

THOS. SOUTHWORTH, Esq.

PRESIDENT CANADIAN FORESTRY ASSOCIATION, 1909-1910.

Born in Leeds county, Ontario, Mr. Southworth early entered journalism, and for several years was connected with the Brockville Recorder—part of the time as sole proprietor and part of the time in association with Hon. Geo. P. Graham. Appointed Director of Forestry for Ontario in 1895, he became in 1897 a member of the special commission appointed to examine and report upon the forest wealth of Ontario. In both positions he attained great success. His enthusiasm and knowledge of affairs brought his office, hitherto chiefly educational, into touch with practical affairs and practical men, and as a result of his work much more is known of the extent and value of Ontario's forests and many important progressive measures have been enacted. As Director of Colonization, also, he did much to make known the agricultural possibilities of the "clay belt". Resigning his position early this year, Mr. Southworth is now Secretary-Treasurer of the King Radiator Co., Toronto. He retains his interest in forestry, and especially in the Canadian Forestry Association, and a very successful year is expected under his presidency.

# Canadian Forestry Journal

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## The Regina Meeting.

Upon invitation of the Regina City Council and Board of Trade it has been decided to hold a special meeting of the Canadian Forestry Association in Regina on Sept. 3rd and 4th. A good program of papers and addresses is being arranged dealing particularly with western conditions. There will be special railway rates from east to west because of the meeting of the British Association in Winnipeg, Aug. 25th to Sept. 1st,

and it is expected there will be special local rates. Those taking in the Seattle Exhibition will also be able to stop at Regina either going or coming. All members of the Association and the friends of forestry generally are invited to attend this meeting. Those who intend to be present, especially those living in the east, would confer a favor by communicating this fact to the secretary.

## Appointment of Permanent Secretary

At the tenth annual meeting of the Canadian Forestry Association held in Ottawa on March 11th, it was decided that the time had come to carry out a more active propaganda in connection with the work of the Association. The directors were instructed to secure the services of a competent man to act as permanent and paid secretary, who would give his whole time to the work of educating the public to the importance of the forestry movement and the work done by the Association.

A special committee composed of Dr. Fernow, Dean of the Faculty of Forestry of the University of Toronto, Mr. G. Y. Chown, Registrar of Queen's University, Kingston, and Mr. R. H. Campbell, Dominion Superintendent of Forestry, Ottawa, was appointed to make a recommendation to the board of directors. This committee considered a number of names and finally reported, recommending Mr. James Lawler, a journalist, as the most suitable man for the position.

A meeting of the directors was held in Toronto on April 20th to consider the

report of the special committee. At this meeting Mr. A. H. D. Ross, who had acted as the very efficient secretary of the Association for the preceding year, but who, because of his position as lecturer in the faculty of forestry of the University of Toronto was unable to give his whole time to the work, tendered his resignation. This was accepted with complimentary references to Mr. Ross's work and Mr. Lawler was appointed and instructed to begin work on May 1st.

Mr. Lawler comes highly recommended. He has had newspaper experience in Winnipeg, Toronto and Ottawa, and has for some years made a study of forestry, particularly on its economic side. In addition to attending to the correspondence of the Association and taking part in the preparation and dissemination of its literature he will also conduct a campaign to extend the membership.

Part of the propaganda work of the Association will take the form of lectures, illustrated by lantern slides, to be delivered by the secretary before clubs,



commercial organizations, schools, literary societies, etc. Wherever possible, these will be taken in series, so as to effect a saving in time and traveling expenses. Members who know of opportunities for delivering such lectures should communicate with the secretary as early as possible, so that details may be arranged. It is hoped by this means

during the coming autumn and winter to greatly increase the interest in the work of the Association and to add largely to its membership.

An office has been secured at 11 Queen's Park, Toronto, and to this office all correspondence should be addressed.

## Growing Trees for Fuel.

By NORMAN M. ROSS, CHIEF OF TREE PLANTING DIVISION, FORESTRY BRANCH.

The question of a home-grown supply of fuel is one worthy of serious consideration on the part of every farmer living more than a few miles from natural timber. The planting of trees for this purpose, however, has not heretofore received any general attention. There have been reasons for this. In the first place, the average farmer, in developing a new home, has not much inclination to devote any time and labor to undertakings not calculated to bring in immediate returns; secondly, the general idea prevails that it takes too long for a tree to grow to make it worth while; again, it has not always been possible to secure cheap and suitable nursery stock for general planting, and finally, the farmer has had no available data to fall back upon to warrant his expending much money along this line of work.

At the present these conditions are somewhat different. Though many settlers may not be in a position to set out plantations there are many more in the older districts who can, and who certainly should, direct some of their energies in this direction. We are now in a position to state definitely that fair fuel can be grown on a prairie farm in from six to eight years, not, of course, of best quality, but sufficiently good for summer cooking. Each year after this adds to the quality of the wood grown. There is now no difficulty in securing suitable nursery stock at a moderate cost. Though even yet we have not much available data regarding the growth of cultivated varieties in close plantations, we shall have a sufficient number of examples of comparatively old planting to prove conclusively that fuel may be grown within a very few years.

### THE BEST VARIETIES.

The question naturally arises: what varieties are likely to be the most profitable for the farmer to plant? This is a point which can be definitely decided only after several years of testing. We can at present merely base our suggestions upon observation and not upon accurate measurements.

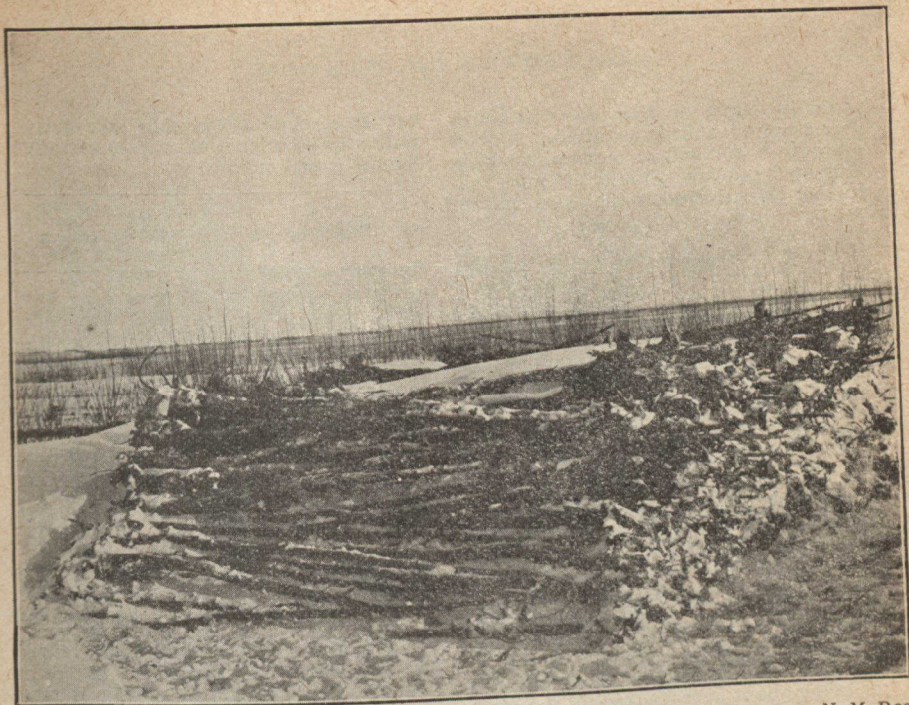
The following are points to be considered:—

1. The variety must be a rapid grower so as to give returns at an early date, and it must also produce wood of a fair fuel value.
2. The varieties must be easily propagated in order that planting stock may be fairly cheap.
3. The varieties should make a second growth readily from the root when the tops are cut down.
4. The plantation must be established at the least cost consistent with the results desired.

Now, as to varieties we would suggest the cottonwood and willow as best for Manitoba, Saskatchewan and North and South Alberta. In the central districts of Alberta the Russian poplar may have to take the place of the cottonwood. Of the willows the acute-leafed variety (*salix acutifolia*) would seem one of the best. Of course we must admit that poplar and willow are not likely to produce as good a quality of fuel as maple, ash or elm; but it must be realized that they will produce a far larger volume of wood on a given area, which will be large enough for fuel in a shorter time.

The common wood fuel of the country is poplar wood. The cottonwood, Russian poplar and willow will produce





[PHOTO BY N. M. ROSS

3½ cords of Cottonwood and Russian poplar poles, cut from trees planted four years. Trees planted on Experimental Farm, Indian Head, Sask., in Spring of 1903, and cut in autumn of 1906.

wood of a very similar quality. As regards ease of propagation these three varieties have a great advantage over other kinds, as they are all readily grown from cuttings. The advantage to the farmer on this score is very evident; for, once having got a few trees of any of these kinds on his place, he can increase his plantation as much as he pleases without expending a cent more on nursery stock.

A mixture of cottonwood and willow would be preferable to a pure plantation of either variety, as temporary conditions frequently are more favorable, in certain seasons, to one kind than another. As to method of planting a spacing of four feet apart each way is probably the best distance. If the trees are set in rows both ways so that a scuffer can be used in any direction very little hand hoeing will be needed. In a plantation of any size it will always pay to mark out the ground before planting in order to get the cross rows even.

#### COST OF THE PLANTATION.

In regard to the actual cost of establishing such a plantation we have the figures from our work on the Nursery Station. Last spring (1903) 25 acres of plantation were set out for test purposes. Five acres of this area were planted with spades at a cost of \$9.99 per acre, and 20 acres were put in with a plough at a cost of only \$6.00 per acre. This, then, shows greatly in favor of using a plough in setting the young trees.

We consider that three years are necessary to establish a plantation of the rapid growing varieties. From actual records kept on the nursery the cost is about as follows per acre:—

1st Year.—Planting, \$6.00; hoeing, \$4.97; horse scuffling, \$1.11. Total, \$12.08.

2nd Season.—Hoeing, \$5.00; horse cultivation, \$1.11. Total, \$6.11.

3rd Season.—Hoeing, \$6.00; horse cultivation, 50 cents. Total, \$6.50.

Grand total for three years, \$24.69.

This sum of \$24.69, then represents,



probably three or four days' labor a year being all that is required. A good plantation of willow, cottonwood or Russian poplar should require no further attention after the third season.

#### RATES OF GROWTH.

In 1905 and 1906 there were set out on the Nursery several acres of plantation, the varieties being the common hardy kinds suitable for prairie growth. Measurements are taken in these plantations annually in order to compare the rates of growth of the different varieties, and also that we may establish the exact cost of a plantation, as this will vary according to the varieties, method of mixing, and planting distance. As soon as large enough the trees will be cut for fuel and in this way it is hoped to arrive at definite conclusions as to the most profitable varieties for a farmer to grow.

The following measurements taken in these plantations last fall (1908) may be of interest as showing the comparative rates of growth during the early years. The measurements represent averages of hundreds of trees selected as being about average trees in the plan-

tations, though we naturally find many individuals far larger than these average figures would indicate.

Variety.	Year planted	Average height, fall, 1908	Average new growth, 1908	
		ft. in.	ft.	in.
Cottonwood.....	1904	12 4	1	0
".....	1906	9 2	2	0 1/2
Willow.....	1904	10 5	1	0 1/2
Russian poplar...	1906	10 0	3	0 1/2
Ash.....	1906	3 8	1	0 1/2
Elm.....	1906	3 6	1	0 1/2
Man. maple.....	1904	9 2	1	0 1/2
".....	1906	7 5 1/2	2	0 1/2
White birch.....	1906	5 9	2	0 1/2
Scotch " pine.....	1905	2 5 1/2	1	0 1/2
".....	1906	2 0	1	0 1/2
Tamarac.....	1904	9 1 1/2	2	0 1/2
".....	1905	7 9	2	1
White spruce ...	1905	2-9 1/2	0	11 1/2

the actual cash expenses for three years in establishing a plantation at our Nursery Station. On an average farm there need be no actual cash expense.

