupation will be gone, and so warns the guides and members of his club to be cautious about their fires.

Where the fire-ranger's district is traversed by one or more railways, he should endeavor to be on good terms with the different section gangs and as many of the train gangs as possible. Drive and shanty foremen operating in the district must also be interviewed and requested to see that their gangs comply with the provisions of the Fire Laws, a copy of which should be left in the possession of each foreman, with the request that he will call the attention of his men to it once a week. Try to get all these people interested in the protection of our valuable forests, so that they will all work in harmony with you in carrying on the good work. Though the fire-ranger will find that a little diplomacy will generally succeed better than harshness, in dealing with the public, there may be cases where it will be necessary for him in no uncertain way to call people's attention to the penalties provided for any infractions of the fire laws.

Every ranger should keep a diary, so that the fullest details possible can be given of any infractions of the law, or of any fire which may occur in his district, as also of his movements from day to day.

Every ranger should be provided by his employer with a collapsible rubber or canvas bucket, an axe and a combination implement (spade, pick and grub hoe in one), the whole kit weighing not over six or seven pounds. This "kit" he should always have with him when he is on duty, so as to be in a position to extinguish at once any incipient fire he may find.

AS FIRE IN THE VICINITY OF THE FOREST IS ALWAYS DANGEROUS, the time to extinguish it is the moment the smallest fire is discovered,

for we have seen already the disastrous consequences which frequently result from neglecting the insignificant incipient fire. After extinguishing it, dig a little trench right down to the mineral soil all around the place where the little fire was before you leave the spot, so that should there happen to be some smouldering embers, which you have failed to quench, the fire—should it start up after you have left the spot—will not be likely to cross the trench which you dig. The trench does not require to be wide, as its object is to simply prevent fire working through the forest floor to the surrounding woods.

If, however, the fire has got a good start before you discover it, do what you can to hold it in check until sundown, remembering that forest fires usually burn low during the night and that as much work can generally be done—between sundown and sunrise—in an hour, as in three hours when the sun is high in the heavens.

Fighting forest fire.—Though the first duty of a fire-ranger is to prevent, by every means at his command, forest fires occurring, there are times when he is unable to do so; when such occasion arises, the ranger should be prepared to demonstrate that he is also a first-class fire fighter.

It is seldom that any two forest fires can be fought on exactly the same lines, as the peculiar conditions concerning each fire must be taken into consideration in handling it. There are, however, some fundamental rules which experience has shewn to be of general use in forest fires, and some of these we will now mention.

All fire trenches should be dug down to the mineral soil, or if the fire is in a peat bog of great depth, until the water-table is reached. As a rule the trench does not require to be more than a couple of feet in width.

Fires in peaty soil must be surrounded by a trench, dug as above stated, in order to confine them, as fire will frequently smoulder for weeks

or even months in such lands, when the conditions are "just right."

If water is scarce, good work can frequently be done by shovelling sand or earth onto the advancing fire, thus smothering it, gradually driving it back and reducing the fire area. It should be borne in mind, however, that digging in the woods is very slow and tiresome work where the ground has not already been broken. Therefore the men with shovels should always be accompanied by one or more men with grub-hoes or picks, with which to loosen the ground for the shovelers, thus making the work easier and quicker for the men and enabling them to work for a much longer period under pressure.

Water, where it is scarce, or has to be carried by the pailful from considerable distances, can be made go a great deal further, by dipping a wisp of branches in it and spraying the leaves of branches with it. It is astonishing to one who has never tried the experiment, how big a blaze in a brush heap one can thus extinguish with a single pailful of water. If, however, the fire is burning fiercely in a pile of logs, this spraying would have but little effect and it would be necessary to throw the water on by the pailful.

Where fire is running along the surface of the ground through the grass or fallen leaves, it can frequently be extinguished by beating it back with a bag which has been dipped in water, or by green branches.

FIRE-BREAKS.—In making a fire-break, choose for the purpose that point to leeward of the fire, where there is the smallest amount of dry branches, leaves, etc., then clear your fire-break, placing any dead branches, or other combustible material removed, on the side of the line towards the fire, leaving the side furthest away from the fire as clear as possible of everything of an inflammable character, so that should the fire come right up to the line, and sparks drop on the further side of it, there will be nothing in the vicinity to feed the fire.

