

Mr Blyth

Canadian Forestry Journal

January 1920



at the Post Office, Ottawa, as second-class matter.



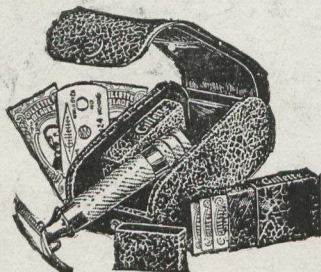
Field, Stream and Road

How strange the old-time pictures of sport would look today—baseball teams boasting at least half-a-dozen sets of whiskers—full-bearded cricketers—champions of the scull with their chins concealed.

Today the athlete knows the importance of the well-shaven chin. He is conscious that he is most keen when he is well-groomed—just as is the business man and the soldier.

For men who love outdoor life and sports, men of virile minds and active bodies, we have designed a Gillette Safety Razor with an extra stocky handle—the “Bulldog” Gillette, shown to the left.

Not that the Gillette needs a sturdy grasp. A light touch, with the angle stroke, removes the most stubborn beard with surprising comfort.



The “BULLDOG” Set includes oval Morocco Case with two blade boxes to match, and 12 double-edged blades.

But there is a certain appeal in the thicker handle of the “Bulldog”. Ask to see this special set and appreciate the point for yourself.

The case, you will notice, is almost as compact as the famous Pocket Edition Gillettes, and the price is the same, \$5.00.

Sold by all dealers catering to men's needs.

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Canadian Forestry Journal

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No. 1.



Foresters running a survey through open country.

HOW FOREST SURVEYS ARE MADE

By Roland D. Craig, *Commission of Conservation;*
Co-author of "*The Forest Resources of British Columbia.*"

With the rise in stumpage values, greater accuracy in timber estimating has become necessary. In the days of plenty, the "timber looker" had only to wander through a tract until he saw enough timber to justify a purchase or an operation, but to-day, with standing white pine selling at \$20.00 per thousand feet, and other species, formerly regarded as of little or no value, commanding proportional prices in the lumber industry, the making of a forest survey has become a technical undertaking requiring a knowledge of surveying and forest mensuration. A forest survey should include not only an estimate of the amount of timber but the preparation of a map from which logging operations can be intelligently planned.

Except where great accuracy is desired and tract to be covered is small it is unnecessary, if not impossible, to measure all the trees so that estimates of the total stand are almost always based on average yields found on sample areas. The sample areas may be taken in small blocks at regular intervals throughout the tract, but the better way is to lay them out in strips running across the tract.

The percentage of the area to be actually cruised depends on the degree of accuracy desired, the area of the tract and the nature of the country. On large areas, of say a township in extent, where topographical and forest conditions are more or less uniform, an actual cruise of five per cent of the area or in some

cases even less, will give a reasonably accurate basis for an estimate of the whole. On smaller areas, or where the conditions which show much variation, it is necessary to cruise at least ten per cent of the area.

THE FIRST STEP IN A SURVEY.

In conducting a forest survey the first thing to do is to establish an accurately measured base-line. If a convenient surveyed line does not exist it is necessary to run one out, leaving marks at every five or ten chains to which the cruised strips can be tied.

The survey should be laid out so that the strips run at right angles to the ridges and streams, otherwise misleading tallies, which do not represent average conditions, will be secured. The width of the strips will depend on the nature of the forest. In open woods the cruiser may be able to see for a chain on each side of the line, but in dense spruce woods he may be able to see only a rod on each side.

The cruising party may consist of two to four men. In large timber two men may suffice, but in small, dense timber it is better to have three or four. The party is guided by a compass-man who, in addition to maintaining the direction with a hand-compass, keeps track of the distance travelled and usually takes notes on the topographical features. The distance is sometimes measured by pacing but usually by means of a tape-chain attached to the compass-man's belt, the end of each chain being marked by a scratch on the ground, blaze or broken twig. In two men parties the cruiser watches the rear end of the chain and tallies the diameter at breast-height and the height class of each tree in the strip. The height class can be recorded in different ways but it can, perhaps, be most readily expressed by the number of logs of a certain length that the tree will cut. When more than two men are used, the additional men call out the sizes of the trees within the strip to the rear chain man who acts as tally-man. The diameters, in some cases, are measured by calipers, but usually the cruiser's eye soon gets trained to estimate the size with sufficient accuracy.

Tally sheets should be changed with each change in the forest type so that when all the cruising lines are completed the boundaries of the various types such as heavy timber, light

timber, muskegs, burns, etc., can be mapped in and the areas of each determined.

The total volume can be obtained with greater accuracy by working up the volume on each type separately than by lumping all the samples together and applying the average to the total area. The greatest source of error in timber estimating has always been in the area to which the detailed estimates are applied. Most of the old "experienced" cruisers can tell with remarkable accuracy the amount of timber which can be cut on a given area, but the variability of the stand in almost every forest area necessitates as much care in estimating the areas of the various types as in estimating the amount of timber on the areas cruised.

TELLING A TREE'S CONTENTS.

Long experience in checking estimates by cutting has enabled many cruisers to tell the contents of a tree with great accuracy especially in types with which they are familiar. The judgment of estimators is not always reliable and it has been found much safer to base the estimates of the stand on actual tree tallies and volume tables which give the average contents of trees of various diameters and heights. These volume tables are based on the actual measurements of a large number of trees. Unfortunately, very little has yet been done officially in Canada in preparing volume tables, but the United States Forest Service has published tables for the species of trees found here and with some adaptation to local conditions these can be used in Canada. Most Canadian foresters engaged in this kind of work have, however, developed volume tables of their own.

The ordinary strip survey supplies data for a good working map and, if elevations are taken frequently with an aneroid barometer and checked up faithfully with known elevations on the base-line, a contour map can be made which will be of great value in laying out logging operations.

It must be remembered that the accuracy of the survey depends on the proportion of the area actually cruised and, though a five per cent cruise may give a reasonably accurate idea of the total stand on a large area, it is almost sure to be found deficient in detail when applied to a small area as a basis of a small logging operation.



Making a close survey with calipers, on Riding Mountain Forest Reserve, Manitoba.

WHAT IS A "FIR" TREE, AND WHY?

By F. W. H. Jacombe, M.F., Ottawa.

The use of the word "fir" in Great Britain differs widely from its use in North America. The practice of foresters in Canada and the United States is to confine the term to the genus *Abies* (commonly known as "balsam" or "balsam fir," represented in Europe by the "silver fir," *Abies pectinata*) and the Douglas fir (*Pseudotsuga*). In Europe, on the other hand, the word "fir" is used in a general and indefinite way which to a non-European is somewhat bewildering. One reads of "fir," "silver fir," "spruce fir," "Douglas fir," and even of "hemlock spruce fir."

Probably the origin of the confusion is to be found in the fact that the word "fir" (of Scandinavian origin and cognate with the Latin word "*quercus*") was originally applied to the Scotch Pine (*Pinus silvestris*), the only indigenous conifer of the British Isles. Some four centuries ago, the Norway Spruce was introduced from the continent, and was known as "spruce fir." The word "spruce" originally was "pruce," and the meaning "Prussian;" consequently the expression "spruce fir" means nothing else than "Prussian fir." Somehow the initial "s" became attached to the word, some claim from the fact that from the shoots (sprossen) of the tree "sprossen bier" was made. Hence the

Norway spruce (*Picea excelsa*) came to be known as "spruce fir," an expression finally shortened to "spruce." (The origin of the expression "spruce up" is similar, possibly from a notion that certain representatives of the race were superior to most other people in point of nattiness of attire, and, no doubt, conceit). From the same sense of "fir" as meaning, generally, a coniferous tree come the expressions "silver fir," "Douglas fir," etc.

J. C. Loudon, writing in his *Arboretum et Fruticetum Britannicum* in the late thirties of the nineteenth century, calls the members of the genus *Abies* (which, however, he denominates *Picea*) "silver firs," speaks of the spruces as "spruce firs," and also uses the terms "hemlock spruce fir" (our hemlock) and "Douglas's spruce fir" (our Douglas fir). Our Balsam fir he speaks of as the "Balsam of Gilead, or American, silver fir." Veitch's Manual of the Coniferae (London, 1900) uses respectively the terms "silver fir," "spruce fir," "hemlock fir," and "Douglas fir."

The Encyclopedia Britannica (eleventh edition) describes "hemlock spruce" and "Douglas spruce," and speaks of the word "fir" as "at present not infrequently employed as a general term for the whole of the true conifers (*Abietineae*)" (this term in-

cludes the spruces, firs (*Abies*), pines and larches) "in a more exact sense it has been transferred to the spruces and silver firs, the genera *Picea* and *Abies* of most modern botanists."

Elwes and Henry, in their monumental work *The Trees of Great Britain and Ireland* (published 1906-1912), largely follow the practice of restricting the term "fir" to the genus *Abies*, but apply the name "common silver fir" to the species commonly grown in Europe (*Abies pectinata*) and the name "balsam fir" to the tree commonly known by this name (or simply "balsam") on this continent. They speak

also of the "spruce firs," but use the term "hemlock" instead of the "hemlock spruce" of other writers, though they speak of the common Eastern American species (*Tsuga canadensis*) as the "hemlock or hemlock spruce." "Douglas fir" is the name they adopt for the famed western species (*Pseudotsuga mucronata* or *Douglasii*).

From the standpoint of simplicity the American terminology has a great advantage; but it is hard to change long-established usage, and the British usage is still indefinite though doubtless time will effect the change in nomenclature.



It looks "barbered" but it isn't. The white cedar tree in the picture is a natural growth out of a stump, four and a half miles east of St. Thomas, Ontario



How trees are sent out to the prairie farmer from the Tree Nursery Station of the Dominion Forestry Branch at Indian Head, Sask.

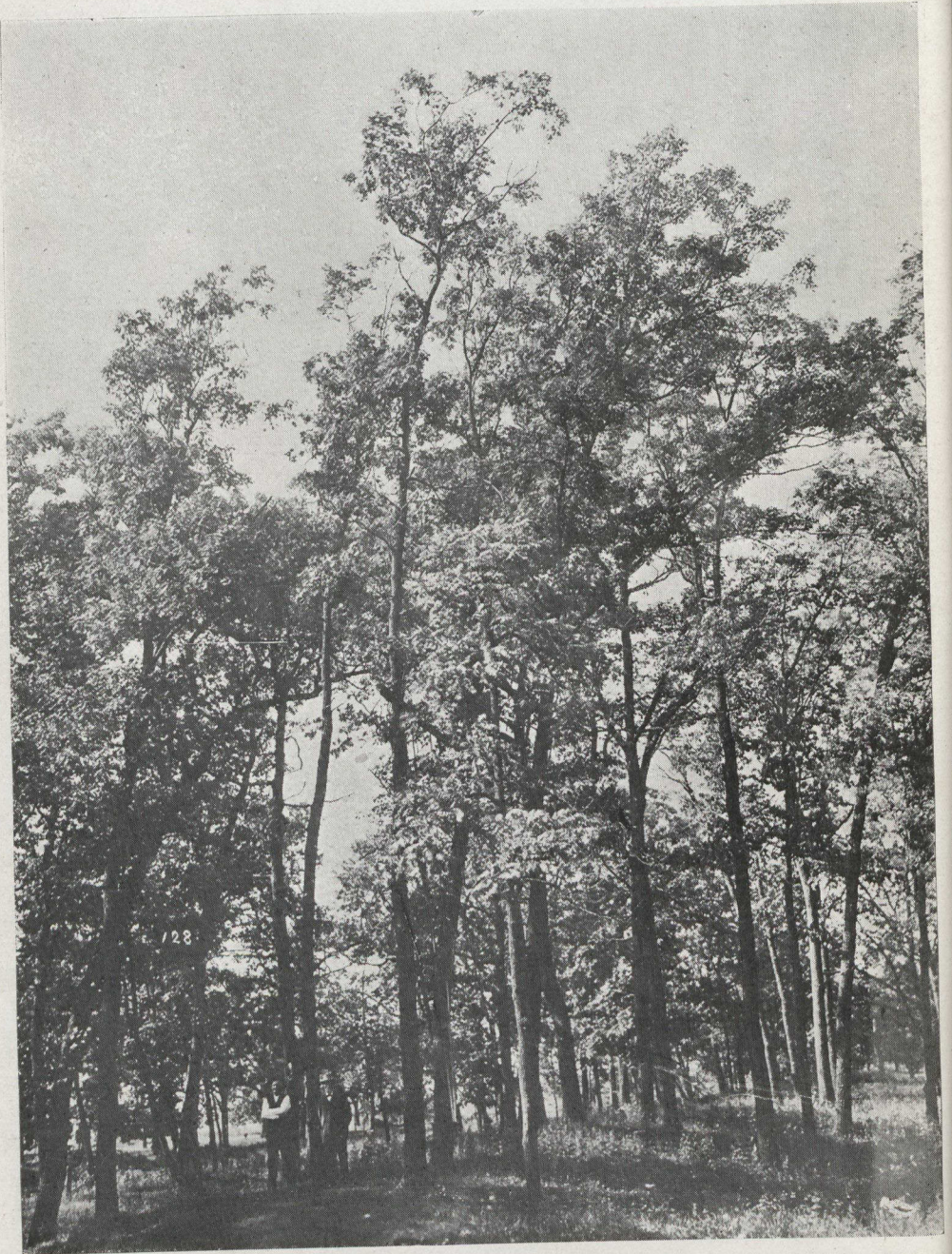
THE FOREST AS FINLAND'S MONEY CHEST

Finland covers an area of approximately 150,000 square miles. It is a country of lakes and swamps with tracts of higher land, occupied by farms or covered by forests in between. The climate is severe. Yet the snowfall is not sufficient to interfere with winter logging. The upland soil is poor and stony. Until quite recently, even long after extensive state Forests had been set aside, it was the belief of a majority of the people (and the government) that the forests should be cleared away and that the land should be farmed. In spite of all of the encouragement that could be given the farmed and grazed lands have not, in many decades, produced anywhere nearly sufficient food to satisfy the nation's needs. It has only been within the last 25 or 30 years that the real value of the forests to the nation has been realized.

The Finnish Forestry Department was created in 1863. To it was entrusted the care and management of the 32,078,457 acres of state-owned forested lands. Of this large area (approximately one-third of Finland's total area) only 13,723,723 acres (43 per cent) is classed as good quality forest land. The rest is either swamp, poor sand or rock, and is either barren or covered by a poor stand of tree growth. The

first duty of the Finnish Forestry Department was to protect, especially from fire and trespass, these state forest lands. In doing so the Forest Department officials had to face the vigorous hostility of the people for the latter had long considered the cutting and burning of the state forests as within their personal rights. During the earlier part of its existence, the Forestry Department was also hampered by small appropriations (\$107,000 for the year 1870), the first income for that year being \$51,000. The annual appropriation was increased gradually until in 1900 it amounted to \$239,000 and in the meantime the annual forest income had reached \$1,024,000. In addition to the state and privately owned forests there is a considerable area of municipally owned forests.

Pine, spruce and birch are the principal Finnish forest trees. In 1910, which may be taken as a normal year, after for a long time having vigorously encouraged the transfer of land from forest to agricultural use, Finland imported about \$20,000,000 worth of agricultural products while it exported about \$50,000,000 worth (80 per cent of all exports) of forest products. These figures show the value to Finland of her forests in international trade.



Western Ontario's patches of lovely woodland—a group of pin oaks.