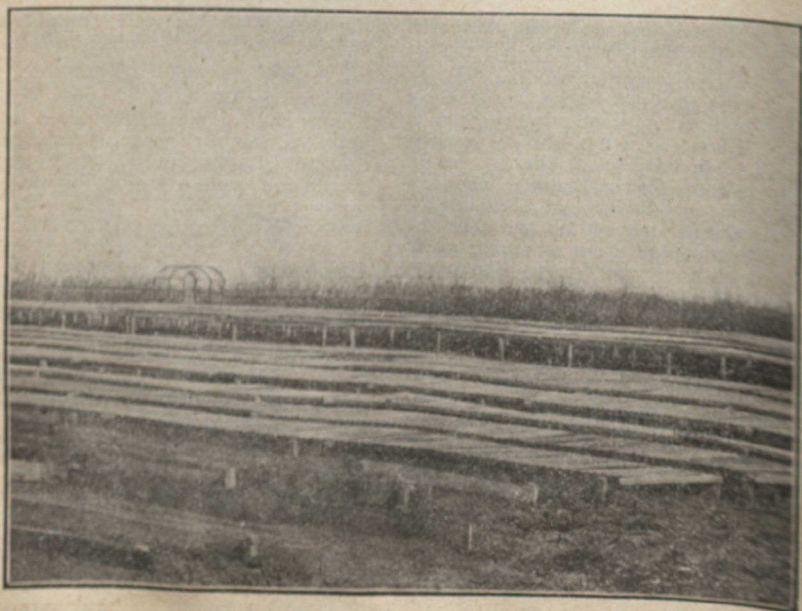


PHOTO BY N. M. ROSS  
Nursery beds of conifers, shaded, at Forest Nursery Station, Indian Head, Sask., in spring of 1908.



At the time of planting all of the above varieties were about 18 inches high except spruce and pines, which would not average more than 9 inches. The trees were planted 3 feet by 3 feet in the case of evergreens, and 4 feet by 4 feet in other varieties.

This table is of value only as showing the relative growth of the varieties for the first three or four seasons. The cottonwood, willow and Russian poplar make the greatest growth in these early years, while the ash, elm, spruce and pine do not grow so fast at the start, but later on make a larger annual growth.

The chief point is this, that the varieties making a rapid growth in the early years can be established in plantations far more cheaply than those of slower growth. For example, our plots of cottonwood, cottonwood and maple and Russian poplar set out in 1906 now require no further hoeing or cultivation; whereas the ash and elm planted in the same year will require cultivation for probably two seasons yet. This is a very important point in determining what varieties to plant.

All we can be absolutely sure of, then, from our present results is that a farmer can establish a thriving plantation of cottonwood, maple, willow, Russian

poplar, or any mixture of these four at a labor outlay, extending over a period of three years, equivalent to \$24.00 per acre. At the end of the third season he should have a plantation averaging from 7 to 10 feet high and likely to make an annual growth of from 18 inches to two feet for the next few years.

Such a plantation properly situated on the farm could be made to serve the dual purpose of shelter and fuel supply. There is no investment that can be made on a farm that is likely to prove so profitable as the setting out of a well-arranged plantation. Buildings cost large sums and deteriorate in value. Plantations cost comparatively little and increase in value at a surprising rate. On the prairies we must take into consideration not only the actual value of the wood produced—which in Europe is all that really counts in a commercial plantation—but also the added home comforts and the very materially increased sale value a good plantation means on any western farm.

Every prairie farm should have from ten to twenty acres planted to trees. Do not try to do too much in one season. One or two acres well planted and properly cultivated will be worth more than twice the area carelessly looked after.

## Service des Agents Forestiers de la Province de Québec.

PAR G. C. PICHÉ, INGENIEUR FORESTIER, DEPT. DES TERRES  
ET FORÊTS DE QUÉBEC.

Dans le numéro de décembre dernier de ce journal, j'ai publié une courte notice détaillant le travail commencé par les premiers agents forestiers de la Province de Québec. J'esquissais également le programme des travaux de l'hiver qui commençait; il sera peut-être intéressant aux lecteurs du Journal forestier de savoir les résultats que nous avons obtenus de nos agents, et cela d'autant plus qu'il a paru dans le *Forestry Quarterly* de mars 1909, sous la signature de Mr. Ellwood Wilson, un article critiquant le Service extérieur de la Province de Québec.

Ainsi que je l'écrivais en décembre dernier, les trois élèves que l'on m'avait confiés reçurent des instructions très sévères concernant la surveillance des exploitations confiées à leur charge. Ils

devaient faire observer à la lettre les règlements de la Branche des Bois et Forêts. De plus, pour forcer les exploitants à exercer plus de vigilance sur leurs hommes, j'avais réussi à faire émettre la circulaire suivante par le Département des Terres et Forêts:

CIRCULAIRE AUX PORTEURS DE LICENCES  
L 16761-'08.

MINISTÈRE DES TERRES ET FORÊTS

Comme on rapporte à ce Département de nombreuses infractions aux règlements des bois, quant à la manière d'exploiter la forêt sur les Terres de la Couronne, j'ai l'honneur d'attirer votre attention sur la présente circulaire et de vous prier de vous y conformer, vous-mêmes et vos employés.



Règlements des Coupes de Bois sur les Terres de la Couronne. Il est défendu, sous peine d'une amende de \$3.00 par souche, de couper aucun pin de moins de 12 pouces de diamètre, aucune épinette de moins de 11 pouces de diamètre, et aucun autre arbre de moins de 9 pouces de diamètre, sur la souche, mesuré, dans chaque cas, à 3 pieds du sol. Il est cependant permis de couper l'épinette de savanne jusqu'à 7 pouces de diamètre, sur la souche, mesuré aussi à 3 pieds du sol.

Le droit de coupe sera prélevé sur:—  
1<sup>o</sup> Les souches mesurant plus d'un pied de hauteur, au-dessus de la naissance des racines.

2<sup>o</sup> Tout le bois ayant plus de 6 pouces de diamètre, laissé dans les têtes ou houppiers.

3<sup>o</sup> Tout le bois marchands employé comme skid, ou longeron, et non sorti de la forêt.

4<sup>o</sup> Tous les arbres laissés accrochés (lodged trees).

5<sup>o</sup> Tout le bois marchand employé pour la construction des ponts ou des chemins dits en "corduroy" (chemins paillés).

6<sup>o</sup> Tout billot laissé dans le bois.  
Les exploitants sont priés d'apporter la plus stricte économie dans toutes leurs exploitations forestières, et de veiller à la protection des bois contre le feu.

(S.) ADELARD TURGEON,  
Ministre.

Je dois dire tout d'abord que nos agents sont arrivés un mois trop tard, étant donné que les exploitations étaient commencées du mois d'octobre et qu'ils n'ont débuté dans leurs inspections respectives qu'en novembre. Néanmoins, ils se mirent à l'œuvre bravement. Le premier travail était de prévenir tous les entrepreneurs; car dans la vallée de la rivière Assomption ainsi que dans celle de la rivière Mastigoche, tout est fait à l'entrepreneur; nous avions commencé, mais pour être justes, il fallait prévenir tout le monde. Ils furent bien reçus à certains endroits mais à beaucoup d'autres, on les accueillit moins bien, ces réformateurs: "On ferait comme avant."

Une fois chacun averti, nos agents recommencèrent leur tournée et en une semaine, sur la seule rivière Assomption l'agent Boisvert imposa pour \$156

d'amendes pour diverses infractions à la circulaire ci-dessus citée. Il n'y a rien de tel avec nos "cannayens" que de tâter leur gousset; lorsqu'ils virent que le jeu était sérieux, ils obéirent tout en maugréant et bientôt tous reconnurent le bien fondé de nos demandes.

Comme il s'est coupé dans ce district au-delà de 35,000,000 de pieds mesure de planche, et que, de l'aveu même de plusieurs contre-maîtres et entrepreneurs, l'économie réalisée cette année a été d'au moins 20% du bois coupé, notre inspection a donné un gain de plus de 7,000,000 de pieds de bois. En calculant ce gain au tarif actuel du plus bas droit de coupe, soit 65c. les mille pieds, nos agents forestiers auraient fait gagnés à la province et au licencié, \$4,550.00 au bas mot.

Il convient de féliciter le porteur de licence, Mr. A. MacLaurin, pour l'aide éclairé qu'il a donné à nos agents. Tous ses employés ont également contribué à rendre notre travail effectif.

De sorte que l'on peut compter que dans cette région, au moins, l'exploitation forestière n'est pas destructive, mais tend plutôt à conserver la forêt et lorsqu'on y abat un arbre, on utilise tout le bois que cet arbre peut donner.

Il serait à souhaiter que nos pères eussent été aussi conservateurs de notre richesse forestière, mais nous ne devons pas imiter leurs erreurs et chercher plutôt à les réparer.

Ces deux vallées renferment encore beaucoup de forêts. Les principales essences sont l'épinette et le pin mélangés à un peu de cèdre et beaucoup de sapin, généralement de pauvre qualité. La majeure partie de cette région est franchement impropre à l'agriculture et si l'on veut continuer et améliorer les méthodes inaugurées cette année, ce sera une des principales sources de bois des environs de Montréal.

Quelques chiffres permettront de voir combien l'utilisation est devenue intense dans cette région. Il y a 10 ans, la limite au petit bout des billots était de 10 pcs.; tout le reste était laissé en forêt à pourrir ou bien à alimenter les feux qui parcourent trop fréquemment notre pays.

On a fait l'hiver dernier 158,313 billots sur la rivière Assomption de ce com-  
comptait—



4,455	billets de 5 pouces	
13,830	"	6
23,287	"	7
30,350	"	8
29,956	"	9
22,137	"	10
13,761	"	11 etc., etc.

Comme on peut voir, on a pris dans les tiges jusqu'à 5 pouces au petit bout. De ce total, on aurait autrefois négligé tous les billets en bas de 10 pcs. et on aurait ainsi laissé en forêt 101,892 billets, ou 64% du total!

Par suite du marché déplorable du bois, les exploitations n'ont pas été aussi considérables que dans le passé et les coupes s'arrêteraient dans ce district vers la Noël. A ce sujet, je crois que l'on devrait cesser les coupes dans cette province vers ce temps-là car durant le mois de janvier surviennent de grandes tempêtes de neige empêchant complètement l'abatage à la hauteur normale. C'est notre intention de punir sans pitié tous ceux qui abattront les arbres à une hauteur dépassant celle spécifiée par la loi. Ce sera d'ailleurs dans leur propre intérêt pour éviter la punition, ils prendront leurs précautions et au jour de l'an, tous les entrepreneurs auront bien rempli leurs contrats.

#### MESURAGES.

Une fois l'abatage terminé, on commence à amener les bois coupés aux dépôts de charroyage. L'habitude est consacrée dans cette province de ne mesurer le bois que lorsqu'il est amené soit sur la glace ou sur le bord des cours d'eau. Cette règle a été imposée par les porteurs de licence à leurs mesureurs et aux entrepreneurs. De sorte, que le gouvernement ne touche des droits de coupe que sur le bois charroyé et non sur tout le bois abattu—à moins que celui-ci ne soit entièrement charroyé. C'est l'intérêt des compagnies et non pas celui du gouvernement, aussi avons-nous stipulé dans notre circulaire que les droits de coupe seraient collectés non-seulement sur les bois charroyés mais encore sur tous les billets laissés en forêt. Cet mesure a eu son bon effet et il n'est demeuré en forêt que 125 billets dans ce district.

Voici d'ailleurs le résumé des divers déficits constatés par nos trois agents durant leurs tournées cet hiver:—  
Bouches en bas du diamètre légal... 90  
Souches dépassant un pied, en hauteur..... 3150  
Bois laissé dans les houppiers..... 4050  
Morceaux ayant plus de 4 pieds de

Longerons non charroyés.....	11
Arbres laissés accrochés.....	8
Bois marchand employé dans les chemins.....	nil.
Billets non charroyés.....	125

J'ajouterai à ce sujet que nos agents avaient des ordres stricts de patrouiller leur cantonnement, et de ne rien renseigner sans spécifier l'endroit exact du délit. Je ne veux point d'à-peu-près; point d'estimation à tant pour cent; il me faut un comptage exact des billets ou houppiers, ou autres choses faisant le corps du délit. De cette façon, nous pouvons soutenir nos chiffres envers et contre tous.