No rule can be laid down for the width to be cleared in making the fire-break, as this will vary with the nature of the forest conditions in the vicinity of the fire, but in the case of a surface fire, a very few feet will, as a rule, suffice. The "Fire-Break" is completed by exposing the mineral soil along the space cleared. In the case of a Crown fire a much wider fire lane will be required.

BACK-FIRING.—As back-firing is always accompanied with more or less risk, it should not be resorted to, except in cases of necessity, but when it becomes the only remaining resource, good judgment must be used in the matter, and a fire line or trench should be prepared on the side furthest away from the fire, before the back fire is set, in order to avoid starting a fresh and possibly worse fire than the first.

Where it is found impossible to cut right across the course of a fire, owing to the wind driving the fire across the fire-break, make the fire-break diagonally across the course which the fire is following. In this manner it will finally be brought to a narrow point, when it can be extinguished.

Where fire is jumping ahead of the main fire, keep one or more men ahead of the fire to extinguish sparks as they fall.

As soon as a fire is under control, crowd it back to as small an area as possible. Chop down at once all standing dry trees which are on fire; otherwise, should the wind rise, these smouldering standing trees are liable to scatter sparks to a considerable distance and start fresh fires. The author has known fires to be started by sparks from a fire a mile distant.

As long as there is fire in the forest there is danger. So it is necessary, after a forest fire, to watch the locality until sufficient rain has fallen to saturate the ground thoroughly, as fire sometimes smoulders for weeks.

A FOREST FIRE

It is a fine morning in early September. Two forest officers have just ascended a high mountain, from the summit of which a view covering a radius of over forty miles can be obtained.

As they look around, one of them calls the attention of the other to several small fires on the edge of the forest and points out the disastrous consequences that may result from these fires if neglected and the weather continues as dry as it has been for the past month, especially as the hard woods are just beginning to shed their leaves.

These fires are scattered over a wide area, the nearest being not over a mile from the foot of the mountain on which the men stand; the furthest is 35 miles away, as the crow flies. Several of the fires are not more than a mile or two apart.

That night there is neither dew nor frost; a gale springs up from the north-west which fans some of the small fires into large ones, and before morning, in one section, several hundred cords of pulp-wood and some thousands of feet of standing timber are destroyed. The Forest Officers return to where they can use the telegraph wires, warn the owners of timber lands of their danger and advise them to organize gangs of men to fight back the fires which threaten their holdings. Some take heed and get men promptly to work, but some of their neighbors show a strange apathy regarding their holdings and even go to the length of saying that it is useless to attempt to check the fire and that "it would be simply throwing money away."

All that day the gale continues, drying still further the already dry soil and starting fresh fires from the sparks which it carries to long distances. Then follow a succession of warm summer-like days with but little wind; the crews of men which are in the field are holding their own against the fire fiend and it looks as

FOREST LITTER

if they would conquer it, but they have forgotten the fires on the lands of the indifferent, who were too penurious to try to check them and which are spreading to the old "burns" and choppings.

The hunting season is now at its height and there are many hunters in the woods.

Each day finds the soil drier and drier, until no moisture is left in the leaf mold, all but the rivers and very large streams have run dry, the weeds and grasses in the woods and "brulés" are like tinder and there is a thick carpet of dry dead leaves in the woods. Live coals from smokers' pipes in the woods now start fires by those who empty them on the ground and spread quickly through the fallen leaves. Small fires are starting up along the railways' right of way, set by passing trains.

Those who are watching and know the impending danger, notice with apprehension that the fires are increasing and the atmosphere is getting thicker from day to day, until the sun is seen as through a thick haze and they pray for rain, which does not come.