The Heart of The Tree.

*Written by Ethel Hutchings, B.A., 25 years ago,
while her father, E. F. Hutchings, was planting the
trees in front of his home in Winnipeg, Manitoba.
The trees are now full grown.*

What does he who plants a tree,
He plants the friend of sun and sky,
He plants the flag of breezes free;
The shaft of beauty towers high;
He plants a home to heaven anigh,
For song of mother-croon of bird,
In hushed and happy twilight heard
The treble of heaven's harmony,
These things he plants who plants a tree.

What does he plant who plants a tree,
He plants cool shade and tender rain,
And seed and bud of days to be
And years that fade and flush again;
He plants the glory of the plain,
He plants the forest's heritage,
The harvest of a coming age,
The joy that unborn eyes shall see,
Those things he plants who plants a tree.

What does he plant who plants a tree,
He plants in sap, and leaf, and wood,
In love of home and loyalty,
And far-cast thought of civic good
His blessing on the neighborhood,
When in the hollow of his hand
Holds all the growth of all our land,
A nation's growth from sea to sea
Stirs in his heart who plants a tree.

ONTARIO'S NEW ROADS TO HAVE TREE BORDERS

Under the guidance of Mr. W. A. McLean, Deputy Minister of Ontario's Department of Public Highways, a new and most interesting tree planting policy has been brought to public notice. Mr. McLean advocates the widening of provincial highways in order to accommodate not only the modern features of motor traffic and electric railways, but to provide space for the planting of rows of the best trees.

In a letter to the Editor of the Forestry Journal, Mr. McLean says:

DEAR SIR:

I am in receipt of your letter of December 20th with respect to the planting of shade trees along new roads in Ontario.

I am herewith enclosing a pamphlet with respect to the widening of roads assumed as Provincial Highways, which is self-explanatory and which indicates our desire to obtain greater width in order that trees may be permanently maintained along these important thoroughfares. This applies more especially to the main artery from the vicinity of Windsor to the Quebec boundary and with branches from Prescott to Ottawa and Hamilton to Niagara Falls.

Roads as originally laid out in the earlier surveys of the province necessarily took consideration only horse-drawn traffic and no provision was made for the additional requirements of motor traffic, as well as street railways,

electric power, telephone and telegraph services which many main highways are now required to accommodate.

As a result, the trees which are regarded as essential in the designing of a well laid out highway have been subject to ruinous and ruthless destruction and mutilation, with no provision for replacing them.

It is my view, in order to permanently maintain well-developed trees on the public highway where wire and other similar services will necessarily find a place, it is essential that an increased right-of-way be provided and when this is done, I hope that we may be able to permanently maintain on such highways a better class of trees than has commonly been planted on them.

Yours truly,

W. A. McLEAN.

PLANNING ROADS TO INCLUDE TREES

By W. A. McLean, Deputy Minister of Public Highways, Toronto.

Main highways of to-day serve purposes not contemplated when originally surveyed and made their present widths.

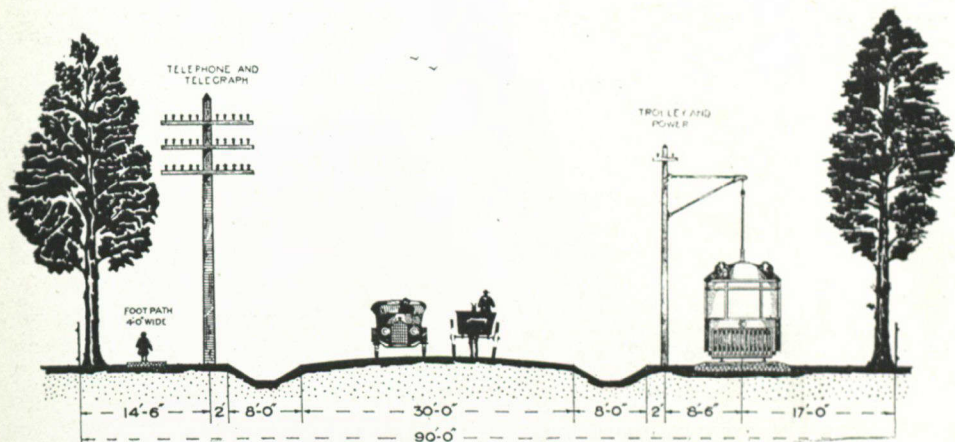
Half a century ago the use of roads was confined to one service—the comparatively slow horse-drawn traffic. Roads in the first surveys were made forty feet wide, but this was found too narrow. Soon a width of sixty-six feet was adopted, as in England, and was made the general standard of the province. This was ample to provide a roadway, drainage, foot-paths, and rows of trees, the natural complement of an attractive roadway.

To-day, in addition to horse-drawn traffic, the fast-moving motor, the heavy motor truck, require an added width of roadway for ordinary safety—safety not alone for the car, but rather for the horse-drawn vehicle. The telephone line (sometimes two or more competing companies), the telegraph line, electric light and power lines, sometimes the electric railway, demand a place on the main highway if public

requirements are to be adequately served. The foot-path, owing to the amount and dangers of motor traffic, becomes a necessity where not previously required.

As a result of the encroachments of these services, the magnificent rows of trees which formerly lined many of the roads have been cut and disfigured, in the end destroyed, in order that the needs of telephone and other wiring systems may be met. Property owners, knowing the ultimate fate of trees, are discouraged from planting them along the highway. It has become apparent that, if trees are to be permitted on main routes of travel, a width of 66 feet or less, where all services are carried, has ceased to give sufficient room, and greater width is needed.

The widening of the Provincial Highway system can only be attained through the loyal cooperation of interested property owners. The additional amount of land required is comparatively small. To widen a 66-foot roadway to



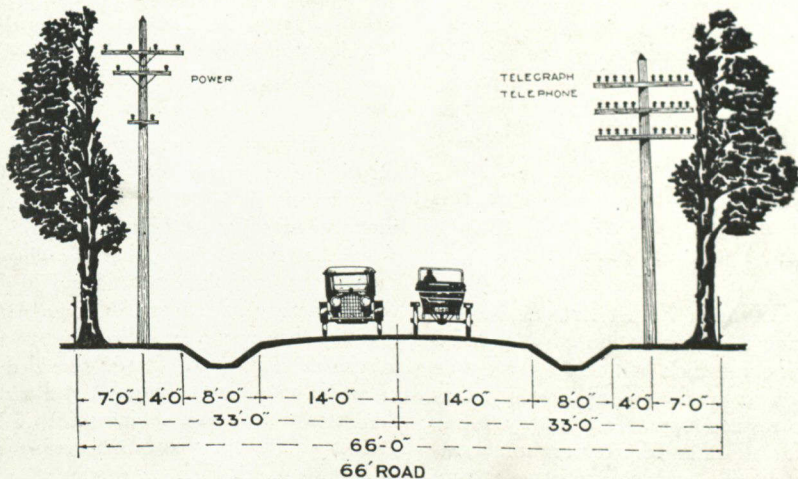
This section indicates a suitable arrangement where an electric railway is on the road allowance, a ditch between the roadway and the electric line reduces the cost of road maintenance and provides increased safety. A width of 90 feet gives sufficient width for the preservation of trees.

86 feet requires approximately two and one-half acres per mile. This acreage per mile means a very small area from each farm. Where electric railways are now in existence or anticipated, a width of at least 90 feet is desirable. Unquestionably a farm fronting on a wide, safe highway, carrying a full complement of telephone and power service, a convenient foot-path, and lined with trees, is benefited thereby much more than the value of the additional land necessary.

In an important sense, the land is not taken from the front of the property, for the travelled roadway is no nearer to the buildings; and the farm still has a front, but on a better and more imposing highway.

The co-operation of property owners should therefore arise from self-interest, as well as from a spirit of patriotism in attaining a work of such manifest public and private advantage—a work of which the province as a whole may well feel proud.

While co-operation is sought, the Department feels it desirable, on behalf of Provincial benefit, to pay property owners for the land an amount which will be equitable and relieve them of temporary inconvenience. But the Department does not feel justified in entering upon a large expenditure for this purpose, in view of the benefit directly accruing therefrom to those from whom the necessary but small amount of land is bought.



On a 66-foot highway, where adequate width is reserved for road and drainage. It is evident that trees are subject to destruction to meet the needs of telegraph, telephone and power services.

SHADE AND ORNAMENTAL TREES.

The object of the Department is to beautify the Provincial Highway—not to destroy beauty. Existing shade and ornamental trees will not be unnecessarily cut or injured. Trees will be conserved—not wasted.

Where no trees are now growing, the standard cross-section can be closely followed in tree-planting. Valuable standing trees, on the other hand, will be preserved as far as possible, and the general design of the road modified to this end. A desirable variety will thereby be created on the highway.

The cutting and mutilating of trees by telephone, telegraph and power companies will be guarded against, and proper pruning insisted upon.

Trees are objectionable along a macadam or gravel road only when so planted as to exclude an amount of air and sunlight necessary to dry the roadway, or when the roots interfere with drainage. To this end trees planted by the Department will be at the greatest possible distance from the roadway—at the margin of the road allowance. They will not be planted too close together, will be pruned upward to admit air and sunlight, and the denser varieties of shade trees will be avoided.

NEWS OF FOREST ENGINEERS.

Capt. L. M. Ellis has been appointed chief forester of New Zealand, and will be in Canada some time in January en route to the scene of his new activities. Capt. Ellis, since his graduation from the Faculty of Forestry at Toronto, has been connected successively with the Dominion Forestry Branch, C.P.R. Forestry Branch, the Canadian Forestry Corps in France, and the forestry work of the Board of Agriculture for Scotland.

Capt. H. R. Christie, having returned from service in France and in Siberia, has been appointed Assistant Provincial Forester of British Columbia.

The British Columbia Forest Branch has recently undergone a reorganization of its administrative machinery which will add greatly to the efficiency of its work. The general salary scale has been revised upward in a way which sets the pace for all other forestry organizations in Canada, and will tend strongly to attract and hold able men, instead of compelling them to seek employment elsewhere.

WHAT ARTIFICIAL SILK IS.

Artificial silk is practically the same substance chemically as natural silk, the retort and test tube of the chemist having been called upon to convert wood pulp into cellulose and then into silk by mechanical processes, just as the silk worm within its body converts the mulberry leaf into cellulose and then spins its cocoon.

In general, wood pulp is converted into cellulose by treatment with caustic soda which forms a sodium cellulose, and then is dissolved in carbon bisulphide. This product, alkali-cellulosexanthate, is popularly known as viscose, used in another form for open-faced envelopes, and is ripened and filtered then forced through minute openings in a metal plate into a solidifying solution, the thread then being about the same consistency and form as the threads of the silk worm's cocoon. The artificial silk goods are sometimes harsher in feeling than the natural, but advanced manufacture is rapidly eliminating this defect.

B. C. DUES INCREASED.

Royalties exacted by the British Columbia Provincial Government on cut timber and logs have been increased to the amount of thirty-seven cents per thousand feet, commencing with the new year.

Following the compilation by the Forest Branch of the Department of Lands of the average wholesale selling price of lumber over the period of the past five years, the increase was decided upon, it being found that with the advance in lumber prices by the mills the above increase was warranted.

The increase is made by virtue of the Timber Royalty Act passed by the former Conservative Government in 1914, by which it was provided that a definite plan of fixing the royalties to be paid should be made effective, thus affording some security to holders of timber areas and lumbermen who would thereby have reasonable knowledge of what royalties they would be called upon to pay into the provincial exchequer. It was provided that the increase in royalties in future would be based upon the average wholesale selling price of lumber over periods of five years each, the average selling price to be ascertained each year f.o.b. at the mills. The present increase is based upon the first five years' period since the act came into effect.



What community would not like to turn a barren neighborhood into a picture like this?
From a photograph taken in a pine, maple and elm grove in Western Ontario.

\$345,000 TO GUARD ONE ACRE.

If the suggestion of a settler in Northern Ontario as to the best method of putting out forest fires had been acted upon by the Department of Lands, Forests and Mines, the Provincial Treasurer would have had to impose a special tax to meet the financial expenditures of the current year. The Department is in receipt of a letter from a settler suggesting that the best method of putting out the fires would be to drop bombs of carbonic acid gas on the burning areas. It is figured out that it would cost the province \$375,000 an acre to extinguish fires by this method.

PRINTING ON SHINGLES.

The Daily Journal, one of the larger Illinois state newspapers, is being printed on wrapping paper because of the general newsprint scarcity. It is recalled that a newspaper in Memphis was once issued on wall paper. The same material was used, however, by a Dawson City publication and some time ago an American western journal was printed on a shingle.

RANGERS CARRY HERBARIUMS.

Equipped with small herbariums, the forest rangers on their tours of one of the United States western districts will henceforth gather specimens of all plant species encountered. Turned in at supervisors' headquarters, these will be mounted and described for public reference. Stockmen using the national forest ranges may become familiar in this way with all the forage plants in the region, and will be able to guide their grazing herds away from areas infested with poisonous weeds.

H. R. MacMILLAN'S NEW CORPORATION.

H. R. MacMillan, former Chief Forester of British Columbia, has formed the H. R. MacMillan Timber Export Company, with headquarters at Vancouver.

W. J. VanDusen has resigned from the British Columbia Forest Branch to become connected with this new concern.

P. Z. Caverhill is now in charge of the Vancouver district, succeeding Mr. VanDusen.

FLYING SCOUTS IN FORESTRY HAVE COME TO STAY

By *Stuart Graham, who managed the aviation work for the St. Maurice Forest Protective Association.*

First Summer's Experience Demonstrated Practical Value of Flying Machines to Central Quebec.

A complete report of the work done by the flying boats loaned by the Department of Naval Affairs, Ottawa, to the St. Maurice Forest Protective Association, Limited, working in conjunction with the Department of Lands and Forests of the Province of Quebec, has been compiled and is of considerable interest. The action of the Department of Naval Affairs in making it possible to carry out this work is highly commendable.

The work has of necessity been carried out along experimental lines, owing to the required initiation of lumbermen into flying work and also the introduction of the flyers into the realms of the forester.

The actual forest flying was materially handicapped in many ways, and over fourteen hundred miles were flown on two trips from Halifax to the St. Maurice Valley. These two trips were the longest cross-country journeys ever accomplished by flying boats, and as landings were made with equal success on ocean, lake and river, it speaks very highly of this type of aircraft for work in Canada where we have such a large percentage of water.

LANDED ONCE IN STUBBLE.

On one occasion, owing to a heavy gale in combination with a "dead" engine, one of the boats was forced to land in a stump-covered clearing. Mr. Ellwood Wilson, one of the passengers on this flight, states that the shock of landing was not felt, and the paint on the bottom of the boat was not even damaged on contact with terra firma. Although demonstrating that the sturdy flying boats are as good on land as water, this was not practised during the season.

Technical points in the report have been omitted, but the following excerpts are of special interest.

"The machines became water-logged from lying in the lake after flights, and owing to the peculiar construction of the hull of the Curtiss HS 2 L Flying Boat, it is impossible to remove the water from certain parts without placing the machine on terra firma and unscrewing drains on bottom of boat.

"On July 20th we endeavored to make a flight but found the machine too water-logged to leave the water, and as the launching track was not completed until a week later, the machine was obliged to lie idle during that time.

HALF-A-TON OF WATER ABOARD.