Le mesurage des billets a toujours créé beaucoup de mécontentement. Les entrepreneurs se plaignent souvent à tort ou à raison qu'on les vole. De leur côté, les licenciés assurent qu'ils reçoivent juste le bois renseigné par leurs mesureurs, etc. Nos agents forestiers ont reçu instruction de contrôler rigoureusement les mesurages des "cullers" par des mesurages partiels pris ça et là. Ils devaient chaque fois qu'on leur rapportait une différence dans l'estimation des bois, faire rendre justice à qui de droit. Ce travail demandait beaucoup de tact et de diligence; nos agents se sont acquittés de leur besogne à souhait. Nous n'avons reçu que cinq plaintes durant toute cette inspection et on y a fait droit rapidement.

Sans vouloir dire que les mesureurs ont dans notre district fait un mesurage plus "serré" que dans le passé, je crois que chacun a eu son dû et que la présence et le travail de nos agents ont eu aussi leur bon effet de ce côté.

Je crois donc que nous sommes en droit de dire que la surveillance des coupes dans ce district a été efficace. Elle a donné de brillants résultats et amené une économie plus comprise dans l'abatage et l'utilisation des arbres. C'est un premier acheminement vers l'exploitation raisonnée, j'allais écrire scientifique de la forêt. Les concessionnaires réalisent l'importance des mesures que nous préconisons et Mr. MacLaurin, le directeur de la Société qui exploite ces deux vallées, est venu à la tête d'une importante délégation, demander au gouvernement de Québec que le système de surveillance inauguré chez lui soit étendu à toute la province.

Nota.—Dans un prochain article, nous discuterons le travail fait par nos agents forestiers à la pépinière de



## Reforestation of Waste Lands.

IMPORTANT MEETING IN THE UNITED COUNTIES OF NORTHUMBERLAND  
AND DURHAM, ONTARIO.

A significant meeting—the first of the kind in Ontario—was held at Cobourg on June 9th, when the subject of the reforestation of waste lands was discussed. The counties of Northumberland and Durham, which are united for municipal purposes, have within their bounds about fifteen thousand acres of sand lands lying along the ridge which is the watershed between Lake Ontario and the Trent Valley. The ridge extends from Burketon Station, on the Canadian Pacific Railway, easterly to Rice Lake, a distance of about thirty miles, and varies from half a mile to four miles in width. A magnificent growth of pine was cut or burned off this ridge and for a good many years fairly profitable farming operations were carried on upon

it; but latterly the soil has been growing poorer from year to year until very few farmers are left on the ridge, and these are struggling against adverse conditions which are making them poorer every day. Buildings and fences have very generally disappeared and areas of "blow" sand have developed which are in some cases encroaching on the good land adjoining. The source of the streams flowing into Lake Ontario and the Trent River has been affected so that nearly every spring there is great destruction to bridges and other property by floods, followed by drought in midsummer and autumn.

The council of the united counties of Northumberland and Durham took the initiative in calling a meeting of re-



[Photo by courtesy Farm and Dairy, Peterboro

Drifting Sand in Durham county, Ontario. The hill shown in the cut is being blown away since the trees were removed. The road is blocked, and the sand is destroying orchards and fields beyond.



representative men to discuss the situation at the June meeting of the county council at Cobourg. The meeting was held in the Opera House, about seventy-five representative men being present from different parts of the counties. The chair was occupied by Lt.-Col. John Hughes, chairman of the finance committee. Warden A. A. Powers opened the meeting with a brief description of a drive he had taken through part of the district a few days before with Mr. C. C. Nixon, one of the editors of Farm and Dairy, who also spoke later. Both these gentlemen said it was scarcely possible to exaggerate the evils of the present condition of affairs. The few farmers who were left were eking out an existence trying to grow rye, with some buckwheat and potatoes. The poverty of the land was being reflected in the poverty and hopelessness of the inhabitants. Blow sand was appearing everywhere, roads and fences were being covered up, great hollows were appearing in the middle of once fertile fields and farmers on adjoining lands were endeavoring, in most cases ineffectively, to stop the encroachments of the sand. Great stumps and young timber were to be seen everywhere, showing the suitability of the soil to grow trees, but it was evident that as soon as trees got big enough for fuel they were slaughtered.

This, with pasturing and fires, prevented the re-growth of the forest which alone was the remedy for this state of affairs. A good deal of the land was abandoned and the rest of it, it was held, could be purchased at from one to six dollars per acre.

Selected speakers from various districts and representing different points of view followed. All agreed as to the urgency of the need for a remedy; the only question which seemed to give ground for discussion was whether the work should be undertaken by the municipality, the provincial government or by both of them in co-operation.

The speakers in this part of the meeting included Mr. C. J. Thornton, M.P., Durham, Mr. William Rickard, Ex-M.P.P., Mr. Sam. Clarke, M.P.P. for East Northumberland, Mr. J. J. Preston, M.P.P. for East Durham, Mr. Sam. Nesbitt, M.P.P. for West Northumberland, Mr. C. L. Owen, M.P. for East Northumberland, and Mr. John Miller, ex-warden of the counties.

Among the points brought out by these speakers were: that the government should take means to induce farmers to preserve and properly care for their woodlots; that land unsuited to agriculture should be kept in timber; that the timber taken off these lands if standing to-day would be worth ten to twenty times the present land value; and that, since trees grew rapidly even in apparently the most discouraging situations, reforestation should be at once encouraged; otherwise there would be thousands of acres now covered with vegetation which in a few years will be blow sand.

Prof. E. J. Zavitz, of the Ontario Agricultural College, who is in charge of the reforestation of the waste lands in Norfolk county, told of the work going on there. By the end of this year the department expects to own one thousand acres in Norfolk. Sixty per cent. of this land will re-forest itself without expense for re-planting. All that will be necessary will be to keep out fires, cattle and trespassers. The rest will require re-planting at a cost of approximately ten dollars per acre. In 1905 he had planted Scotch pine in sand lands in Durham. It was said that it would be impossible to grow anything in such soil, but it was now a thrifty plantation. His experience led him to say that it was possible to re-forest any lands we have in Ontario, and that the ridges could be readily re-forested.

Mr. Thomas Southworth, President of the Canadian Forestry Association and formerly Director of Forestry in Ontario, pointed out that it was now becoming seen that old Ontario had too little forest for the best results in agriculture, for proper stream flow, navigation, water-power, etc. He had hoped the establishment of a nursery at Guelph, where forest trees could be obtained free by the farmers, would solve the difficulty, but the results had been disappointing and this year only 400,000 trees were applied for. The provincial government had begun to buy up lands in the sand area in Norfolk. This was a good move; but the method, from the nature of things, was so slow, and the area of such lands in Ontario so large, that it would be many years before the whole province could be gone over. He suggested as a solution co-operation between the municipalities and the



provincial government. The municipalities might be given power to acquire lands for forestry purposes and such lands might be worked under the direction of the Provincial Bureau of Forestry. By this means efficient expert management could be secured at low cost. The municipalities would bear the cost of management, but as soon as there were profits above the cost of management these would be returned to the municipalities. He anticipated that these municipal forest reserves would prove very profitable in time to come. In the counties of Northumberland and Durham there were 15,000 acres of sand lands which it had been estimated could be secured at an average of \$5 per acre, a total of \$75,000. This on a four per cent. basis would require about \$4,500 per year to pay off interest and principal in thirty years. This was not a large sum for a municipality which had an assessment of \$25,000,000. Stress had been laid upon the fact that this was a work for the good of posterity, but he pointed out that in a very few years the first good effects would be felt in more regular stream flow and in the stopping of drifting sand.

Dr. B. E. Fernow, Dean of the Faculty of Forestry of the University of Toronto, laid down the general proposition that governments should re-forest waste land just as they assisted railways or undertook any other internal improvement on wide lines. In support of this he gave three reasons: (1) it was improper public policy to allow waste lands to remain so if they could be made of profit to the community; (2) our timber resources are not inexhaustible, but relatively small, hence the wood grown on these wastes would be needed when ready for harvest; (3) tree growing is too slow a business for individuals to undertake. On this latter point he gave the figures worked out by professors and students of the forestry course of the University of Toronto in their woods camp on the south shore of Lake Nipissing this spring. These showed that in the forest it took from 180 to 200 years to grow on good soils a twenty-inch red pine tree—a species specially adapted to these sand soils—such as lumbermen require. On poorer soils it took from 250 to 260 years to attain this growth. White pine, under the same conditions on good soils, attained a diameter of 18 inches in 100



[Photo by courtesy Farm and Dairy, Peterboro  
Land which should be in timber still. This picture of a field in Clarke township, Durham county, Ontario, shows that land which once grew magnificent timber is now a waste of blowing sand. Timber would grow again if given a chance.



years, 20 inches in 110 years, and after that grew at the rate of one inch in thirty years.

France had done more than any other country in the way of reclaiming waste lands. In south-western France by 1865, 200,000 acres of shifting sands, much like those under discussion, were planted at a cost of \$2,625,000. The government then sold not quite half the lands for a little more than the cost of the whole, and the remainder was now valued at \$10,000,000 on the basis of cutting returns. In the desert of Landes 1,750,000 acres had been reclaimed at a cost of \$10,500,000. It was now valued at \$96,000,000, with an annual revenue at \$8,000,000. Two hundred thousand acres of limestone lands had been reclaimed and reforested at a cost of \$2,000,000 and were now worth \$10,000,000. Altogether, about 2,300,000 acres had been reclaimed at a cost of \$15,000,000, and these lands to-day were considered worth \$135,000,000, yielding a revenue of about 7 per cent.

German forests were also referred to as producing a revenue of \$2 to \$5 net per acre per year. Prussia had a revenue of \$18,000,000 from its 7,000,000 acres of state forests. For the last forty years it had followed a policy of waste-land planting, acquiring the lands by purchase or exchange. The average cost of these lands had been \$17 per acre, and the cost of planting was about the same. By 1902 \$6,000,000 had been spent for this purpose and then another appropriation of \$25,000,000 was made to continue the policy. Dr. Fernow pointed out that what made the profits of such an undertaking still more sure was the steady increase in the price of lumber. In Germany the average annual increase in the price of lumber for the last one hundred years was  $1\frac{1}{2}$  per cent, and for the last ten years 2 to 3 per cent. This was the rule all over the world. While the reclamation of waste lands was a good proposition, a still saner one was to abstain from creating waste lands. Five thousand acres of naturally grown young timber could be guarded by two men employed all the year round for \$1,000 per year, or a

total with interest of \$112,797 in fifty years; while to plant the same at \$10 per acre and guard it would cost over \$200,000 in fifty years. This emphasized the fact that young trees have value, a fact that was too often overlooked in the forest fire service by individuals and by governments.

All the addresses were listened to with deep attention, and Dr. Fernow's figures aroused a deep interest. Mr. James Lawler, Secretary of the Canadian Forestry Association, spoke briefly on the advantages of organization in this work and explained the functions of the Association. The closing business of the meeting was the passing of a number of resolutions. These affirmed that there was a large area of waste land in the counties dangerous to surrounding lands and that this should be taken over and re-forested; that efforts should be made by the council of the counties to secure the co-operation of the provincial government in working out a policy of reforestation; and appointing a committee to arrange for a series of meetings next autumn to inform the ratepayers on this subject, the series concluding with a monster meeting at the December meeting of the council of the counties when definite action is to be taken.

#### ANOTHER FOREST RESERVE IN ONTARIO.

A tract of one million acres in the Rainy River district has been set apart by the Ontario Government by Order-in-Council, on the recommendation of Hon. Frank Cochrane, Minister of Lands, Forests and Mines. The tract is situated between Fort Frances and Port Arthur, and half of the area is comprised in Hunter's Island. The name chosen for the reserve is the "Quetigo Forest Reserve." The tract contains a large quantity of pine land, and will be a fish and game reserve as well as a forest reserve. The Minnesota state government has a large reserve just across the boundary. The total area of Ontario reserves will now be about 12,700,000 acres.



## Shade Trees for Prairie Cities.

BY A. KNECHTEL, INSPECTOR DOMINION FOREST RESERVES.

A city may have its public buildings, hotels, churches and residences as magnificent as possible, and yet it will never be truly attractive unless made so by parks, boulevards, streets and lawns properly planted with trees.