The people of the villages and small towns, who laughed when warned of their danger from forest fires a fortnight ago, are now beginning to worry and look anxious, for they have been told by those who know, that owing to the long continued drought, where fire starts, not only do the woods and weeds burn, but that all soil of a vegetable nature, whether in the woods or fields, burns, and they begin to hear of fires (started by settlers), which have "got away" from those who started them, into the woods on the one hand, whilst in the opposite direction they have advanced across the pastures and hay fields towards the buildings with the irresistibleness of fate, burning the sod and soil right down to the mineral ground and smouldering in roots of old stumps two, and even three feet, under the surface. Many of the smaller widely scattered fires, which a few days ago could have been extinguished by a few men, have now joined and would require an

army to control them, even under favorable circumstances. These fires are now to be found in all directions in the neighborhood of the farms surrounding the villages. The villagers at last, when it is too late, realize that should a strong wind spring up before rain comes, nothing but a miracle can save them.

There comes a day when the atmosphere is so thick that one can distinguish objects at but a few yards; light cinders and charred leaves are floating in the the air. There is an ominous stillness, as if of some great danger impending. On the farms the owners look apprehensively in the direction of the forests, where they know the fires are smouldering and ask themselves if they had not better take their women and children to the nearest village while there is still time. In the villages of the vicinity business is practically suspended and the men are gathered in little knots discussing plans for meeting the impending danger should the fire come nearer.

The wind rises, quickly attaining the velocity of a gale, the smoke thickens and rolls across the doomed section in heavy suffocating clouds. To windward there is now a glare in the direction of the fires, sparks and burning twigs begin to fall on the buildings of the outlying farms and even in the villages; a crackling and roar as of an approaching freight train, is heard, mingled with the occasional crash of a falling tree, for the smouldering "surface fires" have joined and have become a "crown fire," jumping from tree top to tree top. The fire is now beyond control, and, driven by the gale, is sweeping everything in its path. Men flee before it in terror. Deer, hares, and other denizens of the forest mingle on the roads with the panic-stricken human beings, fear of their natural enemies being lost for the time being, in the greater fear of the all-devouring flames of the forest fire.

Long before the fires have reached the edge of the clearances, new fires have started from glowing embers which have been carried by

the wind. Those who have stayed on their farms, determined to save their belongings, or to perish in the attempt, notice that in the pastures, if a spark drops on an old stump, fanned by the gale, it blazes up and scatters a shower of sparks, which in turn starts other fires. The fire jumps from stump to stump, piles of brush and roots catch fire from the flying sparks. The dry grass is ignited and the flames run quickly along the surface of the ground, seeking further fuel. Even the ground —if of a vegetable nature—is on fire. The heat is intense and the smoke is suffocating.

In the village all is confusion, sparks are already dropping and setting fire to hingle-covered roofs. The fire is seen to be working its way across the fields on the edge of the village towards a lumber yard, and an effort is made by the residents of the village to head it off, but in vain; several carloads of wood freight become ignited and in turn set fire to the adjoining buildings. Night sets in—a night which will be remembered by those who come through it alive, as one of terror.

House after house catches fire; people move out what furniture they can in the hope of saving it. The labor, however, is of no avail, as the things they have moved out into the open are soon in flames.

Children become separated from their parents and scream in terror as the flames rush on towards them, while mothers run about frantically, looking for strayed little ones. Pandemonium seems to have broken loose, the roar of the fire commingles with the crashing of falling buildings and trees and the hoarse shouts of the fire-fighters.

The railway authorities consider the village doomed and order out trains to remove the women and children to distant points of safety.

Strong men lose their nerve, break down completely as they see their comfortable homes devoured by the flames and go about in a dazed manner, wringing their hands. Others, however, of a sterner material, continue the fight

against the flames and succeed in saving some properties.

At last in the early morning the long prayed for rain descends in torrents and the progress of the fire is stayed for the time being, but only for the time being, as the ground is so parched that it will require days of rain to extinguish the fires which are smouldering in old windfalls, hollow trees and in the peaty or vegetable soil, and which, if the weather again gets dry, will break out afresh, unless those who have suffered avail themselves at once of the aid sent them by Providence and extinguish completely these fires while they are only smouldering.

This description of a forest fire and its results is no flight of imagination, but simply the account of an actual fire, a description which, with but few alterations, would serve for many fires which devastated the forests and villages in different parts of our beautiful Province in 1908. If the tale is a rather lengthy one, it must be remembered that the history of many of the most destructive forest fires has been one of small, neglected, frequently only smouldering fires, which have been allowed to go unchecked for days, or even for weeks, until the conditions were "just right," when they became conflagrations.