"Owing to a last minute change in the selection of a base, no preparations had been made for our arrival at Lac la Tortue, and the construction of living quarters, work shop, 125 foot launching track, and the necessary elaborate launching cradle-trucks, was very slow work for our personnel of five to perform without any outside labor. However, by working from daylight till dark, we managed to complete the track, and on July 26th hauled the machine out of the lake, when about 1,000 pounds of water was removed from the hull and fins. We were then able to understand why the machine behaved like a motor boat instead of an aeroplane.

"A few days drying out put the first machine in flying condition again, and on July 30th we resumed our patrol work which suffered no real drawback during the remaining three months. We made over forty trips and could readily have made more frequent trips had it been necessary. However, during these last three months only sixteen blazes were reported by the rangers of the Association, all of which were of minor importance, an area of only eight acres being burnt during the whole period. Ten of these fires were caused by railway locomotives, and were in the majority of cases discovered and extinguished by rangers following up the trains on "speeders." The cheapness and efficiency of this method of railway patrol will never be replaced by aircraft, although the latter may quite frequently be instrumental in spotting and reporting a fire from this source before the "speeder" patrol.

SPOTTING SMALL FIRES.

"That even small fires can be spotted and properly located from a distance of thirty or forty miles, we have frequently been able to prove. On Sept. 17th at 5.15 p.m. we noticed a curl of smoke rising from a point twenty miles to the south of us, between Lake Hamel and the

Mattawin river. Putting on all speed we were soon over the spot and the smoke proved to be from a fire by which some jobbers were preparing their supper, a camp in the course of construction stood a few feet from the fire.

"On July 7th at 4 p.m. we sighted a fire about a mile long on the River Croche, when forty miles to the south of the fire, and reported same to headquarters on our return. A lake was situated not far to the west of the fire, to which we could easily have transported fire pumps and men, but we did not have sufficient fuel either aboard the machine, or at the base, to carry out this project. This was the only patrol made before the end of July, and after that date there was no fire sufficiently large to warrant the transportation of a motor fire pump. However, on October 18th, as a test, we stowed the Johnson fire pump and hose aboard the machine, and found it would be quite feasible to transport this equipment to any lake or river, which offered an open stretch of water for landing.

"During May, June and July, when we were unfortunately not able to carry out aerial patrols, 147 fires were reported by the rangers of the association; these fires burnt over an area of 41,312 acres. The first fire of the season occurred on May 8th and the last on Sept. 5th.

From the above it will be seen that the fire patrol we were able to effect, would not in itself warrant the payment of a sum equal to our season's expenditures. In view of this the following points must be thoroughly considered—We have shown that fires can be sighted from aircraft, and rapidly reported or extinguished, in an efficient manner that could never be achieved by other means. We have proven the value of aerial photography, and shown the cheapness of this method of mapping. With the small personnel at our disposal, we have constructed the necessary station equipment for the carrying out of flying with the boat type machines, and have found out and overcome most of the faults of the machines. In short, we have carried out experiments which will enable us to resume the work at the beginning of the next fire season, without hindrance; and with two machines and two pilots in the field, to maintain as constant a surveillance of the lands under our care as is possible.

PHOTOGRAPHY FROM ALOFT.

The second aim in the work was to prove the worth of aerial photography taken over timberland, in ascertaining the detail with which the various types of timber, and the topogra-

phical features, would be shown. We endeavored to secure an up-to-date camera for this work, but manufacturers were still engaged filling government contracts, and it was impossible to secure one from any source. We secured an inferior out-of-date camera, and with this and various others, we made several hundred exposures, all of which proved unsatisfactory for our purpose.

Ice was forming on the lakes and we had flown through several blizzards before our long promised "real" camera was delivered, but we began with greater zest the work with this now apparatus. This was the Eastman K1 Aerial camera, 100 exposure, 18 cm. x 24 cm., actuated by a wind motor and automatic in operation. At the height we were flying, 5,000 feet, we secured a map of the country three-quarters of a mile wide and sixty miles long with one film, the resultant scale being 400 feet to the inch. Before the lakes became entirely frozen over, we were able to secure three hundred and eighty negatives, portraying all types of country. The results of these pictures exceeded all expectations, watersheds, and their drainage, swamps and burnt-over lands are all accurately shown. The hardwood is readily distinguished from the coniferous, and the differences in size of growth are readily noted. Pine is easily spotted from other coniferous types, and as our experience increases in the interpretation of aerial forest photographs, they will undoubtedly become a great deal more comprehensive, and innumerable other valuable features will be disclosed. It must be remembered that this is a new study, and I feel sure that the contentions of even the most optimistic will be exceeded when the work has been given thorough study.

PASSENGERS CARRIED.

A number of lumbermen accompanied us on our patrols at various times. These gentlemen were representatives of the various branches of work connected with forestry, company managers, foresters, logging superintendents, and explorers. In each instance these men were greatly impressed with the possibilities of the work.

DISTANCE FLOWN.

The total distance covered during the season has been 6,000 miles; of this total, 1,500 miles were flown while coming from Halifax and during test trips. A distance of 4,500 miles was flown on patrol work, and the mean visibility found to be twenty miles, which aggregates 180,000 square miles of territory patrolled.

PROPOSED OPERATIONS FOR 1920.

It would not be fair to make an estimate for next season based directly on the work we have carried out during the past season. The co-operation we have been able to secure has been slight. Mr. Ellwood Wilson, chief forester of the Laurentide company, gave us at all times his earnest support and ready assistance, and maps, canoes, tractors, chain blocks, steel rails, and numerous other equipment was gladly loaned us by the Laurentide company; and I fear that without this individual assistance, the success of our season's work would have been still more handicapped.

During the next season, with two pilots, our patrol time will probably aggregate more than four hundred hours, or a patrol over forty-five thousand square miles of territory a week. This weekly total will, of course, vary according to the requirements of the work. A camera will be carried during all photographic weather, and as much territory will be mapped by this means as is possible.

WHICH TYPE OF MACHINE?

For the work we have been called upon to perform during the season, the Curtiss HS 2 L Flying Boat is undoubtedly the best obtainable at the present time. The varied country over which we have to operate would not warrant the use of too light a machine. It is true they might fly at high altitudes, but we are called upon to make landings on lakes and rivers at any time, and I recall one occasion when we landed on a long narrow lake which had cliffs on both sides rising sheer to twelve hundred feet above the water, a heavy cross wind was blowing, and the agitated state of the air for the first fifteen hundred feet of the climb can be well imagined.

A machine weighing three and a quarter tons, equipped to carry three passengers, could hardly be called efficient, and the HS 2 L is not as efficient as a machine of its power should be.

The ideal machine for work on inland waters is, in my opinion, one of the fuselage-float type, a twin tractor, each motor being one hundred and sixty horse power, with a fuel capacity for not less than four hours' flight. This would allow of carrying pilot, passenger, and considerable extra load. The fuel consumption with his type of machine would be slightly more than half that of the Liberty 33 H.P. as fitted with Zenith carburettors.

Cradles are not necessary for launching or beaching fuselage type machines, a flat truck being all that is required. In the event of one or both floats of a seaplane being punctured by contact with logs or rocks, these can readily be removed and new ones substituted in a few hours; whereas damage to the hull of a flying boat puts the machine out of action for a considerable period. Seaplanes are not, however, as seaworthy as flying boats, and should not be considered where very rough water is to be encountered.

At Riviere du Loup on June 7th, with a heavy sea running, cross tide and wind, we spent a very disagreeable few minutes in the open river trying to "take off." Once the machine buried its nose in the waves within a few feet of the pilot's cockpit, and gallons of water streamed into the front cockpit. This was worse than a straight sea running twice its height, and it was only by getting under the lee of the breakwater, that we avoided becoming swamped. A seaplane in a similar position would probably have sustained damage.

N. S. FORESTS UNDERVALUED.

Halifax.—Hon. O. T. Daniels has made a discovery in regard to the value of the forest resources of Nova Scotia. Hitherto, the statisticians have been putting this value down at \$5,000,000 annually. Hon. Mr. Daniels says the value is \$19,500,000. According to him, those who have been computing the value have been consistently omitting very important items. It appears that no one thought it worthwhile to seriously consider the value of cordwood as an article of consumption, in this province, but Mr. Daniels puts this item down at \$5,000,000, equal almost to the entire value previously estimated by those who wrote on the subject of timber. Mr. Daniels estimates the value of Christmas trees, for instance, at \$50,000 a year. Pitprops, telegraph poles, and a score of other smaller articles previously forgotten, he brings in to swell his aggregate to within a fraction of \$20,000,000 a year.

It may be that other natural resources of the province have been similarly underestimated. Hon. Mr. Daniels is the attorney-general of the province and a lawyer. His figures showing the unexpected importance of our forest industry, will not be displeasing to the people of this province, and may be somewhat of an eye-opener to citizens of other parts of the Dominion.—Financial Post.

CAMPHOR-FARMING

There is no reason why America should not ultimately grow its own camphor, and considerable progress has already been made toward this end. The earliest camphor farm is now 36 years old, and the largest, including some 12,000 acres. Both of these are in Florida. The wasteful Chinese process of destroying the whole tree to reclaim its gum is not now followed. Only leaves and small twigs are harvested, and a camphor-farm is treated, not like a timber-forest, but like an orchard. We quote below from an article in the Du Pont Magazine. Says the writer:

"With the approach of winter housewives begin to arrange, on the cupboard-shelf, various home remedies that are us useful when the youngsters exhibit the first evidence of colds. You may depend on it that a 'camphor' bottle will stand in the front rank. There is nothing of apparent interest in the crystal-clear liquid except its medicinal properties, yet in its manufacture there are several interesting facts that the average housekeeper knows little about. The youngsters know only that it is good for colds and that, when compounded with sugar on a teaspoon, the dose contains far too little sugar in proportion to the camphor, even if only a drop from the bottle is added.

"A great deal of the camphor used in the United States is imported from Japan and the island of Formosa. However, the camphor industry in China is an important one, in which both family and governmental interests are involved. Families are principally interested in the joint ownership of trees. It is not uncommon for a family that numbers as many as two thousand people, considering both direct and collateral relations, to hold an equity ownership in a single camphor-tree.

"Before such a tree can be sold, however, a license must be obtained from the central government authorities, and also from the local officials. After permission to sell a tree is secured the sale takes place, and the proceeds, which average \$225 for a tree, are divided among the owners with regard to their several equities.

"Unfortunately, in China the practice of manufacturing camphor results in the destruc-

tion of the tree. First the tree is felled and the trunk chopped into small pieces or chips of convenient size for the retorts. When the retort is filled, water is added, and a fire is built to carry on the simple distillation process. The camphor volatilizes under the action of the steam, passes through a condenser, usually a bamboo-pipe, and terminates in a wooden tub of cool water, where it is collected as camphor and camphor-oils. It is a primitive process in China and a wasteful one, for although the upper branches and leaves do not contain as much camphor as the larger members of the tree, the Chinese lose some of the product when leaves and branches are used for fuel."

Notwithstanding the primitive means employed and the loss of part of the product, the average yield of a tree, we are told, is about one-half ton of camphor—enough to provide spirits for every household in a large city. To quote further:

"Some camphor is being produced in this country, and it is believed that eventually American production in Florida will suffice to take care of domestic needs. Thirty-six years ago the United States Department of Agriculture purchased a tract of 3,000 acres near Palatka, Florida, and planted camphor trees in long hedge-rows. This camphor farm is to-day a splendidly developed area. Hedge-cuttings are gathered once or twice a year and distilled in accordance with modern chemical practise. By this method the life of the hedges is preserved and the product can be obtained annually for many years. Considering that the life of the camphor-tree in China is about five hundred years, there is little fear that the industry in America will be short-lived, for the trees thrive as well in certain favored sections of Florida as they do in China or other sections of the East.

"In 1913, the Arlington Company, now one of the Du Pont American Industries, purchased a tract of approximately 12,000 acres at Waller, Florida, as the starting-point in developing a large camphor-farm. This is probably the largest acreage devoted to camphor-growing in America."

FORESTRY AND IRRIGATION INTERDEPENDENT



Natural Storage Provided by Tree Growth
Absolutely Essential in the Canadian
West.



The following information regarding forestry and irrigation is taken from an address before the Winnipeg Rotary Club by Mr. Robson Black, Secretary of the Canadian Forestry Association. In view of the fact that the Western Canada Irrigation Association at its annual convention, drafted a resolution to the government urging compulsory tree planting by the farmers on the western prairies, and suggesting a small tax, which would be remitted when the trees were set out, it is of interest.

The Dominion Government is spending annually more than \$700,000 on the protection and administration of western forests, and the wood resources of the three prairie provinces outside of the Dominion forest reserves are in a state of progressive deterioration. Eighty per cent of the west's original inheritance of splendid forests have been destroyed by fires.

TIMBER GROWING PROFITABLE.

Over one-third of the province of Saskatchewan, and half of Alberta are adapted by nature to the profitable growing of timber, and in view of the experiences of the eastern provinces, and European countries, offer possibilities that might rival profits from grain. The day of forest butchery must cease and scientific management and replanting be introduced. The European practice which regards the timber tract as a source of permanent crop should be adapted to Canadian conditions.

Whilst such a large portion of the prairie province is non-arable, forestry must be practiced unless these vast areas are to hang as millstones about the necks of the grain producers. Forests must be grown as a cheap source of timber and to establish in northern localities pulp and paper mills, when the exhausted limits of the east force the paper industries to take up manufacturing in the north of the prairie provinces. This constitutes one of the strongest hopes of industrial development in these provinces. So scarce has spruce become that any province containing tracts in

commercial quantities can attract industries to it and turn wildernesses into thriving industrial centres.