City adornment does not come about haphazard. It needs strenuous effort, well directed, and artistic sense of a high order. Many cities appoint a commission whose sole duty it is to improve the city from an æsthetic point of view. They lay out new parks and boulevards and improve those that already exist. In the newer parts of the city they determine the width that streets shall have and the portion of those streets that must be reserved for the planting of trees. They decide the species of trees to be set, and give attention to the manner of planting, guarding and caring for them.

For the purpose of planting the city with trees, each city supports a tree nursery. In some places property owners are furnished trees free of charge, in others a price is fixed, which covers merely the cost of raising the trees. Parks, boulevards and streets are considered public property and are planted at public expense. Bulletins No. 1 and 2 of the Forestry Branch, Department of the Interior, Ottawa, give details regarding the making and care of such a nursery. A competent man should be employed to manage it, however.

In the Canadian prairie provinces the following trees are suitable for planting:

Broadleaf trees—Canoe birch, European white birch, cut-leaf birch, green ash, mountain ash, American elm, cottonwood, hackberry, Manitoba maple, Russian poplar, balm of Gilead, silver-leaf poplar, golden willow, sharp-leaf willow, and laurel leaf willow. (The Ontario white maple might also be grown).

Evergreens—Lodgepole pine, Scotch pine, jack pine, white spruce, Colorado blue spruce, Engelmann spruce, Norway spruce. (Western white pine might possibly do well).

Deciduous Conifers — Tamarack, western larch, European larch.

Shrubs — Caragana, red dogwood, buffalo berry, black-berried elder, flowering currant, Tartarian honeysuckle, mountain or Ginnala maple, purple lilac, white lilac, Persian lilac, Jasikea lilac, Van Houtte's spirea, Reeves' spirea, snowball, Russian choke cherry, sumach, service crab, Rugosa rose, Ayrshire rose, Carmen rose.

Climbers—Virginia creeper, panicked clematis, hops.

### BIRCH, ASH AND MAPLE.

Considering the hardiness of the white birch and the rapidity with which it grows, I wonder that the tree has not been planted more in these provinces. It extends northward to the Arctic circle. The color of the bark, the hardness of the wood, and the toughness and gracefulness of the branches make it a much more desirable tree than the poplar. In the winter, when the leaves are off, the dark branches contrast most charmingly with the white trunks. Of the European white birch there are three main varieties. The ordinary tree of the woods has branches quite similar to those of the Canadian tree. The weeping variety has very long slender branches that hang down almost vertically. Then there is a cut-leaf variety, the leaves deeply intersected. All three varieties should be hardy in the Northwest.

The green ash is by some botanists considered only a variety of the Ontario white ash. It is native to Manitoba and Saskatchewan. An interesting thing about the ash and Manitoba maple is that the leaves are compound and the fruit has long wings. It grows rather slowly in this country but is quite hardy.

The Manitoba maple or box elder has been planted more extensively in the northwest than any other tree. The attractiveness of the streets of Portage la Prairie is due to this tree. It is a mistake, however, to continue to plant the tree to the exclusion of better species. Winnipeg, when about the size of Portage la Prairie, had little else than Manitoba maple, but now there are many streets planted with elm, ash and birch.



The box elder is a shrub, which by trimming has been forced to take the form of a standard tree.

#### ELM AND HACKBERRY.

Have you ever noticed that the trunk of an American elm divides into two branches and these again into two and so on down to the smallest branches? This habit, though interesting, is sometimes ruinous to the tree since the weight of each half causes the tree to split. To prevent this a bolt is sometimes run through the two main branches. The elm grows slowly in this region but is hardy and likely to be long lived.

The hackberry is not native to the Canadian Northwest, but in North Dakota it is perfectly hardy. It has a leaf formed much like an elm leaf, but it is very rough to the touch. The branches are quite like those of the elm. The outer bark when the tree is about six inches in diameter breaks into small blocks resembling warts. The fruit is a berry. The tree, which is a native of the United States, is often called the Lost Elm, as it grows very sporadically in the northern states. In New York, however, I have seen large groves of this species.

#### MOUNTAIN ASH.

The mountain ash is a beautiful tree. The dark green foliage of summer and the red berries of autumn are a delight to the eye. The smooth bark, too, with its long lenticels is very attractive. There is no other tree native to the prairie provinces that has such beautifully colored foliage in autumn.

Many people have an idea that the autumn colors are due to the frost. Such is not the case. In the fall of 1902 I collected autumn leaves in New York City for five weeks before the frost came and for one week after the frost. I observed that the colors were rather injured by the frost.

Nor do the leaves fall on account of the frost. A corky, brittle layer of cells forms at the base of the leaves, and the wind breaks off the leaves. The hickory usually sheds its leaves before there is any frost.

#### POPLARS AND WILLOWS.

Many people object to the cottonwood because it throws off so much

down in the spring. Cottonwood, balm of Gilead, poplar and willow trees are said to be diœcious, that is, some trees are male and others female. It is only the female trees that are so troublesome in this respect. If the trees were raised from cuttings and cuttings from male trees only were planted, the cottonwood as an ornamental or shade tree would be quite desirable. The tree is native to these provinces. The cottonwood is a kind of poplar and like all poplars the branches are somewhat brittle. This brittleness probably accounts in part for the distribution of the poplars along the streams. The twigs break off easily, float down the stream, stick into the banks and begin to grow. Willows are much propagated in the same manner.

The Russian poplar is an introduced tree. It seems to be doing quite well in some western cities. In some parts of the country, especially in Alberta, it rots early and is very subject to insect attack.

The balm of Gilead is native. It is a good tree to plant in this climate but many people object to it on account of the roots spreading so widely and sending up suckers.

The silver-leaf poplar is by many people called the silver maple, probably on account of the leaves being shaped quite like the maple. The poplars can easily be distinguished from the maples, as the former have their leaves and twigs arranged alternately on the branch; the latter opposite. The leaves of this tree have the lower side covered with a thick, white down, which is quite striking as the leaves flash in the sunlight. The leaves are the chief beauty of the tree. The branches are inclined to spread much, which gives the tree an unshapely appearance. The species was introduced from Europe.

The willows are likely to be used in this country, as in the east, chiefly for hedges and wind-breaks. The evergreens contrast beautifully with the broadleaf trees in summer and lend a charm to the city in the winter, and should be encouraged as much as possible, especially in the parks and private lawns.

#### EVERGREENS.

The white spruce is native to the province and is perfectly hardy when





Windbreak of Golden Willow. Planted as two-year-old rooted cuttings in spring of 1905, photographed in autumn of 1908. Forest Nursery Station, Indian Head, Sask.

planted in the city. It prefers a sandy loam.

The Colorado blue spruce is a beautiful tree to plant on lawns. There are two distinct varieties of this tree; one has green foliage, the foliage of the other is decidedly blue. The blue variety is the one to plant. This tree is a native of the Rocky Mountains. Many individuals of this species have a most delightful fragrance.

The Engelmann spruce is also a tree of the Rocky Mountains. It has blue-green foliage and is very handsome.

The Norway spruce is a European tree with cones four or five inches long. It has been widely distributed by the nurserymen, but is no better than our native species. This is sometimes called the weeping spruce, as the long slender twigs of many individuals hang down almost vertically. This is an excellent tree for planting in cemeteries.

The Lodgepole pine is a very desirable tree for planting in the northwest. It clothes the whole eastern slope of the

Rockies and comes east as far as the Cypress Hills in southern Alberta. The trees bear cones very early. I have seen trees not more than two feet high with several cones. No evergreen restores itself better after fire than the Lodgepole pine. The cones hang on the trees many years without opening. Fire comes along and kills the trees; but, the heat opening the cones, the seed falls to the ground uninjured, and there comes up an impenetrable thicket of young pine. The tree is straight and tall and the foliage is a beautiful green. It is a much handsomer tree than the jack pine of the east.

Scotch pine has been distributed widely in this country by the nurserymen. As its name implies, it is a European species, but it is not indigenous to Scotland alone. The Germans call it the "Common Pine," as it covers the sandy land of that country. It is distributed all over northern Europe. It is no more hardy in this country than the lodgepole pine and is not so handsome.



## WHEN TO PLANT.

Trees should be planted in the spring as soon as the ground is thawed out. At this time the sap will just have begun to flow and the tree will immediately send out new roots. Moreover this is about the time when the rainy season begins and the trees are likely to be sufficiently watered. There is very good reason why trees set in the fall do not live through the winter. When a tree is transplanted the roots cannot be put into such close contact with the soil as they had before the tree is lifted, and the wind blowing the tree back and forth all winter tends constantly to loosen the roots. Hence the tree cannot take moisture from the soil. In prairie regions the air in the winter is very dry, and much moisture is evaporated from the trees. This moisture not being replaced through the roots, the tree dies.

## HOW TO PLANT.

Trees should be planted in well drained soil. They cannot thrive in land constantly saturated in stagnant water. The hole for the tree should be dug much wider and much deeper than just sufficient to take in the roots. The soil with which such hole is afterwards filled will conserve moisture better and allow the roots to spread better than the hard unbroken ground. In this dry climate the hole should be filled with water two or three times, the water being allowed to soak into the ground.

Enough good rich earth should be brought to the side of the hole to fill it in setting the tree. Any good farm soil is sufficiently fertile for trees. Soil brought from a field where a good crop of wheat has been raised will serve the purpose.

In setting the tree fill up the hole with good earth sufficiently so that the tree will stand about two inches lower than in the nursery. Then set in the tree, throw some earth over the roots. Shake the tree up and down. Work the soil carefully under and around the roots with the hand. Throw in a little more earth and tramp it down. Then take a good pounder, and, as the hole is being filled up, pound the earth most thoroughly. About a foot and a half away from the tree leave a depression

to hold water. Do not throw water into the hole while filling it in, but after the tree is set water thoroughly. In a dry time water thoroughly every three or four days after sundown.

## WHERE TO GET TREES.

Native trees can, of course, be obtained from the woods, though such trees are likely to be costly as they require much time to get them, and they do not live so well as nursery grown stock. Forest grown trees are likely to have a few long slender roots, each with a bunch of fibrous roots at the end which will probably be cut off in lifting the tree. Nursery stock is transplanted in the nursery and this transplanting causes the roots of a tree to become a compact mass of fibres. Nursery stock obtained from the United States is likely to be tender. If trees are obtained from a nursery they should be purchased from the Canadian Northwest.

In getting a tree from the woods, it is advisable to take along a piece of burlap. This should be dipped in water in the woods and as soon as the tree is lifted it should immediately be placed upon the burlap and the burlap wound carefully about the roots. Whether trees are obtained from the woods or the nursery, the roots should not be allowed to become dry for a single moment. It is better to select a tree grown in the open. Trees much shaded in the woods are likely to prove tender when planted in the city. Before the tree is lifted it is well to mark it on the north or south side so that it can be placed in the same position with regard to the points of the compass as it held in the field or woods.

Broadleaf trees should be trimmed. It is not necessary to cut the tree down to a pole. Parts of the larger branches should be left to give the tree a shapely head. Branches removed entirely should be cut close to the trunk or the branch on which they are borne. Wounds should be made vertically or so that they will face the ground. They should be left as smooth as possible and should be covered with lead paint.

## SUBSEQUENT TREATMENT.

Constantly cultivate the soil around the tree until the end of August. Do not cultivate after that time, as the



tree must be allowed to stop growing so that it will harden for the winter.

In the fall just before the ground freezes the soil should be thoroughly saturated with water.

Trees should be protected from dogs and other animals by placing guards around them.

Trees can be protected against insect attack by spraying with London Purple or Paris Green or a mixture of these. A first spraying should be done about the middle of June. Then in two weeks the trees should be sprayed again and in two weeks more they should have a third spraying.

## Forestry in Canada.

(A paper read by Mr. R. H. Campbell, Superintendent of Forestry, before the Dominion Land Surveyors' Association.)

Forestry is an art long practised and now has reached the position of a science with defined principles and with many well determined results of scientific investigation. The beginning of forestry was the protection of woodlands for the preservation of game for the king's sport and the forester was the king's huntsman. A forest at that time was not necessarily covered with trees; it was merely a hunting ground. Later the supply of wood became the chief purpose of the forest and from that time dates the inception of scientific forest management. To produce the best wood and the most wood was the problem. Then began the enquiry into the productiveness of different tree species; the relation of soil and climate to their growth and development, their relative vigor of growth and fitness to survive in the struggle for existence which characterises tree life as all other, the enemies, insect, fungal or other, which prey upon them. In short, man's intelligence had placed before it for solution one of the greatest and most interesting problems of nature and economics, the study of a life, varied, multifiform, fascinating to the eye and to the mind, and the directing of that living force to meet the needs and increase the happiness of mankind.