GENERAL NOTES

When we consider that the destruction of the forests means also the destruction of the water, soil and the fish and game of the surrounding district, all of which are very valuable assets, it should be enough to make any person stop and think. They will quickly realize the importance of the subject and acknowledge the wisdom of the Government in straining every nerve in the way of protection.

If the forests are destroyed in the basin of any river, what are the inhabitants of that region going to do with their farms when they find that the rivers have dried up and that the crops fail as a consequence.

But there will be lots of water in the rivers in the spring of the year. Oh! yes, they will be raging torrents, washing away and leaching out the good agricultural soil, carrying out the ice while still green, causing destructive ice jams and silting up the streams and river beds, rendering them each year less capable of carrying off the excess of water during freshets, and causing them to overflow their banks, flooding rich "bottom lands" and destroying both crops and soil of same. After the spring freshets the rivers will dwindle to small diminutive streams, whilst the small streams and springs, which at present furnish drinking water for both the farmer and his stock, will dry up entirely. This is certainly not an attractive picture to contemplate and it behooves the people of this Province to prevent its realization by taking such steps as will preserve our water supplies, by protecting from destruction the forests on our different watersheds.

The manufacturing interests of the country must also be thought of, and it must be borne in mind that many plants—not only along the river's banks, but frequently at distant points—are dependent on these rivers for their power, so that if they are not protected, the mills thus dependent on them for power, will not be able to run to more than one-half, or even one-quarter, of their capacity, thus bringing great hardships to thousands of bread winners, not only in the country places, but also the residents of the cities. This is a national question, and, as such, should be treated on the broadest possible lines, so as to protect the interests of the greater number, even if by so doing it becomes necessary to punish the careless or to curb the greedy lust for money of a certain few.

If we have no forests we certainly can have no game, and the supply of good fish will diminish to a quantity not worth mentioning.

The assets of the Province of Quebec consist mainly in the forests, water-powers, the agricultural lands, minerals and fish and game.

Destruction of the forests will not mean destruction of the minerals, but how can the mines be worked profitably without the forests; they are a necessary adjunct.

It is in the interests of everyone in any country that forest fires should be prevented, but as the guarding of timbered lands is in the hands of those directly interested in the properties, they should study their holdings, so that if a fire occurs on their lands, they will be prepared to handle it to the best advantage and extinguish it before it has time to get any considerable headway.

Owners of timber lands will find it to their advantage to have a plan of their properties, showing not only the location of all streams and swamps, but also the correct position of all camps and logging roads. These old logging roads are sometimes of very great use in a forest fire, as not only do they enable the men working in their vicinity to get around more quickly, but they can also frequently be used as "fire-breaks". They also give the men engaged in fighting the fire a greater sense of security, as everyone knows that it is much easier and quicker walking on a road—no matter how poor a one—than it is to walk through an old chopping.

It is also very much in their own interests for all operators, in logging, to have the branches lopped off of the tops, which are left in the woods. This allows the main part of the top to drop to the ground, on which the branches also lay flat, thus rotting much more quickly and greatly reducing the danger from forest fires, for any one who has had experience knows that the heaps of branches as now left in the woods after a logging operation are largely responsible for the spreading of fires, fire frequently jumping from these heaps of forest litter and igniting the tops or branches of the standing trees, making what would have been an easily extinguished surface fire, a "crown fire" most difficult to manage. Another great advantage to be derived from the lopping off

UNTRIMMED TOPS LEFT AFTER LOGGING—A menace to the forests

of the branches from the tops and the doing away with all brush heaps in logging, is that in the event of a forest fire breaking out, the men engaged in fighting it will be able to get around with much greater ease and more expeditiously, thus reducing the cost of extinguishing it. This lopping off of the branches should cost but a few cents per thousand feet of the merchantable timber taken out, and would be a cheap and excellent insurance for the owner of timber lands.

Owners of timber lands should have at different points on their limits a supply of axes, round-pointed shovels, combined grub hoes and picks, axes and pails. All these implements should be labelled "FOR USE IN CASE OF FOREST FIRE ONLY." The hoes and axes should always be kept sharpened and the whole kept ready for use at a moment's notice, experience having taught that frequently when such implements are needed at short notice, none are on hand, and a few hours waiting for tools with which to fight a forest fire will frequently mean a difference of thousands of dollars to the owner of the tract. These tools ought to be examined from time to time by some reliable employee to make sure that they are in good order and that the stock has not been drawn on for other purposes.