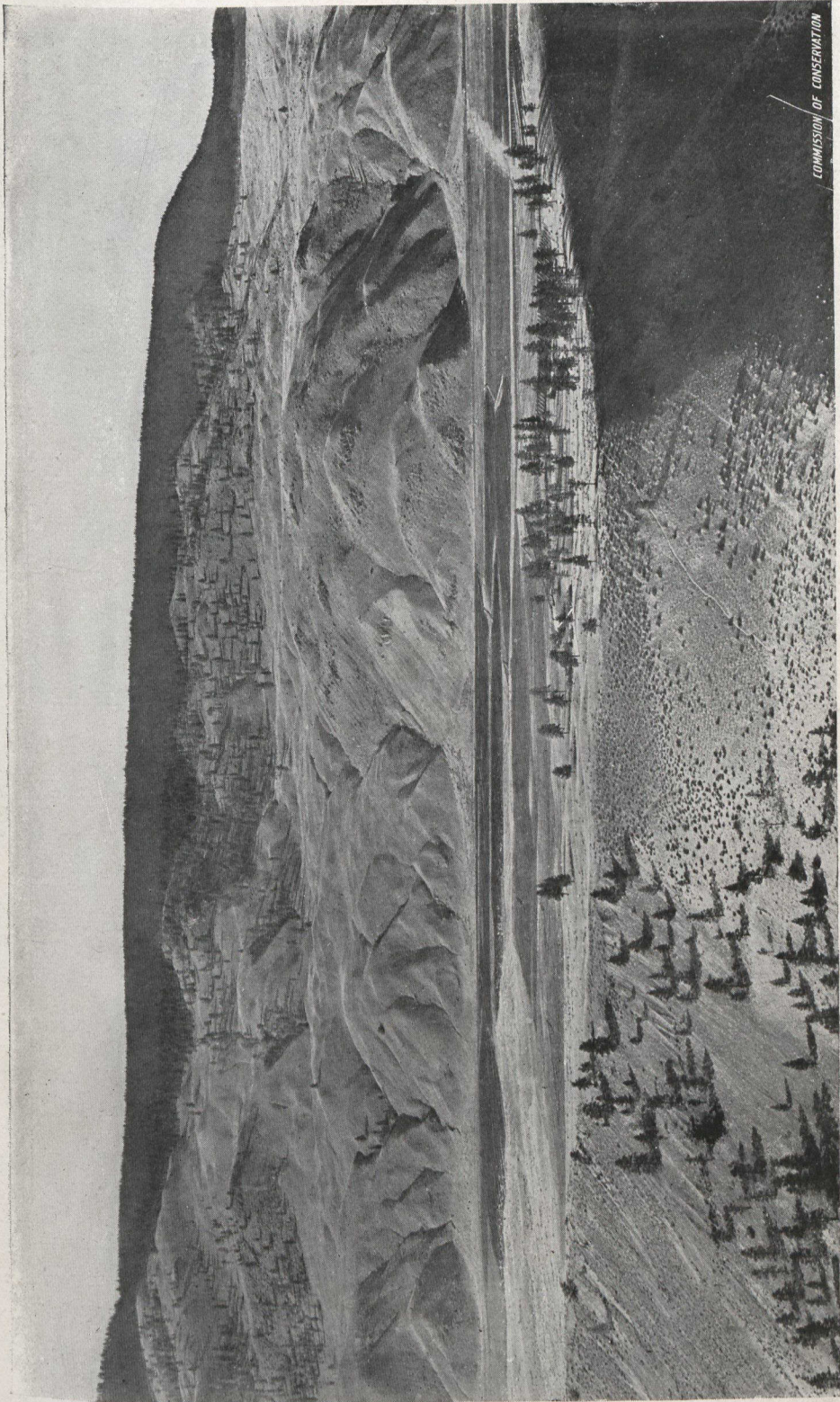
The great development of the past few years along the lines of irrigation, and the demand for further extensions must not be overlooked in the pleas for scientific forestculture. Irrigation projects in the western provinces are all hinged upon the management of the provincial forest areas. Without the natural storage provided by abundant tree growth at the sources of the streams, the distribution of water to the millions of acres in the dry belt is an enterprise of almost prohibitive cost.

At many of the meetings of the Canadian Forestry Association in the western provinces during October, the following telegram from Col. J. S. Dennis, Chief Commissioner of the Department of Colonization and Development of the Canadian Pacific Railway, was read. Col. Dennis, who is an ex-president of the Forestry Association, and also may well be called "The Father of Canadian Irrigation," sent the message at the Secretary's request:

"The destruction of timber on the eastern slope of the Rocky Mountains and on other drainage areas in the west through fire is a serious menace to the successful operation of existing irrigation systems or their extension in southern Alberta or southern Saskatchewan and in the continued supply of water in drainage channels for stock watering. This is due to the fact that when timber and underbrush on drainage areas are destroyed the run-off from these areas is lost through floods with incidental damage, at periods of the year when it should be given off slowly to be of use for irrigation or stock watering.

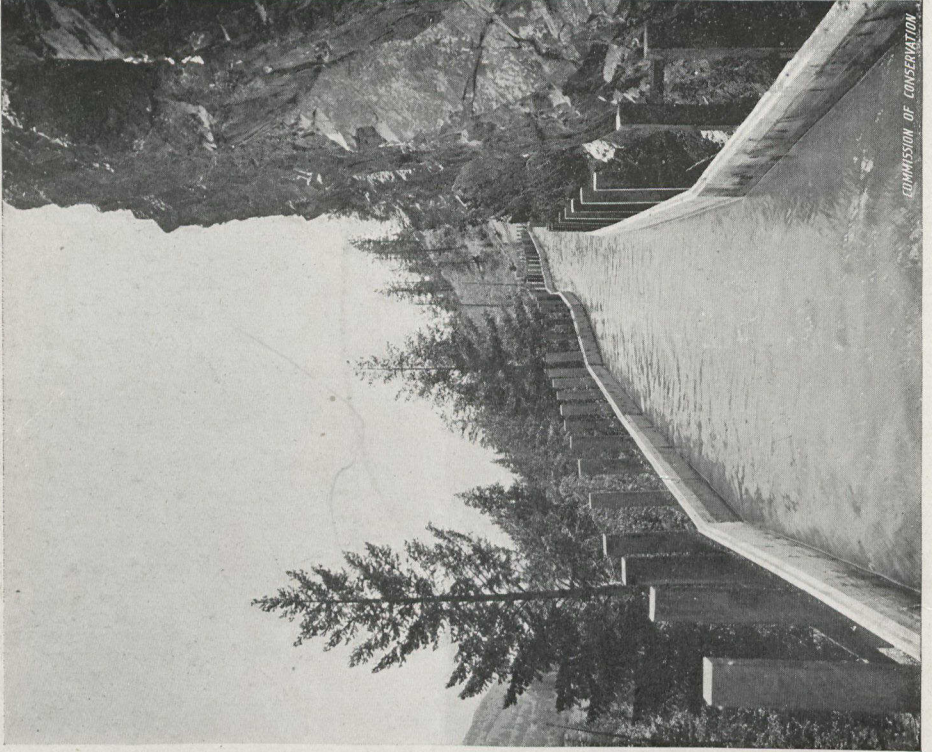
"In my opinion one of the most important matters in the west to-day is to make every effort to prevent destruction of timber on our timbered areas through forest fires."

This he has followed up by the following article:



COMMISSION OF CONSERVATION

TYPICAL VIEW OF CANADA'S DRY BELT COUNTRY. Note scattered timber on the slopes and thicker cover near the summits of the hills, also dry appearance of the soil.



How water is sometimes carried in Western Canada for small power and irrigation purposes. The first picture shows a ditch lined with concrete; the second, a wooden flume skirting a mountain side.

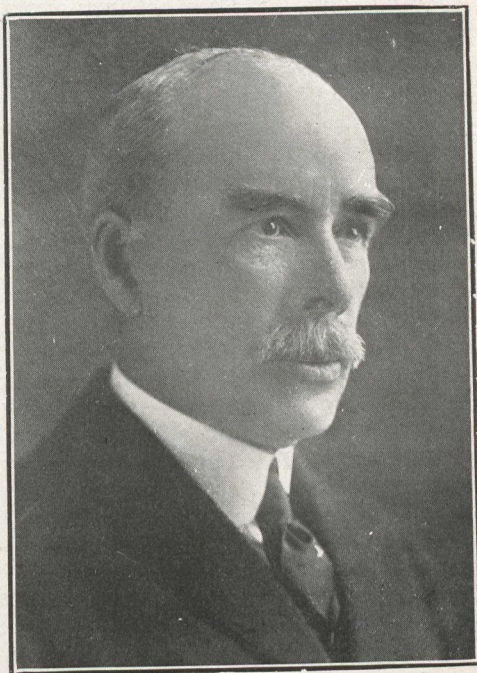
THE POLICY OF IRRIGATIONISTS.

By Col. J. S. Dennis.

It has always been the policy and endeavor of irrigationists who thoroughly understand the basic conditions governing an adequate and regular water supply, to protect our forest areas, and by every means of co-operation with the Department of Forestry, keep wooded areas on water-sheds in a thriving state of growth by fire precautions and reforestation. Every important convention of those interested in irrigation in Canada has drawn up resolutions to protect existing forests on the water sheds of all streams available, or likely to become available, not only for agricultural purposes, but for domestic and industrial use; and to replant denuded areas at the heads of streams so that the sources of the supply of water for all purposes may be maintained for ever. Conventions have urged the establishment of greater fire precautions against devastation by fires, and the increase of fines in the cases of convictions against travellers, campers and settlers who have occasioned the conflagrations. A few years ago the efforts of irrigationists were largely instrumental in securing the reservation of the Rocky Mountains Reserve area, comprising more than 13,000,000 acres on the east slope of the Rockies, and of enormous value to the watershed supplying the rivers and creeks of Alberta and the adjoining prairie province. The association also succeeded in having the reserve of the Cypress Hills enlarged.

WATER-SHEDS MUST BE PROTECTED.

Forestation and irrigation are allied and interdependent, and for this reason water-sheds must be protected. It has been established beyond all doubt that forestation has a considerable effect upon precipitation, and moderates and regulates the flow of moisture in the spring, minimizing the danger of floods, and storing up the melting snow in its springs and vegetable mould. Precipitation is induced in air which has almost reached the point of saturation by contact with some obstruction or the lowering of the temperature. The forests exert a great influence in both ways. On mountain heights their effect may not be very apparent, as the mountains themselves from the necessary obstruction, but their cooling influence is greater than that of the sun-baked mountain sides, and this is found to increase with the elevation. In level country the influence of a large area of forest is more marked and its cooling and obstructive effects come into play without the aid



COL. J. S. DENNIS

Chief Commissioner of Colonization and Development, Canadian Pacific Railway.

of any other agency. Extensive observations in Europe have been made on the influence of forests on rainfall most of which have been quite conclusive in their affirmative results.

CONSERVATION OF MOISTURE.

Forest areas have a greater influence upon the run-off by preventing the rapid melting of snow in spring. In the cooler areas of the woods the snow remains upon the ground for a much longer period and gives off its moisture more gradually. The retarding of the spring floods in this manner not only materially decreases their powers of destruction, but conserves the moisture which appears later as springs. Again, the water flowing from the melted snow, or from showers, is not rapidly seeped in by the rich humus of the forest floor, but is held by the covering of twigs and other vegetable matter which has an absorptive capacity of fifty per cent of its own weight. From this the water is given up slowly or percolates through the earth to springs and streams. It should be taken into account here that a foot of this vegetable covering takes centuries to produce though a single day of forest fire or rush of water by forest clearing will effectively

destroy it. Trunks and roots of trees also present effective obstruction to the flow of the moisture from glaciers and snowfields. The roots, penetrating deeply into the earth, open up channels for the sinking of moisture to the lower strata and reach through these lower levels, springs and streams, long after the surface flow has gone.

Forest growth then has a regulating and moderating effect upon the extremes of the flowings of water, and it is these qualities which govern the value of water courses throughout the year. To assure a sustained and regular flow to the

streams, the forests, with their protective and regulative influence, must be carefully guarded and maintained. This can be most effectively done in the following ways:

By effective protection against fire; by an adequate service of fire rangers and the construction of fire guards; by confining settlement to fertile valleys and keeping hills and mountain slopes where agriculture is less successful, under tree plantation; by the more careful cutting of timber under skilful surveillance; and by the reforestation of denuded or burnt-over areas.

FORESTRY IN THE UNION OF SOUTH AFRICA

Cape Town, December, 1919.—The South African Journal of Industries, in a recent number, gives an interesting article on Forestry in the Union of South Africa. Insistent demands having been made for some years past by all sections of the community that a comprehensive programme of afforestation should be embarked on, the Union Government decided at the beginning of the year 1918 to place a sum of £50,000 on the loan vote for this object.

The Chief Conservator of Forests sets out the position of the Union in regard to natural forest resources, the present acreage of government plantations, and the schemes of afforestation which are being undertaken.

NATURAL FOREST RESOURCES.

In 1913, the last normal year, the Union imported 17,500,000 million cubic feet of timber, worth just short of £1,250,000 sterling. Nearly 90 per cent of that was coniferous timber, i.e., soft timber, and the Chief Conservator

of Forests estimates that even if fully developed, the natural forest resources of the Union will never likely be able to supply 5 per cent of the requirements of the country.

Assuming, on a very conservative estimate, that an acre of plantation will yield 100 cubic feet of timber per annum, the report points out that it will take 350,000 acres to produce the probable requirements of the country in fifty years' time. At present there are only 70,000 acres of government plantations in the Union, and of these 20,000 acres are for special purposes, as, for instance, 7,000 acres in the Transkei to provide hut wattles for natives. From the foregoing the need to press on with afforestation schemes is apparent.

With the extra funds now provided, certain projects have been selected and started. The work is being confined mainly to mountain land, which is of little value for any other purpose, but the question of accessibility for easy distribution of timber has not been overlooked.

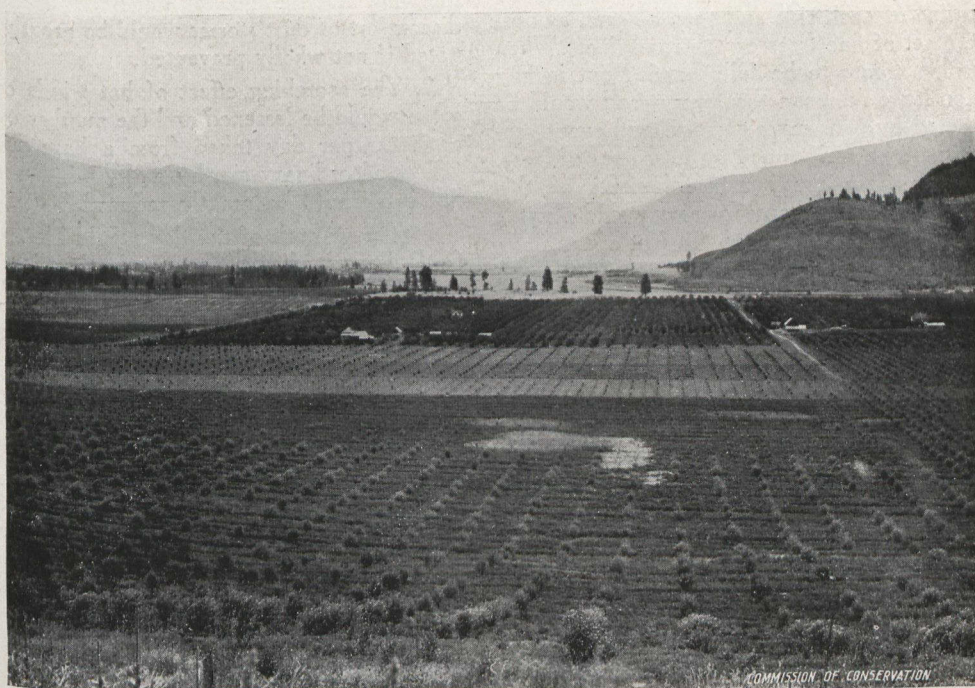
ANNUAL MEETING CANADIAN FORESTRY ASSOCIATION

Chateau Frontenac, Quebec

Tuesday, February 3



Kettle River, above Grand Forks, B.C., showing irrigation flume and railway.



Lower Kettle Valley, near Grand Forks, B.C. This land is under cultivation by Doukhobors.

SYSTEMATIC TREE PLANTING IN COUNTRY PLANNING

By *W. W. Andrews, LL.D., Regina.*

Town planning is the policy of taking a long look ahead in municipal affairs.

It is the intelligent adoption of a plan for a town, or section of country which may take 20 years or more to complete, but every year may be made an approach to its realization.

The object of town and country planning are:

1. Efficiency and economy.
2. Health, and conservation of life.
3. Beauty and culture, or in a word the enrichment of life.

It seeks to make community life richer, happier, fuller, by wide-awake forethought and appreciation of human interests.