The forest has always had its mystery and its magic, whether it towered in sombre grandeur over the rites of some heathen or Druidic festival, whether it was woven into the canoe of some Indian Hiawatha, or uttered its voiceless but irresistible call to the *coureurs du bois* and the backwoodsmen, and the call of the wild is still strong enough to draw men from ease and comfort to thread the mazes and tangles of its

forests and *brulés* and to brave the danger and discomfort of isolation, exposure—and even mosquitoes. From the days of the French pioneer and of the hardy woodsman who cleared the fertile acres of the Province of Ontario, the forest has been inwoven with the history of Canada and nature proclaims by the vast areas of rocky and sterile land and the great watersheds they dominate that if the Dominion is to attain its highest prosperity and best development, the forest must be preserved and perpetuated.

### THE REPRODUCTION OF THE TREES.

What does the forester enquire into? First is the life history of the tree. Where does that begin? You have seen sprouting from the stump of an elm, or chestnut, or maple, shoots which finally develop into trees; you have seen the poplar sending up suckers through your lawn, but the normal method of reproduction, and, in the case of practically all the coniferous trees the only one, is from seed. The processes of nature are patient and sure, but never hurried. The tree must begin with the seed. The crop that we are reaping now was mostly sown a century or two ago, the half mature crop we may yet see harvested, but the crop that is now being sown none of us shall live to see gathered in in its maturity. The first fact for the forester is that he must have a seed supply.

In looking for it he learns something more. Poplar and birch and cherry and hardwoods generally have a crop of seed every year, but pine and spruce and tamarack only every three or four years. So when land is denuded of forest by



cutting or fire, poplar, birch and cherry first fill up the ground, though later they may be followed by pine and spruce if there is any seed left uninjured in the ground, or if there are any seed trees to furnish a supply. If the heavier canopied hardwoods, such as maple, beech, etc., are left, the chances of the coniferous forest are poor, as the sprouting qualities and frequent seed supply give the hardwoods the advantage. If, however, the first growth is only poplar, cherry and white birch, the conifers will in time overtop them and re-establish their supremacy. Recurring fires, however, will destroy this young growth and leave the case for the coniferous forest hopeless by natural processes. Such a condition exists over the greater portion of the Riding Mountain Forest Reserve which has been carefully examined by the Forestry Branch. Spruce has, through frequent fires, been replaced by poplar, and there is not now sufficient of the former tree to provide a seed supply for reproduction, and, as a matter of fact, over the greater part of the reserve there is practically no new growth of spruce. Similar conditions exist and no doubt have been noticed by many of you in other parts of the Dominion.

The sowing of the seed is provided for by two methods, the natural and the artificial. These have been worked out thoroughly in European countries—with the greatest thoroughness in Germany, but also in Austria, France, Italy, Norway, Sweden and Switzerland. The natural method provides for the leaving of seed trees (mature trees from which the seed may scatter), either by selection or strip cutting. In the selection method the trees are gradually thinned out, there generally being two thinnings before the final cut. The second thinnings open the ground to the light and the seed which then falls has an opportunity to germinate and finally, when the last stand is removed, there is a good growth of seedlings coming on. In the strip method the forest is divided into strips corresponding in number to the age of maturity of the forest. The first strip is cut clean and seeds in from the second. Next the second is cut and seeds in from the third, and so the cycle goes on until at the final cutting of the last strip the first strip is again ready for cutting. But these methods imply that the seed years must be watched and the

cutting made to correspond. This is the easiest and the cheapest method, and it is to natural methods we must look for the reforestation of the greater part of Canada, as the cost of any other method would make it impracticable.

Artificial methods are planting and sowing. Both involve the gathering of seed, which is extracted from the cones in a drying house such as has been established by the Forestry Branch at Indian Head, where the cones are spread on trays in a warm temperature which causes them to open and shed the seed. This is afterwards winnowed and cleared of its wings. In the planting method, which is adopted largely in Germany, the seed is sown in beds in a nursery and, after one transplanting, the trees are, at three of four years of age, finally set out in the forest. This is, however, a slow process. A German forester who plants forty acres in a year is doing well, but it would take a long time at that rate to make an impression on Canada's vast areas. It is also expensive, even with the Germans using female labor at 37½ cents per day, and in Canada would be much more so. Considerable planting has been done in New York State at ½ cent per tree, or about \$6 per acre. Fancy replanting Northern Ontario or Quebec at this rate per acre!

Sowing may be done by broadcast seeding or by the seed-spot method. Broadcast seeding is the cheapest, but is wasteful of seed, as it is most like natural seeding which "of fifty seeds brings but one to bear." It is best done on the snow in spring. In the seed-spot method the mineral earth is stirred up by a hoe in spots a few feet apart by one man, while another follows dropping a few seeds into the prepared place and pressing the earth down on them with his feet; or the seeds may be dropped on the surface of the ground and covered with a handful of sand. Trial of this method was made last year on the Forest Reserves in the West with fair results. A good supply of seed was obtained last fall and it is proposed to extend the experiment during the present year.

#### FACTORS IN TREE GROWTH.

When the seed germinates it first strikes downward, forming a root to give the seedling a firm hold on the ground and supply it with moisture. Pushing





[PHOTO BY A. KNECHTEL

Planting on Dominion Forest Reserve.

its way through the soil partly by chemical action at the root tips and partly by the force of the growth and development behind, the root system must develop in proportion to the tree crown. If the root is too small it will fail to support the tree and to supply adequate moisture to make up for the transpiration from the crown. So the cutting back of the roots when transplanting trees necessitates the cutting back of the crown. And it may be mentioned that the small root hairs are the organs of absorption, and, as these are quickly dried out and killed in the sun and air, the roots of trees which are being transplanted should be carefully protected from exposure and be kept moist.

While the chief function of the root is to supply moisture, they require air. Even the bald cypress of the southern swamps must push up its great root knees above water to get an opportunity to breathe. The effect of lack of aeration of the roots is noticeable in the fringe of dead trees which surrounds many of the lakes in the lumbering region where the waters have been raised for any length of time above their

normal height by lumbermen's dams. Trees accustomed to grow in wet and swampy places develop a spreading and shallow root so as to keep in reach of an air supply. The knowledge of the root structure is important to the forester. Some of the most beautiful theoretical plans for the management of spruce forests in the Eastern United States by cutting by the selection method were spoiled by failing to remember that the spruce is a shallow rooted tree, and the pleasing stand of seed trees left to provide for reproduction were levelled to the earth by the first windstorm.

By what force the water is drawn up through the root and elevated one hundred, two hundred, three hundred feet or more in the air is one of the mysteries of vegetable physics. Atmospheric pressure is not capable of raising water above forty feet. Root pressure, whatever that may be, or, if it is only osmosis, that force by which one liquid is absorbed through a membrane by a stronger chemical solution, is inadequate. The pressure of the air bubbles in the cells of the tree trunk, the chemical or physical activity of the living cells, the pull exerted by the osmotic action of



the leaves—all these have been put forward in explanation and probably each has an influence, but we are still face to face with one of the most interesting unexplained problems of nature. The quiet, forceful and economical way in which nature elevates her water supply is no less a locked secret to the scientist than it is to the city engineer and the plumber.

The leaf, the great digestive apparatus of the tree, is not less important than the root. Requiring sunlight to carry on the process of disintegration of the substances on which it feeds, it spreads out its canopy of leaves arranged ingeniously and methodically in such a way as to present the largest surface to the light. Coniferous trees make up for the narrowness of their leaves by their greater number. Carbon derived from the air is the main food of the tree, so that it requires little but moisture from the soil and can therefore live on poor soils, lands useless for agriculture. The Norway pine and jack pine flourish on sandy soil useless for other vegetation. The white pine, the spruce, the maple, may be found grasping the almost bare rock with their roots and finding a livelihood where other vegetation would fail.

The influence of light on tree growth is one of the most important factors the forester has to consider and the trees have been classified as tolerant and intolerant according to their ability to grow in the shade. For Canadian species the list might run as follows, commencing with those most tolerant of shade: hard maple, beech, hemlock, spruce, balsam, soft maple, birch, white pine, black cherry, ash, bird cherry, poplar, tamarack, jackpine, red pine. This knowledge is important, for the forester must give the degree of light which will favor the species he wishes to bring in. Spruce and pine will not flourish under the heavy crowns of the hardwoods, and spruce would have the advantage over pine in heavy shade.

The water, with traces of mineral salts, coming from the roots, and the carbon compounds from the leaves are built up into wood cells, the active work of tree building going on in the cambium or outer cells of the wood next to what is termed in general phrase the bark. These active cells are large and thin-walled and form the sapwood of the

tree. The heartwood is formed of such cells which have gradually thickened their walls and contracted their apertures and which are to all intents and purposes dead. In the earlier years most of the wood is sapwood, in the later years the heartwood is the greater; and as this latter is much more valuable for lumber a strong argument is found in this fact for allowing trees to grow to a mature age. The annual rings, so characteristic a feature and one which enables the forester to determine the age of trees, are the result of the difference between the active spring growth of cells with thin walls and large apertures contrasted with the wood of the later summer with contracted thick-walled cells.

When does the tree reach its best development? With spruce and pine the rotation adopted in Germany is from sixty to eighty years, though trees required for special purposes may be left longer. Trees which are now being cut in the mills at Ottawa for lumber will run between one hundred and two hundred years of age. A growth under forest conditions of an inch in diameter in five or six years on an average is the best that can be expected.

“For Nature, also, cold and warm,  
And moist and dry, devising long,  
Thro’ many agents making strong,  
Matures the individual form.”

Examples of individual trees grown on open lawns or other favored places in short periods are not a criterion for forest conditions any more than are trees grown in wind-swept or other unfavorable conditions. Growth will vary under conditions of moisture, soil, etc., but anyone who expects the renewal of a spruce or pine forest in thirty years or any such period is hugging a delusion, a general acceptance of which would be disastrous.

#### ENEMIES OF THE FOREST.

The forest has many enemies. Wounds caused by fire or other agency give entrance to fungi, which finally work through the tree, breaking down its structure and destroying its usefulness, as has occurred with a large extent of poplar on the Riding Mountain Forest Reserve. Insects have done a like service for one of the few remaining patches of spruce on that reserve.



Storms break the trees, avalanches of snow overwhelm them. But the greatest agent of destruction, the one which has left its mark broad and deep over the forests from the Atlantic to the Pacific, is the forest fire. The scene of towering rampike and tangled *brulé*, of barren rock and dreary sand waste, which characterises so much of our forest districts, is a sad commentary on the wastefulness and prodigality with which we deal with the resources nature has supplied to us. The trail of the prospector, the advance of the settler, the construction of the railway, all have been the precursor of the fire, and, even with the greater interest awakened at the present day, it is doubtful if the destruction will be permanently and effectively stayed.

All the provinces, as well as the Dominion, now have fire patrol systems which have done good work, but the public are still careless, the railways are a serious danger, and the fire ranger, even if he be honest and capable, has generally too large a territory to cover. Besides, it is impossible to supervise effectively the work of the fire ranger, and naturally the work is not always done thoroughly and honestly.

In the prevention of fires, you, gentlemen, going out into, or into the neighborhood of, the forested districts of Dominion territory can be of assistance by impressing the fire danger on those you meet and by giving us information as to the working of the protective system in the districts through which you travel. I have to acknowledge valuable information and suggestions already received from members of your profession and will be glad to receive such in future. We have not by any means attained perfection and we welcome any fair suggestion or criticism.

In return let me give a hint from an experience of one of our fire rangers. He discovered a fire one day a little off a survey line, and, on extinguishing the fire and making a careful examination, he found that it had eaten along a bog underground from a fire on the survey line. The surveyor in charge was a careful man and had given strict instruction about extinguishing fires, and it was thought that this fire was extinguished. It shows the need of constant watchfulness and thorough measures for extinguishing fires.