Good judgment should be used by the limit-holder in his choice of Fire-Rangers. The men chosen should be thoroughly reliable, sober, energetic and intelligent, who will keep their nerve and remain cool under any circumstances, men who have had experience in fighting forest fires and in handling crews of men. Remember that the salvation of your holdings may depend on the coolness, decision and good judgment of your Ranger. Though his position is really that of a foreman, choose one who is not afraid to "pitch right in" to an incipient fire himself for fear of soiling his white collar or dirtying his good clothes. Unfortunately far too many clerks and other gentlemen are appointed to the position of Ranger,

who consider themselves far too fine to handle a shovel, no matter how great the necessity for their doing so. Men of this kind had better be invited to stay at home. They are useless.

If railroads were obliged to make their ditches on the *outer* edge of their right of way, instead of being allowed, as they now are, to make them right beside the roadbed, not nearly as many fires would "get away" from the track into the woods, as now do.

This, and clearing the right of way of all stumps, and burning them and all railway ties, at such times as there is no danger to be apprehended from fire, would probably be much more efficacious in preventing fire spreading from the railroad to the forest, than the broad strip of cleared land on either side of the roadbed, which some so strongly recommend.

Though unquestionably, during a gale, live cinders are sometimes driven right into the forest beside the track, experience has shown that by far the larger number of fires originating from passing trains start right beside the roadbed, or rather but a few feet away from it. Where a broad strip is cleared on either side of the track it seems but reasonable to conclude that as the wind and sun can reach this broad strip much more freely than it could a narrow strip, the grasses and weeds on it become intensely dry during a drought and a fire starting near the roadbed, during a gale of wind would gain considerable vigor in the long dry grass before reaching the edge of the right of way, making it much more dangerous to the adjoining forest. The ditch on the outer edge of the right of way would, on the other hand, even when empty, act as a fire-break, while if it contained water, it would be exactly in the position where it was most required, [illegible] is betwen the forest and the fire.

The telephone is used by some of the owners of large timber grants and is found of great convenience in the prompt despatch of business connected with the proper management of the forests, as by its means owners can, from

headquarters, communicate quickly at all times with the employees engaged in the forest, while fire-rangers (when provided with a light portable telephone), can connect with the office at any point and either summon assistance in their direction, or give timely warning of any fire, the smoke of which they have seen in distant parts of the tract and so enable the fire-fighters frequently to reach and extinguish the forest fire before it has had time to extend to any extent, or to do any great damage.

The building of these single telephone lines along the main trails is not expensive, the wires being simply stretched from tree to tree; in fact when the great convenience and usefulness of these private lines is considered, as compared to the small original outlay and still smaller cost of the subsequent upkeep, one would expect to find such a system of telephones on the limits of all operators, as the loss from a single *small* forest fire would pay for installing very many miles of such a line.

The system of "wireless" telephoning is being investigated by the Forest Protection Branch of this Province in connection with their proposed system of "Forest Fire Lookouts," but so far nothing really practical has been discovered, the cost as yet of this system of telephoning being too great.

THE FOREST-FIRE LOOKOUT system of the State of Maine is probably the greatest step in fire patrolling which has yet been made. Mr. Edgar E. ...ng, the Forest Commissioner, of that State, gives it as his opinion that "one good lookout man is worth 80 of the best fire patrol men." This system is largely dependent on the telephone for its efficiency.