The special feature I wish to bring out is this, the systematic protection of our prairie roads and farms by tree planting. The form recommended is planting of continuous rows of carraguanas and poplar and such sure growing trees, flanking the roads 50 or 100 feet back from the road line of each side and then as soon as possible a set of fine trees on the road line. When this plan comes to be fully carried out in any section it would mean that every road would be protected by four rows of trees and every section would be surrounded by four lines of trees. Probably when the immense benefits of this scheme were seen many farmers would plant a double row of trees at least 50 feet apart along the half-section lines.

TREE-PLANTING BENEFITS.

(a) *To General Traffic.*

1. Drifts from either side would never reach the roads after the third year.

2. With only the snow on the level to contend with in 90 per cent of our winter seasons our automobiles would be able to run as well in the country as in our cities.

This would release for the service of our people one million horse power in automobiles (rated at 20 horse power each) now idle almost five months of the year. This idle power will be doubled in ten years.

If gradually the gauge of our sleds were changed, automobile traffic would be greatly helped.

3. The blizzard and dust storm would be greatly modified. Travel for children would be safe and for all safer and more pleasant. How greatly the winter school would benefit!

4. The prairie country would be like a garden. The beauty, homelikeness and general attractiveness of the country would be greatly enhanced.

5. This plan avoids the serious objections which arise from trees wrongly placed, in causing drifts too near the house and barn and along the roads and upon the ploughed lands.

6. In some cases, roads running diagonally of our survey, with a railway station as a centre would be of great advantage.

7. Roads opened up along the railways need protection on one side only.

(b) *Benefits to the Farm.*

1. Such protection would lessen the force of the wind and the blowing out of grain and the discomfort of dust storms would be greatly mitigated if not wholly prevented.

2. The scorching effect of hot winds on the grain would be lessened and the number of tons of water per day taken from a bare summer fallow of ordinary sie, by a dry wind under a hot sun would be greatly reduced.

3. The warmth of the day would blanket the fields longer after sunset and therefore the growth of grain would be accelerated.

4. The late and early frosts would be distinctly less harmful.

5. The 100-foot strip between the two rows of trees on account of its large share of moisture and its protection, the most valuable upon the farm for the growth of small fruits, silo crops, such as corn, alfalfa and roots, pasturage for young cattle and pig runs and garden stuff, as conditions dictated.

If the whole strip were given to trees it would probably pay handsomely if the varieties were well selected, for wood must always be dear in this prairie land.

6. The beauty, comfort, and attractiveness of the farm home would be enhanced. Witness

many of the older farms in Manitoba on plains originally wholly bare, where the home is found in the shelter of an encircling bluff.

HOW MANY PRACTICAL RESULTS BE OBTAINED?

1. Let the government grant \$1,000 each to a town and municipality who together plant a ten mile length of road on both sides and have trees in condition to pass the inspector a year later.

2. Make a special piece of road an object lesson, say the forty miles between Regina and Moose Jaw.

3. Appoint an enthusiastic officer as forestry and country planning expert for the province, who will carry on propaganda, co-operate with municipality authorities, inspect tree planted areas and do all possible to develop the forestry possibilities of the province.

4. Encourage the establishment of municipal nurseries. Ten dollars' worth of seed a year

will, in a few years, produce surprising results. The Forestry Journal reports that 1,000 seedlings a day may be planted by an adaptation of the cabbage-planting machine. As rows of trees to be satisfactory must be in almost unbroken lines, the best results can be reached by municipal action only.

5. Co-operate with school, church and community authorities in the matter of plans for tree protection around school buildings, churches and municipal buildings, parks and playgrounds.

6. Prepare exhibits of lantern slides showing the results of such country planning.

7. Where low wet spots are near the road, wells six or eight feet deep should be dug and filled up with boulders, or holes bored with post hole augers six feet deep and filled with stones, gravel, brush, etc., and covered over with soil. This has proved very effective both for grain and trees.

DR. BAKER FOR COMMERCIAL POST

The American paper industry has taken over Dean Hugh P. Baker, head of America's biggest forestry college, the New York State College of Forestry, at Syracuse, under conditions which indicate that America's timber industry appreciates the need for a study of future raw materials, and for men with a technical knowledge of forestry in industry.

Dr. Baker resigned Jan. 10 to accept twice the salary which he is now rated as receiving, to become secretary-treasurer of the American Paper and Pulp Association, with headquarters at New York. He takes up his new work probably about March 1.

The selection of Dean Baker for the executive officer of the parent association of America's great paper industry, means, according to Dr. Baker, a greater opportunity for the advancement of the principles of the forestry profession than is possible in any college. His letter of resignation outlines important phases of American forestry development of the past eight years, and also discloses that in the spring of 1919 he refused an offer of \$7,500 from the outside, to remain as Dean of the college at a \$6,000 salary.

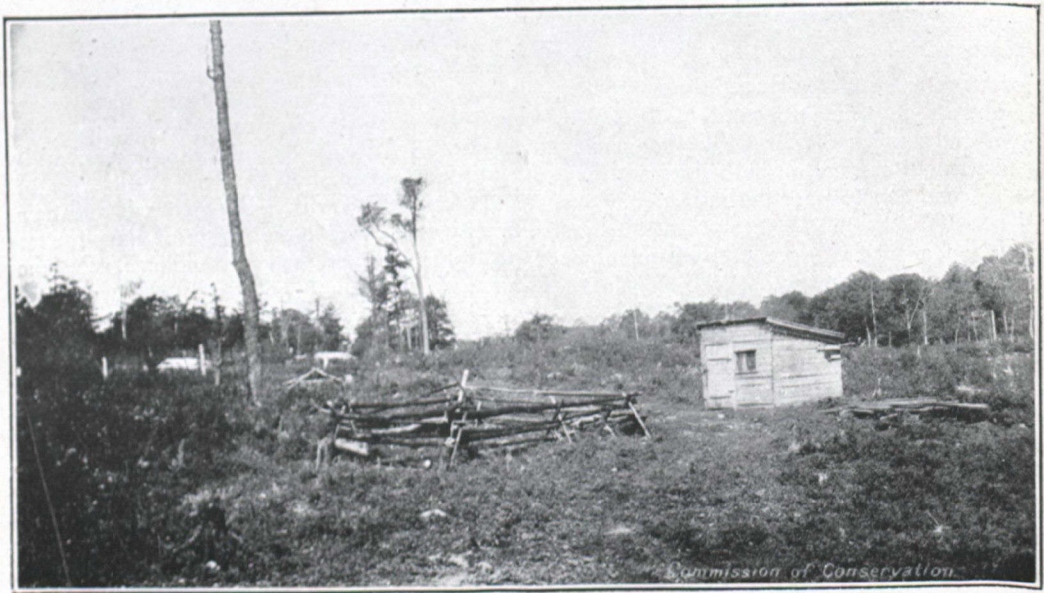
"Canoes that have made Maps and History."

EXPLORERS, TRADERS, AND TRAPPERS HAVE KNOWN THE QUALITY OF LAKEFIELD CANOES FOR OVER FIFTY YEARS.

When Canadian forests were in their pristine glory and when the canoe was the chief means of wilderness transportation, THE LAKEFIELD CANOE was being made and sold. We build Canoes and Boats for every known purpose and have several models with different sizes in each for every possible requirement.

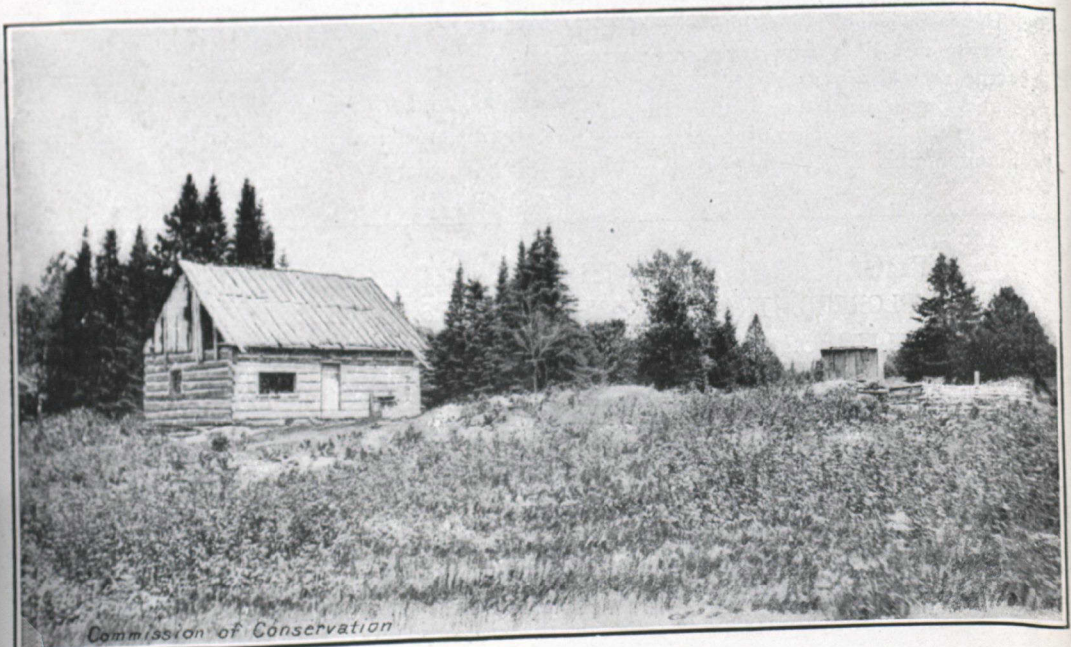
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THE LAKEFIELD CANOE AND BOAT CO., LTD.
LAKEFIELD, ONTARIO, CANADA



Commission of Conservation

A complete story in two pictures, illustrating a common Canadian blunder in land management and colonization. The photographs were taken of a section in the Trent Valley of Ontario where large areas adapted only to timber growing were thrown open to agriculture. An ambitious young farmer built his shack, cleared a few acres, secured a few crops, and then prepared for a happy future by building more commodious quarters, as shown in the lower picture. A year or two passed by and his land "pinched out." The soil was never adapted for field crops. Here we have an instance, unhappily typical of thousands of others, where Land Classification would save an industrious settler from years of wasted effort. It would also retain such sections forever under their only profitable crop—timber.



Commission of Conservation

PLAIN STATEMENTS ON CANADA'S FORESTS

By Frank J. D. Barnjum, Annapolis Royal, N.S.



A Discussion of the Limitations of the Nation's Wood Supply With a Suggestion as to Remedies.



(Mr. Barnjum, a practical and successful business man of Nova Scotia, owner of the largest timber limits in his province, began his studies of timberlands and the wood supply twenty-eight years ago when he made his first purchase of timber areas in Maine. He moved to Nova Scotia where for twenty years he has been extensively interested in timber properties.—Editor, Canadian Forestry Journal.)

The wood resources of Canada have been so grossly exaggerated that very few are aware how meagre our supply of available wood really is. I have spent a large portion of the past few years in a personal investigation of the Canadian situation, the results of which are so alarming that I have refrained from publishing my findings.

The theory of an annual growth that has been indulged in so freely in the past has simply become a popular delusion. There is, of course, a gross growth, and a net growth under some conditions, but to offset this the annual wastage by fire, wind, insects and fungi, taking the country as a whole, far over-runs the gross growth. Consequently we are simply consuming our capital year after year.

If anyone has any question as to the enormous amount of this wastage, let him explore the woods of Ontario, Quebec and New Brunswick, where one can travel day after day and see nearly everywhere the vast destruction caused by the spruce bud worm alone. There are millions of acres in these provinces where over fifty per cent of the standing pulpwood has been completely destroyed.

To emphasize further this question of growth, it is only necessary to refer to the recent reports on the growth in some sections of Quebec, which show only about 30 board feet per acre, meaning about one 6-inch tree per acre per year. It has never been disputed that there is no actual accretion in virgin timber, but the mortality more than offsets all growth. Furthermore, even in cut-over land when one rea-

lizes that it is only necessary to have an average of one ordinary sized tree per acre per year blown down, how easy it is to see that the annual growth is wiped out by this one process of destruction. I have seen thousands of acres laid flat by wind, not only in cut-over lands but also in so-called virgin stands. So much for wind.

Now with regard to the losses from forest fires, the spruce bud worm, borers and fungi. The figures are so appalling that I dare not commit the result of my findings to print, but these losses are so enormous that no one who is sincere will attempt to deny that they far over-balance any annual growth that there is in Canada or the United States. Cut out this mythical annual growth theory and what are we doing? As I said before, we are simply using our capital.

WHAT IS ANNUAL GROWTH?

One often sees the statement in print that we are "using more than three times our annual growth," while in fact, as previously stated, there is no annual growth to use, for the reason that enemies of the forest, cited above, destroy much more than the growth.

The timberland owner has the satisfaction of knowing that even if he has lost one-half of his standing timber, by the ravages of the spruce bud worm, still what he has left is worth double the previous price per cord, as the destruction is country wide, and the consequently diminished supply will necessarily create an immediate and substantial advance in land and stumpage prices.

If some of the paper mills of the United States had not gone so far afield for their wood last year by invading the more remote sections of Ontario and Quebec, where the freight alone amounted to \$16.00 or more per cord and accepted wood down to a diameter limit of one and one-half to two inches, they would be short of wood to-day.

In some of the wild estimates of our supply of standing timber made in the past, they have simply taken the map of Canada, determined the number of square miles, and arbitrarily figured so many cords per acre. Now as logging by aeroplane has not been perfected as yet, there are only two ways you can get out wood, namely, by river or railroad. About all the more important rivers of Canada have been logged on and driven, from the very earliest days. Many of them have been practically stripped or cut out, while others are being operated pretty well back to their head-waters, so far remote that it takes two years or more to drive logs to the mills.

In the case of the railroads the conditions is pretty much the same, with the exception of, possibly, the Transcontinental, but inasmuch as this road was built beyond the height of land, there is very little wood available north of this road, as the rivers all drain away from it towards Hudson Bay. This leaves only the territory that lies south of the railroad, but as sawmills are springing up along this line, like mushrooms over night, and as fire is taking a heavy toll in this section, the paper mills will derive only a small supply from this source. Every time a railroad is built in a wooded country, more wood is burned up than is hauled out.

When talk is made about obtaining pulpwood from the cold northern sections that have not been opened up, where it takes 150 years to grow a four-inch tree, where the snow falls to a depth of 15 feet, and the thermometer registers 50 below zero, it will be only when pulpwood reaches a price more than \$75.00 per cord. We hear Alaska suggested as a possible field for the making of paper, but all of the above handicaps apply to this section, except along the coast, as well as the fact that it is 4,000 miles distant from the large paper consuming market.

All anyone needs to know is that in the United States more than 5,500,000 cords of wood are used annually for pulp alone, in order to realize that this appalling shrinkage in our capital stock of standing timber must necessarily too soon wipe out the remaining supply.

WOODPILE 9,000 MILES LONG.

I want the reader to pause a moment when he reads this paragraph, five million five hundred thousand cords—not feet, but cords, used every year in the United States for pulp, and principally in the Eastern and Middle States. Few can realize just what this really represents, but to try and make this comprehensible, it means a

solid pile of four foot wood, twelve feet high reaching clear across the continent, or a pile four feet high, nine thousand miles long, and yet we may travel for days on the railroads and hardly see a spruce tree. Personally, I should not want to take the contract to furnish this amount for even one year, and where is it to come from after the next ten years?

Imagination can hardly grasp the real significance of the terrifying estimate of the annual consumption of all lumber in the United States alone, namely 244 million cords. This estimate of consumption is doubtless conservative, as it is impossible for the government to obtain complete reports of all actual production.