Another respect in which the members of your Association may be of assistance to the Forestry Branch is by their reports on the timber in the districts surveyed by them. Valuable reports are being furnished by some surveyors and these reports are being plotted on sectional sheets. Such reports accompanying returns of survey would in time give a good idea of the timber in the districts covered.

#### HOW MUCH WOOD DO WE USE?

But why should the public take an interest in the preservation and propagation of the forests? What purpose do they serve?

In the first place they supply wood material. And wood is useful for so many purposes that it would be idle to attempt to enumerate them. The floors we tread, the seats we sit upon, the finishing of our houses, the newspapers we read, and a thousand and one conveniences come from the forest. And in spite of all the substitutes that have been found for wood the total quantity used is steadily increasing as well as the total per head of population.

The figures of consumption in Canada are not very reliable or complete, but taking the total of the last census, 1901, the product was about nine billion feet board measure and the annual consumption now is probably near to double that quantity. Of this quantity about four billion feet board measure was for sawing into lumber and therefore from trees of a size suitable for that purpose.

In the United States the consumption for the year 1907 was forty billion feet board measure of sawn lumber and the total of all forest products would bring the figures up to probably five times that amount. It is considered by the United States Forest Service that that country has reached its maximum of production and each year hereafter will see a decline, the deficiency resulting from which must be supplied elsewhere.

Europe as a whole is an importing continent. I am not able to give the present quantities, but for the period from 1895 to 1899 the total net imports of European countries were 12,012,500,000 feet board measure, Great Britain leading with more than half and Germany coming second with over one-



fourth. The total net exports were 11,347,500,000 feet board measure. Most of this was from Russia, Sweden, Austria-Hungary, Norway and Roumania. Russia was expected to increase its export and probably also Sweden, but the others were expected to decline, and I understand that Sweden has not kept up the promise of that time. The net deficit in the European supply was at that time, therefore, close to two billion feet and it is certainly now much greater.

#### FUTURE PROSPECTS.

If Canada is called on to supply any great share of the deficiency of the product in the United States and Europe—and there is no place else to look—how are we prepared to do it?

The quantity of pine estimated as standing in the Province of Ontario is twenty billion feet and in the Province of Quebec forty billion feet, the latter probably an over-estimate when compared with that of Ontario. The pine cut of the United States last year was 4,192,708,000 feet board measure. The pine cut of Michigan, Wisconsin and Minnesota in 1892 was eight billion feet board measure and is now two and a half billion feet. To make up even the shortage in the product of these States would mean that our supply of pine would last ten years.

Outside of yellow and white birch, maple and some red and burr oak, our hardwood supply is gone and would probably not total more than twenty billion feet board measure.

Of spruce, balsam and hemlock suitable for lumber we may have a stand of three hundred billion feet and the British Columbia forests of fir, cedar, spruce, pine and other western conifers have been put at 320,000,000,000 feet.

If the Dominion, including quantities exported, reaches even half of the production of the United States, the supply of trees for lumber is far from inexhaustible, and in fact the supply of virgin forest could not last much over fifty years, making no allowance for growth in the meantime.

There are large quantities of spruce, balsam, and poplar in the northern forests suitable for pulpwood but to what extent they can be saved from fire is uncertain. The distances are great and the lands not easily accessible.

The species in question are easily injured by fire and in a dry year the present methods of handling the situation are inadequate.

Our great hope, however, for the immediate future is in the saving of the young trees now well established or half grown. If this is not done Canada cannot retain supremacy as a forest country.

#### HOW FORESTS INFLUENCE WATER SUPPLY.

Another great purpose for which the forests should be preserved is for their influence on the water supply. What degree of influence the forests have on the water supply is not determined. Experiments to determine whether they have any effect on precipitation have been made in Europe with conflicting results. German experiments leave the question uncertain or decide it negatively. French experimenters decide that the forests do exert an influence. One of the great difficulties in obtaining accurate results is the defectiveness of the rain gauges and the varying influences of the winds and other forces on the quantities of water reaching them. My own opinion is that considerable areas of forest in a level country have an influence, though slight, due probably to the cooler atmosphere over them in summer.

Their sheltering effect on the snow-fall in the spring and the mechanical obstruction which the trees, roots and cover of the forest floor present to the run-off of water is undoubted, though not unquestioned, and, thus assisting towards the regularity of the stream flow, present a strong argument for their preservation. The use of water for irrigation, domestic and municipal purposes, and power plants is increasing rapidly, and on the regularity of the water supply the future prosperity of many communities and the development of industries largely depend. In the irrigation district of southern Alberta and Saskatchewan I hope that the observations of stream flow and water supply which are being carried on by the irrigation service, and which are now being arranged on a somewhat adequate basis, will be carried on co-ordinately with the observations of the forest officers on the eastern slope of the Rocky Mountains and in the Cypress



Hills, and that as a result definite data as to the influence of the forests on stream flow may be obtained. Such observation may give us information as to how the disastrous floods from the eastern slope of the Rocky Mountains may be prevented, or, at least, may enable us to give warning of their coming, and prevent some of the great loss which frequently occurs.

#### OTHER USES OF TREES.

Forests protect the soil from erosion, provide a shelter for game, and pleasant resorts for summer outings, and so in various ways minister to the good and increase the happiness of the people.

Woodlands also protect the farms from wind and the Dominion Forestry Branch have assisted the prairie farmers by furnishing them with trees to form shelter belts and wood lots. Thirteen million trees have so far been distributed from the nursery station at Indian Head and two million and a half are ready for distribution this spring. The comfort and beauty and homelikeness resulting from the planting of trees around the homestead can only be appreciated by those who have been able to contrast the attractive tree-sheltered cottage with the house set bleak and bare and unadorned upon the windswept prairie.

#### FOREST POLICY IN CANADA.

What are the main lines that should be followed in the forest policy of Canada?

First comes a fire patrol system. The patrol system has been instrumental in reducing the loss by fire, and, even with the large districts to be covered and the lack of supervision, has been of great benefit. I fear, however, that in dry seasons it will only be the blessing of Providence that will prevent fires of serious proportions. A patrol is the only measure that can be taken in our large and difficult forest tracts and the proper policy to follow is to take every measure to make it as effective as possible. On Dominion territory it has been extended as far north as the Peace, Great Slave and Churchill Rivers. The fire notices have also been prepared in the Indian syllabic in Cree and Chipewyan for posting in the northern districts.

But railways are being built, settlement is crowding in, and if the forests

are to be preserved it will be necessary to have inspections made in advance and such lands as are unsuitable for agriculture set apart as forest reserves. On the reserves already set apart we find that it is largely a case of locking the door after the horse is stolen, for many of them have suffered so severely by fire that the timber on them is now of little value either as to size or species. The same story will be repeated over the rest of the great northern forest unless such reserves are set apart and guarded by an adequate and reliable staff of rangers under efficient supervision. Exploration of lands before settlement and the creation of forest reserves would therefore be the second item in a Canadian forest policy.

And as a part of, and a framework for, the policy of exploration I would like to see, in so far as Dominion territory is concerned, meridian lines extended northward well in advance of settlement, with base lines run out at suitable intervals. Any further inspections made could then relate themselves to some fixed locations and the division between agricultural and non-agricultural lands could be made with greater facility and the position of the tracts so differentiated could be determined with some definiteness.

A timber survey should be made on the forest reserves and the timbered lands in general to determine with some degree of accuracy the quantity of timber available, its condition and the outlook for the reproduction of the supply. In the United States the forest reserves under charge of the federal government have been so surveyed. Such surveys have been completed in twenty-one states and are being carried on in thirteen more. In Canada a million and a quarter acres of the ten million acres in Dominion forest reserves and parks have been so examined. Ontario in 1899 sent out a number of exploratory parties to make an effort to determine the wood available in northern Ontario. Outside of these no systematic and sustained effort has been made by any government, Dominion or provincial, to find out the condition of its forests or where Canada stands in regard to this great resource. Geological survey officials, lumbermen, foresters, every body who has ever travelled through the woods, even if



it is only on the railway or on the map, may hazard a guess and establish a reputation as an expert by speaking learnedly and definitely of that of which he knows little or nothing. As a distinguished gentleman, sometime deceased, used to remark, "The public like to be fooled," and they illustrate it by willingly accepting the statements in regard to the forest resources of Canada of any person who claims or does not claim to be an expert instead of demanding that the Government should do the only right and natural and effective thing, and that is to go and get the information where it is to be found, that is, not in the office or on the street, but in the forest, and to get it by a method intelligent, effective and comprehensive enough to be adequate to the position and dimensions of the great Dominion of which we are all so proud and know so little.

An adequate forest policy would demand the spending of more money. From all sides we hear expressions of admiration of the work done by the Federal Forest Service of the United States and they are fully deserved. But it must not be overlooked that that service has a permanent staff of over two thousand, temporary assistants numbering eight hundred, and an annual appropriation of over four million dollars, and the United States is not greater in extent than the Dominion. Besides this there are numerous state forest services assisting the work and increasing the total of forest service expenditure. If the Canadian people wish a service equal in all respects to that in the United States they can have it by paying the price, and I feel sure that Canadians, whether in the forest service or any other service of the Government, are capable of carrying out a public policy as broadly, as comprehensively and as intelligently as any other nation on the face of the earth.

European experience is to the effect that a thorough management of forests, even at an increased expense, gives the best net results. The forests of Saxony, which have been under scientific forest

management for a century have a net expenditure of \$2.30 per acre and a net revenue of \$4.37 per acre. At first the expenditure per acre was eighty cents and the net revenue ninety-five cents. Later the figures were \$1.15 expenditure and \$2.39 net revenue, and now the figures first quoted have been reached.

With increase of population, with greatly enlarging necessities, with expanding industries, with increasing complexity of life, the time arrives in the history of every nation when haphazard methods of administration will no longer suffice, when wasteful and destructive dealing with the great resources of the country must end, and when, if that country is to retain its place among prosperous nations and maintain its population in comfort and happiness, scientific and economical methods of dealing with the resources of the country must be adopted, intelligence and skill must work together to prepare them best for the needs of man and bring them most conveniently to his hand, and the public service must be not only honest and loyal but far-sighted and progressive. Canada has reached the place where her own necessities and her position as one of the possible great factors in the future history of the world make it imperative that, learning from past civilizations and the history of other nations, she should ensure that prodigality and wastefulness such as have stopped the progress and crippled the strength of other countries, and in the path of which, in so far as her forest resources are concerned, the Dominion has followed far and long, should not be a reproach of future generations against her, but that gathering wisdom from out the storied past, used within the present and transfused through future time by power of thought, she may have a history greater and grander in the future, worthy of the great inheritance with which she has been endowed by a bounteous Providence, worthy of the race from which she has sprung, and worthy of the great destiny which lies in her hands to accomplish.



## Report of Forests and Waterpowers Committee.

Immediately following upon the International Conservation Conference the House of Commons took up the question of the investigation of the natural resources of Canada, and appointed three committees for this purpose, to which were assigned respectively the duties of reporting on (1) the Forests, Waterways and Waterpowers; (2) Mines and Minerals, and (3) Marine and Fisheries.

On Feby. 26th the members of the Committee on Forests, Waterways and Waterpowers were named as follows:—Hon. Clifford Sifton, Hon. Sydney Fisher, Hon. J. G. Haggart, Messrs. Jas. Arthurs, H. S. Beland, Glen L. Campbell, F. B. Carvell, M. Chew, M. Currie, J. W. Edwards, F. L. Fowke, George Gordon, T. Macnutt, H. H. McLean, C. A. Magrath, J. P. Molloy, F. D. Monk, G. H. Perley, S. W. W. Pickup, W. Price, J. W. Richards, E. W. Tobin, G. V. White, W. H. White and C. A. Wilson; to these Mr. F. T. Savoie was subsequently added.

The committee met for organization on March 31st, when Hon. C. Sifton was elected chairman. Several meetings of the committee were held, at which evidence was given by Messrs. R. E. Young, R. H. Campbell and P. E. Ryan.

On May 17th the final report of the committee was presented by Dr. Beland, and on May 18th, on motion of Hon. C. Sifton, was concurred in by the House.