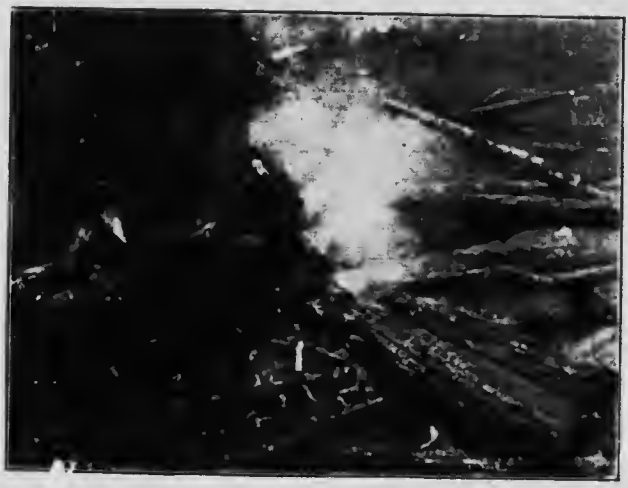
Briefly described this system is as follows:— Lookout stations are established on the tops of the highest mountains in the territory to be protected and are connected by telephone with the existing telephone systems and provided with range-finders, compass, telescope, etc. Each lookout is placed in charge of a reliable man familiar with the use of these instru-

ments. This man is supplied with a map of the surrounding country, and the moment he sees smoke in any direction, he locates where it is, rings up the nearest fire-warden and tells him about where the fire is. He next rings up the limit-holder, whom he also warns of the fire, and immediately makes an entry to that effect in his "log," stating the date and hour that each was warned. In the State of Maine the owners of the timber lands build and equip the lookouts, but the State supplies the lookout man. The lookouts which they have already established have cost from $500 to $600 each to install, apart from the instruments.

Owners of t mber lands should bear in mind that it is a shortsighted policy to withdraw a crew of fire-fighters from a forest fire before the last smouldering tree or fire has been extinguished, for experience has shown that fire will smoulder for weeks and then start a forest fire if the conditions come just right, and last fall the writers in widely distant points, saw smoke from forest fires when the ground had been covered with snow for weeks. These fires had probably smouldered in the woods' earth and fallen timber for a couple of months. It can, therefore, be seen that when rain comes to the assistance of those who are endeavoring to extinguish the fire and for the time being prevents it spreading further, those interested in the lands should avail themselves of the opportunity to thoroughly quench it. It is likely to be money saved in the long run. But even after one thinks it is all extinguished, should the weather continue dry, the site of the fire should be watched for some days, or until enough rain has fallen to thoroughly saturate the ground, in case there should be any smouldering fire which was not detected.

The accounts of the following forest fires show how dangerous it is to let a smouldering fire go unchecked. Some of these fires are "historical" and are frequently referred to by different writers on the subject. They all furnish an instructive, if deplorable, lesson of

A GOOD SITE FOR A LOOKOUT STATION



FIRE STILL SMOULDERING IN FALLEN TIMBER—After twelve (12) hours rain

neglect, and in some cases almost criminal carelessness on the part of the people of the district.

THE HINCKLEY FIRE.—"Occurred September 1st, 1894, and was the most destructive fire of recent years. Hinckley, Minnesota, and several other towns were destroyed, about 500 lives were lost and more than two thousand people were left destitute. It is estimated that the loss in property amounted to about $25,000,000. The loss of life from this fire would have been much more than stated had it not been for the fact that the railroad companies ran special trains to carry the settlers away from the flames. This fire was wholly unnecessary and could eaily have been put out in its earlier stages. For two weeks previous to the breaking out of this fire into an uncontrollable mass of flames, small fires had been raging in swamps about Hinckley and filled the town with dense smoke and it was only when these became united under the direction of a hot south wind, that it passed beyond control. Had the present forest-fire law of Minnesota been in force at that time, this fire would undoubtedly have been prevented."

THE MIRAMICHI FIRE of 1825.—"This fire occurred near Newcastle, on the Miramichi River, in New Brunswick. In nine hours it had destroyed a belt of forest eighty miles long and twenty-five miles wide, and almost every living thing was killed on that area; even the fish were destroyed in the smaller lakes and streams. It is estimated that the loss from this fire, not including the value of the timber burnt, was $300,000. One hundred and sixty prsons lost their lives and nearly 1,000 head of stock were killed."

THE PESHTIGO FIRE occurred in October, 1871. This burned an area of over 2,000 square miles in Wisconsin. Between 1,100 and 1,500 persons lost their lives, and property to the amount of many millions of dollars was destroyed."

"On a tributary of the River Gatineau, *one* "settler clearing land to sow potatoes, started "a fire, which burnt up two to three millions "of dollars worth of the finest white pine "which ever grew in the Province of Quebec."