In addition to this enormous amount that is being cut, fire is taking a terrible toll as well. Over a billion feet of lumber was destroyed this present year in just one state—Montana. This means two million cords, or nearly half the entire amount consumed for pulp in one year, destroyed by the fire fiend in one state. Last year the same thing happened in Minnesota, and this same thing has been going on since this country was first settled and to such an extent that 75 per cent of the original stand of timber has been destroyed by this same cause, and yet some authorities will still talk of an annual growth.

It is a curious fact that some of the coldest sections are the most prone to fire, such as Newfoundland, British Columbia, Northern Ontario, Northern Quebec, Minnesota, Alaska, etc. These fire zones are just as well defined as land and water.

PAPER MILL APPETITES.

In many of the estimates that have been made as to the length of time our standing timber will last, the important question of the increase in consumption is quite overlooked, and as showing what an important factor this is, I will simply cite a five-year period in the St. Maurice Valley, where the increase amounted to 300 per cent, or at the rate of 40 per cent per year.

Thus far I have largely discussed principally the pulpwood consumption, and yet when you add to this the extraordinary demand we have in sight for lumber for new construction the world over, it simply adds to the danger that is facing this country from a premature exhaustion of a supply of raw material for our magnificent paper mills, which to-day are the second most important industry in Canada, and which with a proper and judicious guarding of our raw material, will shortly occupy first position.

The paper mills which have a wood supply will make large profits in the future, as there

are so many American mills which have no supply of their own and will be forced out of business on that account, which will make a continued shortage of paper from this time on. Furthermore, no government can for any length of time, interfere with the natural law of supply and demand, or make a spruce tree in less than 50 to 75 years.

As showing what effect lumber and other products of wood may have on the price and scarcity of pulpwood, I will simply note that in some sections, owing to the abnormally high price of laths, pulpwood is being sawn into laths netting from \$30.00 to \$35.00 per cord for the wood at point of shipment.

In an article which I wrote three years ago when the publishers were complaining of 2¼ cents paper, I then stated that the question of the future would be not one of price, but of obtaining paper at any price.

That prediction has already proved only too true in a much shorter time than I anticipated.

I have devoted the past 28 years to the study of the one subject of timberlands and wood supply, and during this period I have seen lands go from \$1 to \$15, \$20 and up as high as \$50 per acre for the same lands; and stumps go for \$1.50 for a mark of logs that only took four to the thousand, to the price of \$20 per thousand for a mark of twelve to the thousand;

pulpwood from the low price of four dollars to a high of thirty-two dollars per cord, and spruce lumber from a low of twelve to a high of sixty dollars per thousand. Stumpage in New Brunswick even has been sold as high as \$15 per thousand during the present year.

A GRAPHIC CHANGE.

In 1890 they were cutting trees that took not more than six or seven to make a thousand feet of lumber, while to-day they are cutting to such a small diameter limit that in many sections it takes forty trees to make a thousand feet. I saw one pile of wood out on the Transcontinental containing 4,000 cords, where the largest stick was 4½ inches and from that it ran to 1½ inches, with the average size running under three inches.

In one section of the Pacific Coast where the United States Government estimate a stand of eighty-six billion feet, the highest authority in the timber cruising line, and one who knows more of that particular section than any other man, from actual cruises says the figure 8 wants to be dropped, as there is not over 6 billion at the most. Another example I have in mind is a certain territory which was estimated to contain 25 million cords of pulpwood and where, after operating seven or eight years, and cutting out only about 250 thousand cords, all the available wood was cut, and at a severe loss,



IN CANADA'S NO MAN'S LAND.

stripped of timber, and the soil burned off by recurring fires, this portion of Central Ontario has been turned from a fine Provincial asset into a Public burden.

so that further operations of the property was abandoned.

I have in mind another limit that had been estimated to contain 16 cords to the acre, that was examined by a very competent cruiser, who found it ran nearer 16 acres to the cord, as he expressed it. I can cite several cases where the shrinking in estimates are just as striking as those above enumerated.

In connection with this phase of the subject, I cannot help thinking of the reply an old lumberman made when at one of the Canadian Forestry meetings in Montreal. The question of shortage in supply was being discussed, and one of the members suggested that we did not know what timber might be in the unexplored regions. The old lumberman replied that "in any section that the Canadian lumberman did not know what there was, there wasn't anything."

WHAT ABOUT THE STORE OF WOOD?

The great trouble with the paper mills in the past has been that the management have been devoting their whole thought and time to speeding up their paper machines, installing new and improved machinery, and improving their water powers, all of which is, of course, very desirable; but while they have been doing this they have lost sight of the most vital question, viz. a supply of raw material to keep these mills running.

The newspaper publishers are not without blame for the present shortage in newsprint, for every time they have fought a legitimate advance in price, they have made it more difficult and expensive for the mills to do business, especially under government control and regulation, and with regard to price it is not nearly as surprising that newsprint has advanced from 2 to 4 cents per pound and higher, than it is that eggs have advanced from 25 cents to \$1.00 a dozen. A hen can be produced in a year, while these trees that are being made into paper have taken from 75 to 250 years to grow, and as they are becoming more and more remote from the mills, must necessarily become more costly to procure. Think even of the cost of toting supplies back into the woods, a distance of 70 miles, the cost of which in many instances amounts to from \$50 to \$60 per ton for haulage alone!"

Newspapers must accept the inevitable, as all other legitimate lines of business have done, and simply pass the cost along by increasing the price of their papers and their advertising

rates. The newspaper has become a public necessity—no one will do without it to-day, and papers will sell just the same, whether the price is, 2, 3 or 5 cents per copy. And when the paper mills are forced to use some annual crop as a substitute for trees in making paper (which is not far distant) paper instead of costing 4 cents per pound will cost 24 cents or more. So far as the American publishers are concerned, it is of course immaterial to them whether newsprint comes from Canada or the United States, so long as they are assured of a paper supply while the trees last.

When the public begin to realize that this timber, which is being cut to-day as if it were an annual crop, has been growing from 75 to 250 years, and the only way it can be reproduced is by re-planting, planting with the present high cost of labor amounts to a matter of \$12 to \$15 per acre, to which must be added the cost of the land, which is from \$ 3 to \$10 per acre, something will be done. This brings the cost per acre of these plantations of tiny little seedlings from \$15 to \$25, with an annual charge for interest, taxes and fire protection for at least a matter of 50 to 75 years before another crop can be harvested.

In addition to this there is a possible loss from fire, and the spruce bud worm, and other enemies; for it must be borne in mind that fire is always with us, and the bud worm returns in cycles of from 20 to 35 years, and further, that each recurrence, as the lands become harder cut, increases in violence.

INCREASE IN PRICE OF TIMBERLAND.

As soon as the above facts are absorbed, as they are beginning to be quite rapidly at the present time, timberlands will be selling on a much higher scale than they are to-day, and my prediction is that the biggest rise in timberland values that has ever been known, will take place within three years.

There is not a commodity in the world that is selling so much below its real value as an acre of timberland to-day. Think of a crop that has been 50 to 250 years growing, and that under most favorable conditions will take from 50 to 75 years to reproduce with all the attendant risks, and an actual cost of \$75.00 to \$125.00, selling to-day at \$10 to \$15 per acre of land and all, while an annual crop of cereal or potatoes brings from \$15 to \$100 or even more per acre, above cost of planting and harvesting, and without the land.

THE REMEDY PROPOSED.

It is far better to look this question of a rapidly diminishing timber supply squarely in the face and try by practical methods to put off the day of reckoning as long as possible, and I advocate the following remedial measures:

An active campaign of education carried on by literature, and illustrated lectures, so as to reach all timberland owners and the public in general.

The creation of a strong public sentiment by various methods, so as to establish a greater appreciation of the value of forests to all, and a desire on the part of the public to help actively in preventing forest fires.

Improvement and enlargement of the present fire protective service.

Reforestation on a large scale by Governmental appropriation, regardless of cost.

Burning of slash under certain conditions and in certain cases.

Change the present wasteful method of logging by a closer supervision of woods operations by intelligent practical foresters.

An embargo or export duty on raw material taken from fee lands; or the

Annual purchase of fee land wood by a combination of all the Canadian mills.

I will personally subscribe ten thousand dollars to the Canadian Forestry Association, if each of the other pulp and paper mills in Canada will subscribe a like amount, to be used in carrying out the work outlined above, under the direction of an executive committee to be appointed by the subscribers to the fund. This will give us a fund worthy of the name and will enable us to do some real work.

I am giving freely of my time and money towards an educational campaign along these lines, as I feel that it is the duty of every Canadian citizen to do everything in his or her power to safeguard, preserve and perpetuate our forest resources as they are the backbone of our country.

With regard to reforestation, I am glad to note that the bud worm has not invaded this part of Nova Scotia owing largely to the fact that it is practically all spruce, the amount of fire being almost negligible, and probably also to the fact that the spruce is of such a sound, vigorous and rapid growth. I presume that the quality of the growth here is due to the fact that soil and climate conditions are ideal for spruce growing, the amount of precipitation being very great. Records at Halifax covering

a period of 35 years show an average annual rainfall of 57 inches.

I have a sample section of red spruce tree in my office what shows a growth of 20 inches in 20 years, an inch a year in diameter. That is, of course, abnormal, but it is a fact that spruce makes the most rapid growth here of any section on this continent, which hints at possibilities in reforestation that are not applicable elsewhere. This phase is well worth the serious consideration and careful investigation of the Canadian Forestry Association.

In the old days when railroads were first built in Nova Scotia the timberlands were of little value and there was no such thing as fire protection, this province shared the fate of the rest of Canada and vast areas were destroyed by fire, but this is a thing of the past, as Nova Scotia has to-day one of the very best forest fire protective systems, and her citizens are thoroughly alive to the fact that timber is one of the most important assets.

LETTERS to the EDITOR

TREE PLANTING ON HIGHWAYS.

I am glad to see in the September number of the Canadian Forestry Journal that the Forestry Association is devoting some attention to the planting of trees along highways. Though this may not be the main object of the Association, nor have much connection with the growing of timber for commercial purposes or with conservation of rainfall, it is here that the spheres of forestry and road-planning meet.

It is of the utmost importance to the community that roads should be pleasant. As the country develops they will carry an ever-increasing traffic, and a pleasant road not only raises the value of the country through which it passes but is actually more effectual and traversed with less fatigue than a monotonous one.

The character of the planting must depend on the road allowance. Great continental highways should have a road allowance of 200 feet (or more at special points) and should in the main follow the contours of the land; and here the most effective way of disposing trees is by grouping them in plantations on the eminences or at curves or angles, or if the road is straight and level, at intervals of, say, 200 or 300 yards on the average. On second class highways trees might be planted in groups of four, and on ordinary highways in single rows.

At any rate the best results are obtained if highways are made to go to their destination by the easiest route and grade, irrespective of geometry and points of the compass, just as railways are.

Yours faithfully,
FRANCIS W. CAULFEILD.

London, England.

SIGNALLING IN THE FOREST.

To Canadian Forestry Journal.—The question of forest communication has not been given that careful consideration by the government that it rightfully deserves.

I have studied the question of forest communication very carefully, and consider that the communication of a forest area is the basis upon which the successful fighting of forest fires rests.

The chief means of communication in forest areas to-day is by telephone, a costly and not altogether satisfactory method. This one means of communication requires constant supervision to keep it open, as one finds there is always danger of windfalls and fires breaking the line, and in the case of the latter the situation is certainly a serious one. The means of communication I would suggest for large forest areas during the summer are as follows:

(1) HELIOGRAPH.

Range up to 65 miles with a 5-inch mirror.

Weight complete with stand, 18 pounds.

This instrument could be carried by ranger over the roughest country, and communication established in a few minutes from high ground in the vicinity.

(2) LAMP ELECTRIC SIGNAL.

This type was used in the army and proved to be an exceptionally rapid and clear means of signalling.

Range up to 6 miles during day time and 15 to 20 miles at night.

Voltage 12.

Weight complete with stand 18 pounds.

Life of battery 80 hours of intermittent signalling.

Life of battery making ordinary signals from one month to six weeks.

PIGEONS.

Each ranger to carry say two pigeons (changed periodically) which have been trained

to "home" to a central loft, preferably situated in or near a settlement.

The ranger would carry one or two birds with him during his trips. (Special baskets are made for the purpose of transporting homing pigeons, and can be carried on the back.) In the case of a fire one or both birds could be released according to the seriousness or otherwise of the fire, the released bird or birds carrying a message to the central loft giving the location, extent, etc., of the fire.

The ranger remains on the spot doing what he can to get the fire under control, instead of having to leave the scene to return for help, thereby losing very valuable time. Pigeons were found to be very reliable message carriers in France, and will give satisfactory results under all conditions, provided they are properly housed and trained.

WIRELESS.

This means of communication is rather more complicated than the others enumerated, and requires special training on the part of the operators.

In accessible regions small portable sets could be used to advantage, with a sending range of 20 miles and an unlimited receiving range. (The receiving range depends upon the wave length of the sending station.)

Small sets situated in the northern portion of Manitoba or Saskatchewan should be able to pick up signals sent by the wireless station at The Pas, but would not, of course, be able to transmit messages to this station.

The visual and carrier pigeon means of communication would undoubtedly give a far larger field of operation to the ranger, he would not be tied down to one particular place from which he could communicate to the outside.

There are many specially trained visual signallers in Canada to-day, who with additional training in forest ranger duties should become useful servants of the Crown. I hope your many readers may find something of interest in this letter. I may say that I instructed in all these means of signalling in France, and have great confidence in them.

Yours very truly,

G. R. SCOPY,

Late Instructor Canadian Corps Signal School in France.

c/o Dominion Bank, Winnipeg.

FORESTRY LEGISLATION IN CANADA DURING 1919

By F. W. H. Jacombe, Dominion Forestry Branch.

Below is given a resume of forestry legislation concerning Dominion and Provincial forest lands in 1919:

DOMINION OF CANADA.

Two Acts were passed to amend the Dominion Forest Reserves and Parks Act; one of these is general in nature, the other provides for the withdrawal of certain lands from the forest reserves. Under the former, authority was given to forest officers to seize the outfit and equipment of persons arrested for capturing or killing game or fish. Amendments were made to the Act further defining the power of the Order in Council to convey to the Province of British Columbia the surface rights in connection with mining claims in the Dominion forest reserves in British Columbia. Power is also given to appropriate lands for Dominion parks.

Under the latter Act, a total of about seven hundred and fifty square miles was withdrawn from the forest reserves. The chief withdrawals are in Manitoba (343.22) square miles, and in Saskatchewan (378.09) square miles.

By order in council of March 29, 1919, a considerable increase was made in ground rents, dues and fees for cutting timber on Dominion lands.

ONTARIO.

The Legislature passed the Poplar Pulpwood Export Act, giving authority to the Minister of Lands, Forests and Mines to authorize the export of poplar pulpwood in an unmanufactured state during such a period as should seem proper to him (suspending the operations of the "Manufacturing Clause").

QUEBEC.

In Quebec the law regarding the protection of the forests from fire has been amended by legislation compelling every license-holder to have his limits patrolled from May 1 to November 1, by rangers, paid by him, but appointed by the Minister of Lands and Mines, and devoting their whole time to the work, the number of rangers to be prescribed, when necessary, by the Minister. Monthly returns of fires, and of the number of fire-rangers employed are prescribed, returns of co-operative fire protection associations to be accepted for the members thereof. Offenders against this and other provisions of the fire-protective regulations may be tried summarily before a justice of the peace.