### THE COMMITTEE'S REPORT.

After a brief reference to the appointment of the committee late in the session and the consequent incompleteness of the report by reason of the short time allowed for investigation, the committee recommended as follows:—

1st. It has been shown that the officers of the Transcontinental Railway have framed and promulgated excellent regulations for the protection of forests along the line of the Transcontinental Railway and that various plans are being adopted in the Provinces of New Brunswick, Quebec and Ontario for enforcing these regulations. It is quite apparent that the result of the attention which has been given to the subject has been to very largely reduce the destruc-

tion of forests by fire which has heretofore almost always characterized the construction of railways through forest territory. Your Committee, however, are impressed with the belief that a great amount of additional attention should be given to the enforcement of the regulations and believes that the Commissioners would feel that their hands were strengthened in the work if they were supported by specific action on the part of the House of Commons. It is therefore recommended that the Commissioners be asked to devote special attention to the enforcement of the fire regulations and to provide any additional staff necessary for that purpose; also that power be given to the Commissioners to expropriate additional width of right of way where necessary to provide adequate protection against fire.

2nd. Your Committee desires to call attention to the need for immediate action in regard to the conservation of the forests on the eastern slope of the Rocky Mountains. This territory, once heavily timbered, is no longer in that condition, although it contains a considerable quantity of merchantable timber. There has been very great destruction by fire, even in recent years. The importance of preserving the forests on the tract in question cannot possibly be exaggerated. The rivers which flow down through Saskatchewan and Alberta, upon which, almost exclusively, the whole water supply for domestic, municipal and irrigation purposes of the population of these provinces depends, have their sources between the foothills and summit of the Rocky Mountains. Apart from the question of actual water supply, other matters of far-reaching importance are involved, such as the continued fertility of the soil, the regularity of the rainfall and the moderation of the climate. These all depend upon the continuation of the flow of the rivers in question. When these rivers are used to their utmost limit as at present distributed, the quantity of water there, leaving aside domestic and municipal supply, is sufficient to irrigate about two per cent. of the irrigable land,



while, if properly regulated and conserved, it would suffice to irrigate from sixteen to twenty per cent. Instead of moving toward a system of proper regulation of increasing the amount and efficiency of the water flow, the forest land, which alone can sustain the supply, is being rapidly destroyed by fire owing to the insufficiency of the protection which is accorded. The officers of the Department of the Interior who are employed in connection with this work are believed to be active and efficient, but a larger and better organization and a much more extensive staff is required in order to cope effectively with the evil.

Not only the water supply but the fuel supply is involved in the effective handling of this question. Western Alberta is very rich in coal, and the mining industry has passed the initial stages and is no doubt upon the eve of great development. A supply of timber at reasonable cost is essential for economical coal mining and this timber should be procurable from the territory in the neighbourhood of the location of the mines. If such a timber supply cannot be procured it will add most materially to the cost of mining and therefore to the cost of fuel. It is safe to say that unless very decisive measures are taken the supply of timber for mining purposes will very soon disappear.

In view of these facts, therefore, your committee begs to recommend that immediate action be taken to enlarge the boundaries of the National Parks or Forest reserves, and that a single continuous forest reserve be created from the international boundary line to the northern watershed of the Peace River.

It is recommended that a competent warden, with an efficient staff be placed in charge of the reserve above indicated, and that stringent regulations be provided for the purpose of as far as possible absolutely preventing the destruction of timber by fire, and for the further purpose of carrying on a system of reforestation whenever possible.

It is further recommended that an accurate forest survey of the territory included in the reserve, commencing at the southern and more immediately important portion, be carried on with all convenient speed, and that it be a portion of the allotted work of such survey to locate and determine upon possible

reservoirs for the storage of waters within limits of the reserve.

If it be regarded as too late in the session to introduce legislation for the purpose of giving effect to the recommendations above set forth, your committee would suggest that by executive action the reserve should, as far as possible, be constituted, defined and put into effect looking to the introduction of the necessary legislation at the next session of Parliament.

#### THE EVIDENCE.

Mr. R. E. Young, first taking up the question of waterways, spoke favorably of the possibility of a waterway from Lake Superior to Winnipeg, and thence to Edmonton, either by way of the Red River and Lake Winnipeg and the Saskatchewan, or by way of the Assiniboine and Lakes Manitoba and Winnipegosis to Lake Bourbon and thence via the Saskatchewan. The recent progress in settlement in the West and its vast possibilities made the question of waterways one of great moment and also gave great importance to the natural waterways in the north country which led to the Arctic Ocean, two of which—that to the Arctic Ocean by way of the Athabasca, Peace, Slave and Mackenzie rivers and that from Fort Churchill to Baker Lake and into the Thelon river—he took up at length. He gave the following figures, compiled by the Railway Lands Branch of the Department of the Interior, in regard to the water powers of Canada: Yukon, 470,000 horse power; British Columbia, 2,065,500 h.p.; Alberta, 1,144,000 h.p.; Saskatchewan, 500,000 h.p.; Manitoba, 504,000 h.p.; Northwest Territories, 600,000 h.p.; Ontario, 3,129,168 h.p.; Quebec, 17,075,939 h.p.; New Brunswick, 150,000 h.p.; Nova Scotia, 54,300 h.p. To these, water powers on the proposed Georgian Bay Canal would add 1,176,310 h.p., making the total 25,692,907 h.p. Of the Quebec water powers the Grand Falls on the Hamilton river gave at least 9,000,000 h.p. Of all this energy only 486,887 h.p. were at present in use. The unused 25,206,000 h.p. (assuming that 5 lb. of coal per hour were needed to generate one horse power of energy) would be equivalent to 552,011,800 tons of coal per annum.

Mr. Young believed the merchantable forest area of Canada to be much less



than that of the United States. Estimates of the extent of Canada's forests varied from 800,000,000 acres down to 100,000,000 acres. In the north country timber was largely confined to the banks and immediate vicinity of rivers. In northern British Columbia, owing to the ravages of fire, the areas of good timber were limited.

Mr. Young concluded by urging the need of protection of the forests from fire, especially in the northern districts.

Mr. R. H. Campbell, Superintendent of Forestry, twice appeared before the committee. On the first occasion Mr. Campbell prefaced his evidence by briefly reviewing the history of the Forestry Branch of the Department of the Interior and comparing it with the U. S. Forest Service in respect to the number of employees (in the U. S. service, over 2,000; in Canada, 40), and annual appropriation (in the U. S., \$1,640,000; in Canada, \$100,000). He then outlined the organization of the fire ranging staff and the working of the patrol system, especially along the railways. In 1908, out of 251 fires reported on Dominion territory, the great majority were put out without loss; the most serious had been one in the Spray River Valley, Alberta, where four million feet B. M. of timber were destroyed. The need of more money for fire protection was emphasized and ways of fighting fires discussed. An inspector of rangers was needed for the northern district of British Columbia. In the construction of the Grand Trunk Pacific Railway much stricter regulations were being enforced than in former railway construction and these were well observed. The patrol system should be extended and on all railways passing through forested territory an inspector, with authority from the Railway Commissioner, should be kept at divisional points to watch the equipment of locomotives with spark arresters.

The question of jurisdiction in the case of railways operating under Dominion charters and running through provincial territory was discussed at some length by the committee.

Mr. Campbell, resuming, spoke of the present area of the Dominion forest reserves and proposed extensions. The purpose of setting aside a wooded tract as a forest reserve, he stated, was to regulate and administer it for wise use,

not to close it altogether; and he gave, in detail, reasons for so reserving such an area. The work on the Dominion forest reserves and the staff in charge of it was outlined and regulations regarding the cutting of timber and of hay were sketched, also regulations for the use of the reserves by campers. Experiments in reforestation on some of the reserves were referred to, and the provincial reserves and their areas were given.

The question of forming a forest reserve on the eastern slope of the Rocky Mountains was then taken up. Title to the land included in such a reserve, examination of the land, protection of the woodland from fire, the relation of the reserve to the water supply of the plains, the stream measurements and existing irrigation schemes were discussed.

At Mr. Campbell's second hearing the question of the forest reserve on the eastern slope of the Rocky Mountains was investigated in considerable detail. The districts already reserved (as National Parks) were described, and also land already examined and recommended to be included in the reserve. The question of a supply of timber for the mines, especially in the Crow's Nest district, was given special consideration, and the advantage to the mines and mining industry of the proposed reserve brought out. The areas under grazing leases and timber licenses were also given. The present administration of the territory and the need for an increased staff were dwelt upon, and the varieties of timber growing on the area and their use and value were also discussed.

The causes of forest fires, especially the danger from railways, were next spoken of and the best width for the right of way and the burning of all debris along the railway were discussed.

Some discussion also took place with regard to the country north of Jasper Park, but it was pointed out that knowledge of that country was very limited.

Mr. P. E. Ryan, Secretary of the National Transcontinental Railway Commission, gave evidence in regard to fire patrol and other fire-preventive measures along the line of that railway. At the very beginning of their work, he said, the engineers had been instructed in regard to the forest fire laws of the country through which the railway would pass. Contractors were com-



pelled, at their own expense, to adopt precautionary measures. Mr. Ryan outlined the scheme of patrol along the lines of the railway in New Brunswick, where it was carried out entirely at the Commission's expense; in Quebec, where the provincial government, the limit-holders and the railway each bore one-third of the expense, and in Ontario, where the provincial government had undertaken all the work and had billed the commission for the expense, which the commission did not acknowledge their liability for. On the whole eastern section, from Winnipeg to Moncton, the

patrol had been successful, and any fires originating on the right of way had been put out by their own men. Reports of extensive destruction of the forest by fires originating along the line of the N. T. Ry's line of surveys east of Lake Nipigon last summer had not been confirmed by their engineer. Mr. Ryan read the regulation regarding the clearing of debris from the right of way by the contractors and explained what information was contained in the reports of the commission's engineers regarding the forests and waterpowers along the route.

## Canadian Conservation Commission.

Falling into line with the movement for conservation of natural resources, the Parliament of Canada at its last session, made provision for the appointment of a "Commission on Conservation," the bill being finally approved by the Governor-General on May 19th last.

The duties of the Commission are defined by the act to be "to take into consideration all questions which may be brought to its notice relating to the conservation and better utilization of the natural resources of Canada, to make such inventories, collect and disseminate such information, conduct such investigations, inside and outside of Canada, and frame such recommendations as seem conducive to the accomplishment of that end."

The Ministers of Agriculture, of Mines and of the Interior are to be, ex-officio, members of the commission, as are also the members of each provincial govern-

ment who are "charged with the administration of the natural resources of the province."

Besides the ex-officio members there are to be twenty members appointed by the Governor-General-in-Council, to hold office during pleasure. Of these at least one member appointed from each province must be a member of the faculty of a university within that province.

The Commission is to meet annually on the third Tuesday in January in Ottawa or such other place as has been decided on by the Commission. The members are to be allowed their expenses, but will receive no salary for their services.

The chairman may be appointed by the Governor-General-in-Council.

Provision is made for the appointment of a secretary and other officers and clerks.

## Survey of Nova Scotia Forests:

The Province of Nova Scotia, which two years ago under the influence of the Western Nova Scotia Lumbermen's Association organized an efficient fire patrol service, will this year, stimulated by the same agency, and especially by its active president, Mr. F. C. Whitman, undertake a forest survey of the province, such forest survey to form the basis of further development of a forest policy.

Dr. Fernow has been invited to organize this reconnaissance or stock-taking, which will probably require two seasons. The survey is to be made thorough, so as to bring out precise information as to the extent, character and condition of the forest area of the province. The total forest area, it is believed, comprises about six million acres, about 50 per cent. of the total land area. The Government, having



in former years sold the fee simple on such lands as were disposed of, retains ownership to only one and one-half million acres, most of it probably of inferior character, while lumber concerns control about two million acres.

The information obtained will be laid down on the Land Office survey plats, drawn to the scale of two inches to the mile, insuring tolerably accurate location.

Dr. Fernow will have four assistants, namely, Dr. C. D. Howe, Lecturer in the Faculty of Forestry; Mr. J. H. White, M.A., B.S.F., who has just graduated from the Faculty; Mr. H. B. Ayres, one of Dr. Fernow's former assistants in Washington, who has wide

experience in this class of work, and the Chief Ranger of the province; all fire rangers and deputy surveyors will aid the party in the field in their respective districts.

It is hoped that this work will prove so valuable as to stimulate other provinces to follow the example.