In 1908, bush fires in British Columbia were most disastrous. Details of this conflagration are easily obtainable.

During the summer and fall of 1908, in the Province of Quebec, in the most thickly settled parts of the Province (a great drought prevailing), between one and two million dollars worth of forests, buildings, railway cars, fences and crops were burnt up and this very largely owing to settlers' fires. Many more instances of tremendous fires could be given, but the above will suffice to show anyone that on this side of the Atlantic ocean the greatest enemy our forests have is the consuming element of fire. If the United States and Canada had the value of the timber which has been burned, in the Treasury, they could pay their National Debts.

CONDENSED INSTRUCTIONS TO FIRE-RANGERS

The wood cut in accessible forests every year is greater in quantity than what grows every year. Then, when you figure how much wood is burnt every year besides, it is easy to see that the forests will NOT last for ever.

Keep in close touch with the Church. The priest or clergyman will always be ready to advise his parishioners to be careful of fire in the forests and to abide by the law.

Work hand in hand with the Guardians of the Fish & Game Clubs. The members will in every case give their assistance to the cause of protection and compel care being taken by their employees.

Interview the settlers frequently and have serious talks with them on the subject of protection. Many will agree with you at once and influence others; some will not. Stop

and reason with these latter and in a little while they will also be convinced that what is being done is for their benefit and also the country at large.

Work on the most elevated points of your district, so that your eyes can cover the greatest possible area.

Tack up your fire posters in the places where they will do the most good and attract the greatest attention.

If your work lies along a railway you should know every spot where water can be procured: also sand and loose earth. Close watch should be kept in the rear of every passing train.. If you detect any locomotive engineer emptying the ash-pan on the track between stations, report it at once. Work up the section men and try to induce them to keep a sharp lookout for fire. Report if the Company does not keep barrels filled with water on bridges crossing streams, and on culverts where water is obtainable.

Whenever you notice smoke, proceed at once to the spot and snuff out the incipient fire. If assistance is close by, don't hesitate to order the men to go with you.

If you are on a river section, confer with the foreman of the drive and get him to compel carefulness on the part of the men under his control.

In fighting a fire, always work to leeward, spread your men out, and, if possible, have them where you can quickly give special orders to any particular one and keep a couple of men some distance further on and to leeward to snuff out incipient fires caused by sparks from the main fire. Be on the watch to try and create a fire-break. This is best done on a down slope. Don't attempt a fire-break on steep rising ground unless the fire is a low burning ground fire: make your effort on the other side of the hill. With a few men just at the top of the slope you can do good work and check the fire long enough for your men below to make their fire-break. Keep working

with your advance men until you are forced back to the fire-break. Then, all together, you will probably get the upper hand of it. Teach your men how to handle wet branches or bags also beating back fire by throwing dirt on it when water is scarce. When you have controlled the fire, chop down any burning tree trunks you can, or beat out the fire on them completely. Even if rain comes, have your men go over the burnt area and beat out anything that is still smouldering or smoking.

Always put in your hardest work in the evenings and early mornings, at which time there is least wind and the leaves and ground are generally damp from the dew.

Never attempt back-firing except as a last resort, unless you have a good number of men: this is too dangerous to try. If you see that the attempt MUST be made, start your trenching men at work, detail two or three men to remain to leeward of the trench or fire-break, then start your back fire a little distance ahead of your fire-break and keep it well under control with the rest of the men you have. See that you have picked men at each side of your back-fire and that they do not let it spread beyond the required distance. It is important in the greatest degree that when the main fire reaches your back fire, the said back-fire be practically snuffed out; then, when the main fire reaches the area you have burnt, your men, except the few to leeward of the fire-break, are all concentrated on the leeward side and working together with a will, the devouring element is completely checked, as your back fire has done its work and the flames have nothing to feed upon, and your men then complete the quenching out process.

If your district borders on a settlement or village and they have no organization for protecting themselves, report the fact to your employers, so that they may petition the Government to take the matter up.

Give all particulars you can in your reports, even when you have no fires. The fuller the

DANGER OF FIRE FROM RAILROAD CONSTRUCTION—Fire started beside right of way and is now burning the entire hill side.

information obtained, the more can precautions be taken to guard against every possible condition.