Other legislation extends the provision of the existing law cancelling the sale, lease, etc., of land in case of fraud, etc., to sales, leases, etc., made prior to 1868.

NEW BRUNSWICK.

According to the new regulations which came into effect on August 1, 1918, the maximum height of stumps was fixed at sixteen inches from the ground. All trees to be taken from the woods up to the diameter of six inches at the top for balsam fir and spruce, and seven inches for pine.

All lumber left in the woods in contravention of the regulation to be charged for at \$7.50 per M. The lopping of tops is again enjoined.

Permission was given to the licensee to cut and remove, under supervision of the forest engineer of the district, down or damaged lumber, irrespective of size. By subsequent amendment the licensee may also be called upon by the Minister to remove such timber.

By the new timber regulations which went into effect August 1, 1919, the stumpage on softwood (coniferous) and poplar logs was increased one dollar a thousand feet, board measure; a diameter limit of nine inches is placed on the cutting of jack ("princess") pine; all sound butted trees are to be sawn down "as low as possible, and never higher than sixteen inches from the ground, regardless of snow conditions"; and stumpage is reduced by one-third on all trees wholly killed by fire or killed by the spruce bud-worm.

ALBERTA.

Authority was given to the Public Utilities Commission to apply to the provincially chartered railways the regulations of the Dominion Board of Railway Commissioners.

BRITISH COLUMBIA.

The Forest Act was amended in several particulars. Lease-holders on renewing their licenses are placed under the same conditions and subjected to the same ground rents as the holders of special timber licenses.

Under certain conditions special timber licenses were made exchangeable for pulp licenses. Provisions were made to enable holders of mineral rights to exercise these rights where the lands so held were covered by timber lease or special timber licenses, in case of failure of the respective right-holders to come to any agree-

ment. Provisions were also made for the renewal up to Sept. 30, 1920, of licenses of which the right of renewal expired September 31, 1919. The close season for fires was extended from September 15 to October 1, the close season now extending from May 1 to October 1. Authority was also given the Department to require the disposal of slash where thought necessary, the costs to be borne half by the operator and half by the Forest Protection Fund; in case of neglect of the operator, the work to be done by the Crown and all the costs to be charged to the operator.

The Forest Relief Act was amended so as to

exempt up to March 31, 1920, soldiers and sailors in the late war who held special timber licenses from penalties provided for neglect of renewing such licenses.

By the Aeroplane Spruce-Cutting Act, power was given to the Minister of Lands or anyone authorized by him to enter upon and occupy any lands in the province, to have the timber cut and disposed of in whatever manner and for whatever amount the Minister should determine. In such cases land may also be used for rights of way with or without the owner's consent. Compensation was granted for timber cut or land used as rights of way.

AN "INSURANCE POLICY" ON CANADA'S GREAT PAPER INDUSTRY

By George Chahoon, Jr., President, the Laurentide Co., Limited.



The Need of Scientific System in Operating Woodlands Emphasized by Noted Industrial Leader.



The present economic situation in Canada makes it imperative that our industries produce the greatest possible amount for export. Our war debt can only be paid and the adverse rate of exchange turned in our favor by exporting as much as we possibly can, preferably manufactured articles, so that our labor can profit by the increased value of raw materials made into finished products. No other industry is doing so much to swell our exports, nor is any other industry likely to do so much in the future, as the pulp and paper industry. Its exports have risen since 1914 from \$22,120,934 to \$82,092,776, an increase of 271 per cent, and there is no reason why this growth should not continue, if proper steps are taken to provide a permanent supply of raw material. Canada has large areas of spruce and balsam forests, which supply the best possible material, and abundant water powers for its cheap conversion, and be said to be, to-day, in a more favorable position for the manufacture of pulp and paper than any other country in the world. According to the latest reports from the United States, the supplies of pulpwood are being rapidly and will approach exhaustion

in the next fifteen or twenty years. This is evidenced by the purchase of pulpwood lands by United States concerns in Canada and the construction of mills on this side of the line.

Unfortunately, our own supplies are by no means inexhaustible, and rapid inroads are being made on them. In the past, forest fires have taken an enormous toll of our forests and have destroyed more than has been used; but this menace, while not yet entirely overcome, has been enormously reduced, and with the building up of special protective forces of trained men will be still further reduced and will be held in reasonable bounds.

PROBLEMS MUST BE FACED.

We still have large areas, which though sparsely timbered, still have in the aggregate very large amounts of timber on them; but they are far from the mills. In the supply which is economically possible to use with the present means of transportation, there is quite a large amount of waste of low-grade material and also some loss in driving the wood the long distance necessary to reach the mills. These problems are being studied, and it is hoped that methods will be so improved that such wastes can be largely reduced.

The ideal situation for which all foresters are striving is that of a sustained yield; that is, that a region shall be lumbered that no more wood shall be removed in any one year than the amount which actually grows per annum. By such a system of management the forest becomes perpetually productive, and as long as it is not destroyed by fire, it will be an unfailing source of raw material. Under this system, mature trees may be cut over areas where the trees are of different ages and sizes, leaving the smaller trees to grow for a future crop, or a portion of the territory may be cut over entirely clean and a new crop obtained by natural seeding or by planting young trees which have been raised in a forest nursery.

All of these systems have been thoroughly tried out in Europe and are in use separately and in combination wherever forestry is practiced. Our Canadian forests have, in general, been handled under the first or selection system, not by any carefully thought-out plan, but by a fortunate chance. Unfortunately, the system has been carried out, not as in Europe, by taking the oldest and poorest trees and leaving the best and most vigorous for the future crop, but by taking out the best and largest trees and by leaving the feeble and decaying ones, or the young and stunted ones, which either never recover or take a very long time. Studies have shown that on the pulpwood lands of Quebec, under the present system of cutting, it will, in all probability, take sixty years to produce a crop and that the amount which can be cut at that time will be only one-quarter of the amount which is being cut to-day, an amount too small to make profitable logging possible.

ACCESSIBILITY IS THE TEST.

If a proper system of cutting should be adopted, the present cut per acre would, under the selective system, be reduced and logging expenses increased, but each year would see a larger possible cut, until the land had reached a maximum yield three or four times as large as that at present produced. If, on the other hand, we should begin to cut our lands clean, we should more than double the present yield, but we should have to wait for forty or sixty years for another crop, depending on whether we left the restocking to nature or replanted the forest ourselves. The crop at the end of the period would then be nearly eight times that at present obtained per acre. Any system will, for the immediate future, increase the price of pulpwood, but as the forest increases in yield the cost will drop

progressively until the full yield is reached and will then remain practically stationary. The problem has to be faced, and the longer we wait before beginning a sane and practical policy, the more it will cost. Everyone in the country is vitally interested in this problem, and the cost should not be saddled entirely on the manufacturers of pulp and paper, but should be borne in great part by the provincial governments, which are the owners of the land. The price of wood is rising rapidly and will continue to rise until proper steps are taken to insure a permanent supply, and the cost will naturally fall on the consumer of the product. Newspaper publishers should be vitally interested in this question, as they are probably the largest consumers, and they should do their part by economizing in the use of paper and by educating the public and the voters, so that a sound policy can be adopted and the proper legislation passed to make it effective. All classes of the population are interested.

GOOD WORK BY COMPANIES.

The pulp and paper companies have foreseen the difficulties which confront them in the waning supply and the increased cost of logging and transportation, and have given much study to its solution. This great industry has organized and perfected a system of fire protection and has obtained from the government the enactment of better laws for the protection of the forests. It has proposed legislation for reforestation and is urging the government to pass it. It has spent money for experimental work, so that there would be a sound basis of facts on which to lay down rules for forest management and on which to base a wise forest policy. Experimental plantations have been made to determine the best species of plant and the proper soils on which to plant them.

The Laurentide Company, Limited, were the pioneers in this work, and have a large forest nursery, experimental plantations and cutting operations and are planting nearly two million trees the coming season and will rapidly increase the number.

The Riordon Pulp and Paper Company, Limited, are doing the same kind of work and have been planting for several years; 750,000 trees in the spring of 1919.

The Abitibi Power and Paper Company, Limited, and Price Bros. and Company, Limited, and the Spanish River Company, Limited, have the matter under consideration.

PUBLIC MANAGEMENT OF FORESTS.

This whole question of management of forests for a sustained yield and for the good of the country at large cannot, however, be left to private or corporation effort. Since the forests actually belong to the Dominion and Provincial governments, it is their plain duty to manage them properly. Then, too, the long term investment required, the length of time necessary to raise a crop of trees, the low rate of interest which must be charged against the principal invested, require that such work and management must be undertaken by the only certain long-lived agency capable of such work—the government. In all the provinces a large

part of the general expenses of government are taken out of revenues, and in no instance is a reasonable or properly adequate sum being used in the upkeep and perpetuation of the property. Our legislators and administrators are beginning to realize the situation, and much progress has been made in the past five years. We are far ahead of the United States, but there is much need of further progress and in this work both the governments and the public can be assured of the broad-minded and public-spirited attitude of the pulp and paper industry and can be assured that it will co-operate in every way to develop a forest policy which will place Canada on a firm and solid basis as the greatest pulp and paper producing country in the world.

FUNDAMENTAL COMMONPLACES IN FORESTRY

By Dr. B. E. Fernow, Dean Emeritus of the Faculty of Forestry,
University of Toronto.

1. Forestry—the growing of wood crops as a business—is based upon the presumption that wood will always be a necessary raw material in our civilization and that its present uses and methods of use will continue. It is a speculation, in futures. Perhaps we can learn in the future new uses for wood which will open up new resources not yet known. It may be possible, for instance, to grind up woods from the tropical forests and recombine them into new products.

2. Forestry as a business requires a small amount of labor, a large amount of capital and a long time for its products to mature. This last requirement distinguishes it from all other industries. It involves compound interest calculations—speculations for a long distant future. The time element alone means a speculation in compound interest.

LARGE AREAS ESSENTIAL.

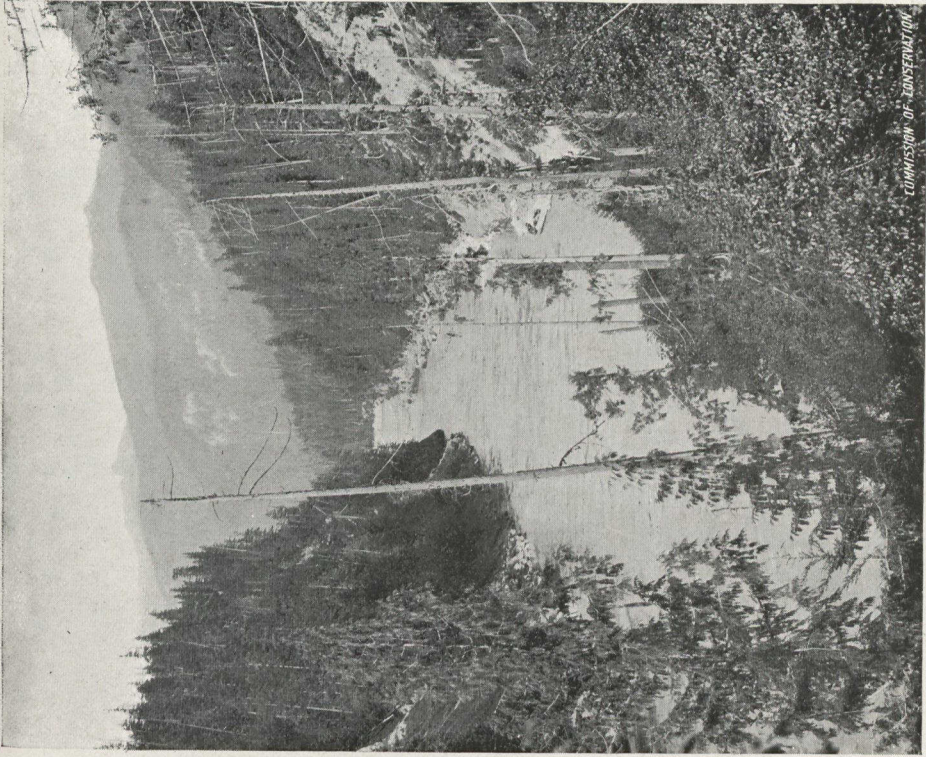
3. Forestry as a business may be profitably carried on only on large sized areas which are capable of furnishing a sustained yield of sufficient amount annually. This applies especially where home markets are not developed. In the early days of my career I received a letter asking whether private forestry was possible and as to methods of carrying it out. This letter was signed "The Jabez Club." In

answer, I stated that I believed I could carry it out if given 3,000,000 acres of southern pine and a working capital of \$2,000,000. In reply this correspondent said that he had one-half the required acreage and asked for suggestions where he could get the balance. This letter was signed as was the first and I replied that before going further I must know the name of my correspondent. This letter had no reply. I was unable to find the Jabez Club in any dictionary. Jabez is a name mentioned once in the Bible, when he was the only gentleman present.

4. Proper economic considerations demand that agriculturally fit soils be reserved for food production, leaving the poorer sites for forestry use. This condition reflects disadvantageously upon the unit area production, and upon all the financial aspects of the business. For this reason the great yields of agricultural lands can not be expected as an average from forest land.

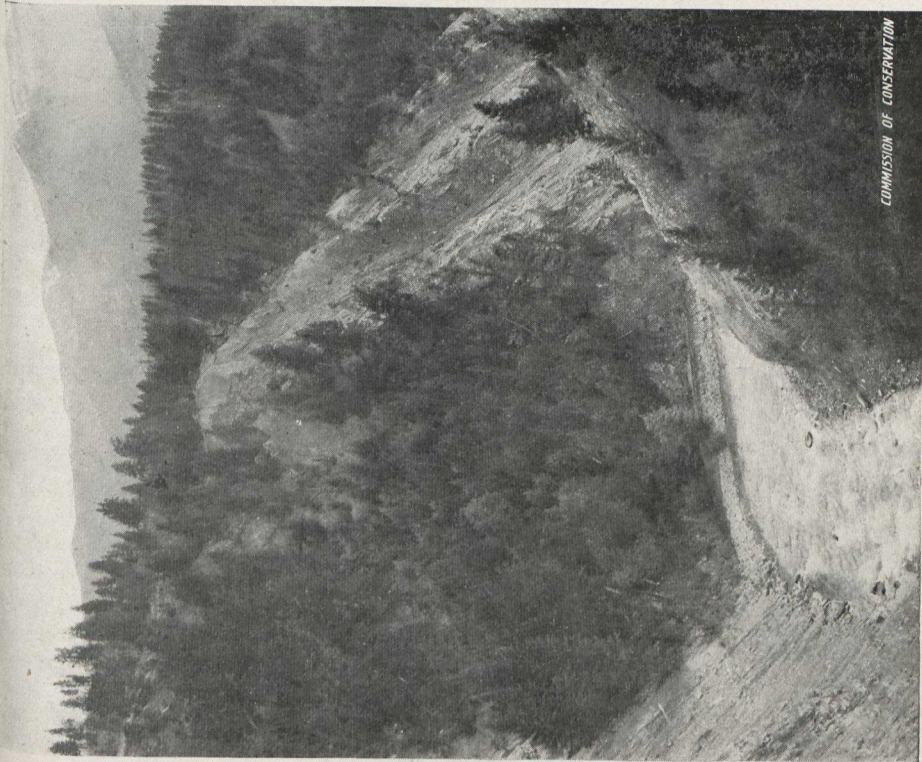
5. Financially, forestry means foregoing present revenue or making present expenditure for the sake of future revenue. Forestry is profitable only in the long run; and the long run on so-called forest soils as a rule means 50 to 150 years.

6. These fundamental conditions of forest-growing render it unattractive to private enter-



COMMISSION OF CONSERVATION

Columbia River, above Revelstoke, B.C. The river here is navigable by steamer.



COMMISSION OF CONSERVATION

One of many deeply eroded streams tributary to upper Columbia river. A portion of Toby Creek.

prise, which looks for immediate or nearby results. Only large, long-lived corporations may be an exception and industries like paper manufacturers, with heavy investments in operating plants, relying on a continuous supply of raw material. Their position is peculiar, and not to be confused with most lumber companies.

7. The interest in forestry of the community, municipality, and state is three-fold; namely in the assurance of continuous supplies for wood using industries, in the influence of the forest cover on water conditions, in the utilization of all land areas to the best advantage.

8. This communal interest establishes the right of the community to control the handling of private forest property at least to the extent of protecting itself against damage in the three directions of preventing its abuse and the turning of productive into waste lands, possibly also enforcing silvicultural methods. This gives the state the right to interfere; whether the federal, state, or municipal government is the most practical influence is not predicated.

9. Silviculture—the art and operation of securing reproduction of wood crops, is based largely on empiricism, and its methods vary according to local conditions and judgment. No two foresters may agree on procedure in a given case, and yet both may be successful. It is therefore impracticable to prescribe procedure with assurance; it is also difficult to inspect and control procedure.

10. Silvicultural success depends upon the combined effects of species, soil, climate, weather and size of operation. While financial considerations favor large contiguous felling areas and rapid exploitation, silvicultural considera-

tions necessitate small, disconnected felling areas, and, if natural regeneration is to be relied upon, slow removal of the mature crop; hence accessibility to every part of the forest property, involving large capital outlay, is a silvicultural necessity. Woodlot forestry is different from that practiced on large areas. If one wants to apply forestry it must be on large areas, say one of 30,000 acres, and the owner must be able to cut anywhere so as to take advantage of changing conditions.

WHICH REGENERATION?

11. Natural regeneration while apparently cheaper than artificial reforestation because not requiring visible outlay, entails slow, i.e., expensive removal, waiting for seed years and luck in weather, while artificial regeneration can be forced to success but requires definite capital outlay. Success by natural regeneration is largely a matter of luck; for if all elements are favorable you may get results. If any one of these conditions fails, then it is necessary to apply art at once, through artificial means.

12. All points considered, forestry as a business can be successfully applied only or mainly by the community, municipality, or state.

The problem here involves the prevention of nuisance on private lands, or the conversion of timberland into waste land, through improper handling by the private operator. The private individual can not be expected to engage in business which will show results only in the lifetime of a man, and he will not figure on returns for his children or his children's children.

ALBERTA'S LOSSES \$2,250,000 FOREST RESERVE FIRES

Calgary—Fire losses on the forest reserves in Alberta during 1919 aggregated more than \$2,250,000, or greater than the estimated loss of the previous ten years. The loss in 1918 was approximately \$1,000. These figures were issued by the Forest Reserves Inspectorate. Fires swept over 548,000 acres of forest reserve in 1919, while 20,000 acres were burned over in 1918, which was chiefly open land.

AMERICA'S BIG JOB AHEAD

Filbert Roth, Professor of Forestry, University of Michigan,
in the American Lumberman (Condensed).

To Secure Timber it Will be Necessary to Start at Once a National Forest Policy

Forty years ago the "experts" told us two big stories: That there was an inexhaustible supply and that substitutes would rapidly replace wood. Both stories were wrong. The truth, well recognized now, is that we have about 2,500,000,000,000 feet of standing timber. The big woods decay as fast as they grow; that is, they make no net growth for us to figure on. The annual cut of timber has been hovering around the 40,000,000,000 mark for about thirty years. We now use, and have used all these years, over half of all the lumber cut and used in the world. The per capita use of about 400 feet of lumber increased up to about 1908, and has dropped slowly since.

THE TIMBER NEEDED.

Even if we can keep up a cut of 30,000,000,000 feet a year the expected population of 200,000,000 in fifty years will have 150 feet b.m. per capita to use. This is about the rate of consumption of timber in Germany and a little more than that of Great Britain, France and other industrial countries, and represents the approximate minimum which any progressive people can get on with. And when that day comes, the people of the United States will pay higher prices for timber than have ever been paid by any people anywhere; for they are used to wood and they have the money. We may even bring in billions of feet of timber from Europe.

The substitutes have done little more than help us to find new uses, and the war has driven this bugaboo out of the brush. The present supplies will hold out sixty years, and by that time we shall need 200,000,000 acres of real forest producing in actual yearly growth 150 feet of saw timber an acre; three-fourths conifers, the oldest big enough to use, and ready to cut.

"But we can bring timber from Siberia and Singapore," say some. This is nonsense, and thinking people are tired of being fooled.

So, then, the problem is here, real and big. It awaits solution and not mere talk. It is

simple but calls for work and money and above all for common sense, good will and persistence.

FORESTRY IS A BUSINESS.

Forestry is business, and means putting woods in such shape that a crop can be cut every year. And whether this woods is 100 or 10,000 acres the forester tries to get it into such condition that he can harvest in any one year about as much as grows during that year.

To illustrate a real forest by an actual case:

Area: 8,000 acres (round figures).

Timber: spruce, with some beech.

Improvements: roads, open lines for roads and for protection, dividing tract into small fields of from 10 to 40 acres; also houses for forester and his helpers.

Method of silviculture: cut old stands clean (about 80 acres each year); replant next spring; thin the timber on every acre once every ten years; in any one year, then, about 800 acres.

Age: when ripe timber is cut, about 100 years.

Harvested in 1908: 630,000 cubic feet of ripe timber from 80 acres; 340,000 cubic feet from thinnings. Total, 970,000 cubic feet of wood.

Cash income, gross: over \$80,000 a year.

Net income: over \$50,000 a year.

Pays out in expenses, chiefly labor, about \$30,000 a year.

The boss is a college bred man; he has maps and books, and every ten years his whole tract is inspected, re-estimated (new inventory), and a new plan made for it. His helpers are in the forest every day, rain or shine.

This is forestry, and it works and has worked for several centuries. It pays; it has taken land worth, say, \$20 an acre and made a property worth over \$200 an acre. It yields taxes higher than do most of our farms.

FORESTRY AND FARMING.

But central Europe has proved by centuries of success that forestry works; that it beats the farm in relative effectiveness. The farm in

Europe and America is not over 50 per cent effective; that is, the average crop is not over 50 per cent of the full or perfect crop: but forestry in Wurtemberg is better than 70 per cent effective to-day and is improving. The state forests of Wurtemberg and Saxony, over a million acres, have for years past made better than \$5 net an acre a year and have paid higher taxes than the farm.

What these forests do for shop and factory, for climate and water flow, for transportation—railway and highway—would easily be worth \$10 an acre a year. And this "secondary benefit" the state gets, but a private owner does not, and here again lies a peculiarity of the forest as a crop. That the forest can use poorer land, cold and frosty sites, wet ground; that it keeps up and even improves the soil; that timber in the lumber yards does not spoil like potatoes, but seasons and improves; that it is bulky and costs money to haul, all these things are too well known to need mention. To some of our railroad people it might be of interest to know that the forest beats the farm easily four to one in freight requirements.

AMERICA HAS ADVANCED.

Forestry is an old business in Europe, it is new with us. And yet, thanks to Fernow, Pinchot, Roosevelt and others, much has already been accomplished. Forty years ago the word "forestry" was not in the American dictionary; there was no forester in the United States with an acre of land to work or a log to sell; we knew little about our forest trees or our forests.

To-day the United States forester has jurisdiction over an area of forests more than four times that of all the forests of the former German Empire. He offers for sale timber by the hundreds of million feet. He has built thousands of miles of roads and trails and telephone lines, and has developed the best protective system to be found anywhere in the world, when we take into consideration the meager means allowed by Congress.

The forests of the United States are now well known as to location, area, kinds of trees and condition. The foresters of the United States have more real forest studies and experiments under way than France ever attempted and we shall soon be in shape to tell a man what he can do and what he can expect with any of over thirty kinds of timber on different soils and sites, north, south, east or west.

But what is more important than all this is the fact that the people of the United States are

informed, that their mind is set on forestry, that the legislatures of most of our timbered states have taken hold of this problem and that forestry as a definite policy in Congress has come to stay.

Forestry is here, it has progressed, and progresses now faster than ever. The great national forests have proved their worth; the states have made beginnings; we are now ready to attempt the hardest and the most important task, that of getting forestry not merely started but going in all of our most important forests—those in private ownership, the forests from which comes over 80 per cent of our lumber cut to-day. Until we have succeeded in putting forestry there we cannot claim really to have it in this country; and is no real assurance of our future supplies and the safety of our industries and welfare.

THE JOB AHEAD.

The job ahead is to prepare for a "growing stock" of timber large enough to supply our people with a yearly cut of at least 40,000,000,000 feet or 200 feet b.m. of lumber per capita for a population of 200,000,000, and do this in about 60 or at most 100 years. According to Endres, the German forests in 1900 furnished a cut of about 700 million cubic feet of timber. Allowing as they do for one-third waste, this means about 5.6 billion feet b.m. saw stuff. This was grown on about 35 million acres of woods, so that the yearly growth and cut of saw stuff averaged about 160 feet b.m. an acre.

On this basis we would need 250,000,000 acres of productive forests growing 160 feet b.m. an acre a year, or about 200 million acres outside of the present national forests. We shall need more, for it takes time to learn the business to start real timber crops and avoid large losses.

The task is here; it looms clear and is well recognized. Interested and thinking men in many walks of life are earnestly discussing the subject. Forty years ago when Fernow started our people in a campaign for real forestry the general application of forestry was out of the question. He knew this. To-day we are ready for it and need it. We can see that without the help of bulletins. Cypress plank in Michigan at \$130 a thousand feet; Pacific coast lumber in Ohio and the east; dozens of sawmill towns in desolate ruins; miles of railways abandoned; the lumbermen's statement "the big mills of the

Northern Electric

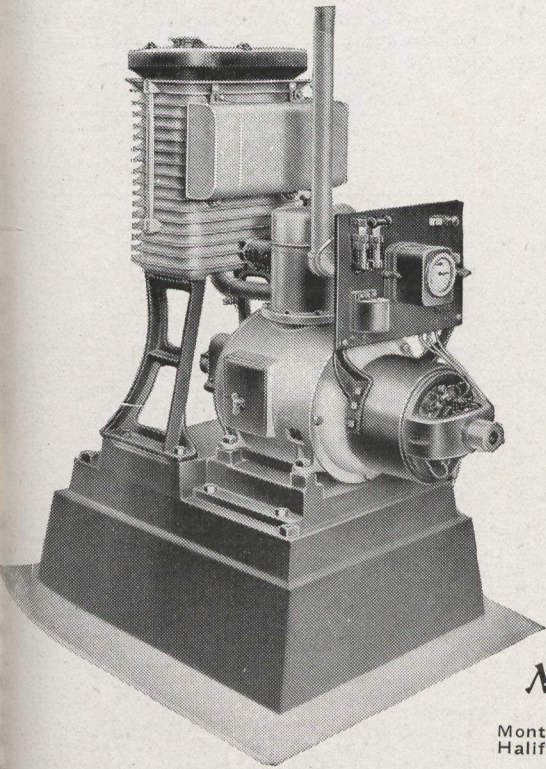
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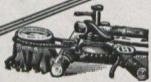
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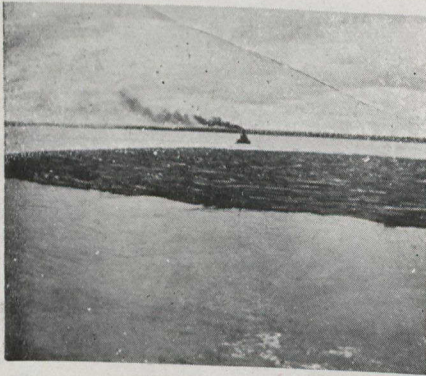
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THREE ESSENTIAL FACTORS.

What is there to do? Where must we begin? What is the plan? As in so many things, there are several roads to Rome. No one man knows it all, or even knows very much of it; and no one's opinion and plan, therefore, should be set up as infallible. This task is too big to hurry or "railroad" through; if a good beginning is made in five years we may feel satisfied.

In its fundamentals forestry is very simple; to introduce it under the great variety of conditions, from Maine to California, from Minnesota to Louisiana, is quite another story.

All will agree that a plan for the general application of forestry in the United States must have three qualities to be useful: It must be just, acceptable and practicable.

Justice to the people means that plenty of lumber shall be supplied regularly and at a fair price (not cheap, but fair); that the future shall be safeguarded by keeping a sufficient area of forest in a productive condition, and that the forests are well distributed over the country to avoid the great burden of long distance transportation.

Justice to the timber owner means that all shall fare alike. A plan which forces the man in Georgia to mark and cut by the selective

method because this seems to work out in Maine is not a just plan. The man in Georgia may practice better forestry by cutting his land clean and planting and seeding it. A plan which allows one man to neglect his slash and compels another to clean up is not fair; nor is one which gives good fire protection at one place and poor protection at another.

That the plan must be acceptable is evident to all. As soon as the leading men in the Government of the nation and the states can get together with the owners of the forests on a just and workable agreement the matter becomes simple and easy.

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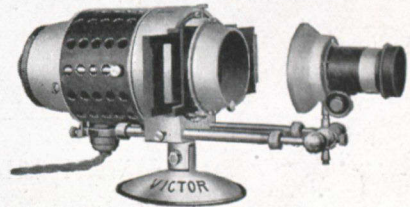
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ALBERTA'S ANSWER IS EASILY GIVEN

(Editorial in Edmonton Journal, Saturday, October 25, 1919.)

AN ALARMING STATE OF THINGS.

Mr. Robson Black's statement regarding the loss of Alberta's forest wealth and its consequences is startling. The actual destruction of timber is a serious matter, but it is its effect on the arable areas of the province which is now mainly concerning forestry officials. Those portions of southern Alberta which are dependent on irrigation have reason to be specially concerned.

It should not be necessary at this date to explain how essential to an abundant and uniform flow of water in our rivers is the preservation of the forests in the mountain regions where these rivers take their rise. It was in recognition of this that some years ago the whole eastern slope of the Rockies was set aside as a forest reserve. But fire, it seems, has been largely nullifying this action.

Measures to cope with this evil have been in-

itiated and carried through with much difficulty owing to the failure of the province to cooperate as it should with the federal authorities.

The Dominion now spends \$700,000 a year for the protection of forests, but derives no direct benefit from these nor from the irrigation schemes which are dependent upon forest preservation. Considering all that Alberta has at stake in the matter, and considering that the provincial government is not called upon to meet any of the actual outlay entailed by the efforts of the forestry officials, it should, at least, help where its help is essential to the securing of results. Legislation has been withheld which would allow Dominion fire rangers to make criminal charges against homesteaders and others who cause fires through wilful carelessness. Most fires arise in this way and, as prosecutions are impossible, the fires continue to be a menace. They have been especially destructive during 1919.

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