A WORD TO MUNICIPALITIES

The majority of forest fires originate *near* the forests in the clearings made by settlers. Most of these people find it easier to burn their clearings in the spring and fall than at any other time of the year. Just at these seasons there is the greatest danger to the adjoining forests on account of everything being so dry and inflammable, and it is for this reason that the Government has been obliged to prohibit the setting of settlers' fires from 15th March to the 15th June, and from the 1st September to the 15th November.

A great many instances of forest fires starting from clearings could be given, but that is not necessary, as one has only to think of what occurred last year in the Eastern Townships, or what happened at Whitworth, near Lake Temiscouata, this year.

These settlers' fires nearly always do damage to others than to the person who sets them. They spread and burn up the property of neighbours. Then law suits ensue and the general results are regrettable to all parties.

The Municipal Councils throughout the Province could do a great deal of good and prevent a lot of fires occurring by taking this matter up seriously and arranging for someone to patrol the outlying lots in the municipality, warning the settlers about fire, explaining the law to them and generally putting them on their guard. The cost of such service would be but a trifling affair.

The Government has sent out a circular to the municipalities suggesting some such action on their part. It is hoped that close attention will be given to it.

There can be no doubt that it is less trouble to burn brush in the spring or fall. There is also no doubt that these are the most danger-

DANGER OF FIRE FROM RAILROAD CONSTRUCTION—Fire started beside right of way and is now burning the entire hill side.

ous seasons of the year to do so. The question, therefore, to be decided by the authorities is this: is it more profitable to the community to burn in the spring and fall and probably devastate a large area of forest which a lot of people depend upon for their living, or is it better to burn the brush when there is the least danger to the surrounding forests. We leave the Councils to decide which is the better course to pursue in their own interests, and have no doubt as to what their decisions will be.

When there is a drought between the 15th June and the 1st September, no fires should be set to clearings, as there is great danger under such conditions. This fact must be apparent to anyone who stops to consider for a few moments.

Fires are also set by fishermen and hunters. These people should be watched and if an example can be made it would have a good effect. A careless passer-by may start a fire that will wipe out the whole settlement and leave hundreds of people homeless. Every municipality is exposed to such occurrences and great damage has been done in the past in this way. It is high time that we protect ourselves, but the protection must first begin with ourselves. When that is accomplished the rest will be easy in comparison.

"**FLAT-SLASHING.**"—Wood should have been piled, leaving at least 50 ft. of clear space between it and the forest

IMPROPERLY MADE SLASHING — Fire set in here almost certain to extend to the adjoining forests.

SHORT GLOSSARY

Starting a fire to leeward of main fire, directly in line, first making a fire-break and placing men to leeward of *it*, so as to prevent sparks starting a fire there, and fighting the main fire as it approaches th fire-break.. — **Back-firing**

This must never be attempted except as a last and final resort. — **Note**

A trench, dug across the line of fire at right angles to same. through the forest; a road, or trail, situated as above mentioned, or nearly so. Freshly turned up earth under such circumstances will stop a ground fire nearly every time with a few men working intelligently. — **Fire-line or Fire-break**

Site of an old forest fire. — **Burn Brulé**

A quick running fire, consuming the forest litter, dead grass, etc., not extending up into the branches of the trees, but scorching the roots and trunks. — **Ground-fire Surface-fire**

A fire consuming the timber itself and often the forest litter as well, destroying or seriously damaging both mature and young growth. — **Crown fire**

The dead leaves, moss, small branches and debris of all kinds which accumulates on the surface of the soil in the forests. — **Forest-floor Forest litter**

The water which is distributed under the surface at greater or lesser depths. Example: If fire is smouldering in a peat bog or swamp and a trench is dug round the fire, one may find the water-table is reached when water appears in the trench so dug. — **Water-table**

The actual earth underlying the forest floor, moss, or other soil covering. — **Mineral soil**

Fires set by colonists in the slash, or area chopped for the purpose of clearing land for future cultivation. — **Brush fire**

Young second growth timber. — **Sapling**

Stunted growth of trees. — **Scrub**