Hon. W. T. Pipes, Attorney-General and Commissioner of Lands for Nova Scotia, visited Toronto on June 7th and arranged the details of the survey with Dr. Fernow. While in Toronto Mr. Pipes met Hon. Frank Cochrane, Minister of Lands, Forests and Mines, and compared notes with him as to forestry problems in the two provinces.

## Forest Fires of May and June.

The forest's arch-enemy, fire, has been much in evidence during the spring months of 1909. From nearly all the provinces of the Dominion come reports of large fires and much loss, the most serious of these coming from New Brunswick, though Nova Scotia and British Columbia were the first to report fires.

Despatches of May 5th report the first serious fire of the season; these were from Kamloops, B.C. The area burned over extended from Notch Hill east to Three Valley and from Sicamous south to Vernon. "It is the old story," remarks a British Columbia paper, commenting on the occurrence, "a few bush fires smoulder for days unheeded by anyone, and a fierce wind fans them into a flame that gets beyond control." Three large fires had been burning for days and a strong wind fanned the flames and united the three fires into one. Newspaper estimates put the loss at about \$500,000. In the destruction of the Carlin mill, near Notch Hill, was involved the loss of \$75,000, and \$35,000 loss was caused by the burning of the Carrigan mill on Salmon River. Scores of settlers and ranchers were burned out. In the White Valley, around Lumby and Blue Springs, there was also a serious fire which burned out several ranchers.

On May 14th a fire, supposed to have started from fire left by a party of campers in brush land, began at Four

Mile Lake, twenty-five miles east of Annapolis Royal, N.S., and, fanned by a stiff westerly wind, burned over hundreds of acres of timberlands, valued at many thousand dollars. The burned district was between four and five miles in length and varied in width from a quarter of a mile to over a mile. Some of the finest young timber in Annapolis County is said to have been destroyed. The fire ranging system of Nova Scotia proved its worth in coping with this fire.

At Lac Brochet, Que., \$25,000 damage was done by a fire which started a few feet from the right of way of the National Transcontinental Railway and had its origin, it was thought, in a camp-fire left unextinguished by a party of Italians in search of work on the railway. The fire extended for about two miles and several camps were burned up. The Leroux saw-mill and several millions of feet of lumber were saved only after hard work.

The town of Dalton, Mich., was reported to be destroyed by a fire, and near Aurora and Calumet, in that state, fires were raging.

During the early part of June the chief centre of forest fires was the Province of New Brunswick. Even during the last few days of May a number of fires had been reported to the Crown Lands Office, most of which had not assumed serious proportions.



On May 31st a serious fire was reported near Nappadogan Lake. On June 4th it was reported that near Waweig (Charlotte County) a tract of heavily timbered land two miles long by a mile to a mile and a half wide had been swept. The fire was first noticed shortly after a C.P.R. train had passed. Hartland also reported forest fires on the same date.

Fires continued to be reported from various widely separated parts of the province. Carleton County was the chief sufferer; the village of Coldstream was in great danger, but a fortunate change of wind saved it, while at Carlisle several buildings were destroyed. The forests at the headwaters of the Miramichi were in great danger. From Tapley Mills to Woodstock a stretch of eight miles was burned over. Fires were also reported in St. John County. Along the Keswick stream fifty square miles of fine timberland were said to have been burned over. On June 7th and for several days thereafter the atmosphere at Fredericton was heavy with smoke. In the Grand Falls district—at Grand Falls and on Miramichi Lake—contractors on the N.T.R. were having a hard fight with the fires, while the C.P.R. had large gangs of men fighting fire along the Gibson branch from Fredericton to Woodstock. The N.B. Railway Company and the Miramichi Lumber Company had considerable timber destroyed by fire.

About the tenth of June the fires, which had somewhat abated, were again stirred up by high winds. On the Miramichi River the fires were especially serious. A large saw-mill near Campbellton, with a large quantity of lumber and shingles, were destroyed, and the staff, with their families, forced to flee for their lives. Fires were also raging at Renous River, in Rogerville parish and at Lockstead, Busby siding and Taxis River. Rains coming on about the middle of the month aided in extinguishing the fires. According to information received at the Crown Lands Office three-fourths of the fires were caused by farmers burning brush.

In Nova Scotia severe fires were reported in Guysborough County and near Port Morien Junction, C.B.

In Quebec a fire about a mile in length was reported from St. Romuald. At St. Francis, D. Fraser & Son's mill,

together with most of the dwellings in the village near-by, was destroyed. Much damage was done to timber limits on the north and south shores of the St. Lawrence and along the line of the Quebec and Lake St. John Railway. In Bonaventure County hundreds of thousands of dollars' worth of loss is said to have been caused by the fires.

Forest fires were reported from Elk Lake, Ont., on June 3rd, on J. R. Booth's limits and the Big Six Mining Company's property. On the line of the Algoma Central Railway, a few days later, the fire covered a stretch of country some six miles long by six miles wide (three miles on each side of the railway). A couple of camps were destroyed and others were threatened. Shortly afterwards serious fires were reported from near Kenora and large fires also near Port Arthur.

A very serious fire raged along the Prince Albert branch of the C.N.R.; the burned district was said to be almost 100 miles long. A large saw-mill and a four-span bridge on the C.N.R. were among the property destroyed; the losses totalled \$75,000.

Many forest fires were said to be raging during the first few days of the month in the interior of Newfoundland, and in Michigan there were many fires between Sault Ste. Marie and Ignace.

#### AN ONTARIO PROBLEM.

In a pamphlet of some thirty pages, published by the Ontario Department of Agriculture, Mr. E. J. Zavitz, Forester to the Department, writes of the Reforestation of Waste Lands in Southern Ontario. The author outlines the extent of sand lands in the counties of Norfolk, Lambton, Simcoe, Northumberland and Durham, and discusses the cost of artificial reforestation under the headings of Cost of Land, Cost of Plants, Cost of Planting, Cost of Management and Protection. Rate of Interest, Taxation and Estimates of Investment. On an acre of white pine land, managed on a rotation of sixty years he figures a profit of \$639.66, equivalent to a yearly income of \$3.25. The total expense of management during the sixty years amount to \$165.34; the gross proceeds to \$800.00. The report is illustrated with a number of fine half-tones and two maps.



## NOTES.

The greatest care is taken to have the list of members as nearly correct as possible. With a list as large as that of the membership of the Canadian Forestry Association now is, there will be a number of changes to be made and some mistakes to be rectified. If members whose names are incorrectly spelled or whose addresses are not properly given will kindly notify the secretary to this effect, it will be much appreciated.

### STUDENTS IN THE FIELD.

The members of the senior and junior classes of the forestry course in the University of Toronto had a very successful woods session this spring. Last spring they got their practical work in the woods in Rondeau Park, Lake Erie, and Algonquin Park, Northern Ontario. This year they did their work on a limit of the Strong Lumber Company on the south shore of Lake Nipissing, about thirty-six miles west of Callander on the Canadian Pacific Railway. When they arrived in Callander they found that, owing to the ice still being in the bays, it was impossible for them to proceed to their destination, as they had expected, by steamer. They had consequently to make a detour by which they got as far as Nipissing village by wagons and then had to walk twenty-seven miles to the camp. Dr. Fernow, the dean of the faculty of forestry, and his assistants, Dr. C. D. Howe and Mr. A. H. D. Ross, tramped it out with the students. Supplies had to be borrowed from a camp about six miles away until their own supplies could be brought in. The camp was in a thick stand of virgin red pine which was about 175 years old and uninjured by either fire or axe. A growth of white pine about two thousand to the acre is coming up all over the limit. The adjoining limit was cut over about fifteen years ago, and, not having been injured by fire, gave a good opportunity to study how this area naturally reforests itself. The students had a very successful session. They made a reconnaissance survey of 6,000 acres and a close survey of 400 acres.

As part of their work they will bring in reports as to the quantity, species, and quality of timber on the tract surveyed, and also a report on the best methods for getting out the timber, the location of logging roads, whether the tract is suited for agriculture, and if not, how best to ensure its perpetuation as a timber forest. Owing to the difficulties which have been encountered in getting into the woods in the spring Dr. Fernow will suggest to the University of Toronto the advisability of changing the time of holding the wood sessions from spring to fall. It is expected the first of these held in the fall will be in October and November, 1910.

### FORTHCOMING BULLETINS, ETC.

There are now being printed, under direction of the Forestry Branch, a number of bulletins and other publications of interest to all students of forestry. In "Forest Conditions in the Crow's Nest Pass, Alberta." (Bulletin No. 5), Mr. H. R. MacMillan, B.S.A., M.F., describes at length his investigations pursued last autumn in the region named, a partial description of which was given in the issue of the Canadian Forestry Journal for December last. "Canadian Forest Fires of 1908", by the same author, outlines the extent of last year's forest fires in Canada and ventures an estimate of the loss, with suggestions for more efficient preventive work. In "The Riding Mountain Forest Reserve", (Bulletin No. 6), Mr. J. R. Dickson, B.S.A., M.S.F., gives a resume of the work done on this reserve during the summers of 1906, 1907 and 1908, describes conditions obtaining in the area and makes suggestions for the future management of the reserve. To obtain copies of any of the above, free of charge, application should be made to R. H. Campbell, Esq., Superintendent of Forestry, Ottawa.

It is said the Canadian Pacific Railway will this year begin the erection of several plants for creosoting ties.



FORESTRY  
LECTURES.

Mr. A. Knechtel, Inspector of Dominion Forest Reserves, spent some time during the months of March and April in visiting the chief cities and towns of Alberta, Saskatchewan and Manitoba, lecturing once or oftener at each place on forestry topics. The places visited, taken in their order, were as follows: Lacombe, Red Deer, Wetaskiwin, Edmonton, Calgary and Lethbridge, in the Province of Alberta; Moose Jaw, Regina, Saskatoon and Prince Albert, in the Province of Saskatchewan; and Dauphin, Brandon, Neepawa, Winnipeg and Portage la Prairie, in the Province of Manitoba. The lectures and addresses were delivered under the auspices of various organizations, among these being Boards of Trade, Canadian Clubs, Horticultural Societies and others. They were well attended and were very successful, and it is expected that a much greater interest in forestry will be awakened by them in the places visited and generally throughout the West. It is hoped to extend the work further next year.

POINTS FROM  
MR. PICHÉ'S  
ARTICLE.

In this issue of the JOURNAL Mr. G. C. Piché, Forester for the Department of Lands and Mines of Québec, writes of the Forest Agents of that province. He answers Mr. Ellwood Wilson's criticism of the outside forest service of Quebec so far as it relates to the forest agents by showing that these were employed in districts outside of Mr. Wilson's sphere of work. He states, furthermore, that this organization is totally different from the ordinary forest ranger service. These young men intend entering the forest school, when that shall be opened, and they are university graduates. Mr. Piche goes on to show the nature of the new regulations they were to enforce. These prohibit under penalty of \$3 for each offence, the cutting of pine under twelve inches, white spruce under eleven inches, black spruce under seven inches or other trees under nine inches. Timber dues are to be collected on all stumps over one foot high, all tops more than six inches in diameter left in the woods, all merchantable wood used in building skids, bridges and corduroys, all lodged trees

and all logs left in the woods. Though the forest agents did not arrive at their posts in the valleys of the Assomption and Mastigoche Rivers until November (a month late), they at once set to work. Their close inspection resulted in an estimated saving of 20 per cent. of the cut, or of 7,000,000 feet for the district, which was so much gain for the limit holders, and which brought in, at 65 cents per thousand, an additional revenue of \$4,550 to the province. Mr. Piché pays a tribute to the license holder, Mr. A. MacLaurin, for his unstinted aid in furthering the work of the agents. Mr. MacLaurin was satisfied with the work of the agents and expressed the hope that the same system would be extended to all parts of the province. This is impossible now from the lack of the right men, but men will be forthcoming when the forest school is in operation.

TIMBER ALONG  
THE GRAND  
TRUNK PACIFIC  
RAILWAY.

Mr. W. I. Margach,  
Chief Forest Ranger  
at Calgary, writes  
the CANADIAN FOR-  
ESTRY JOURNAL in

regard to Mr. Rau's article in the December JOURNAL, which, he thinks, does not give a fair account of the timber along the G.T.P. Mr. Margach disagrees with Mr. Rau's statements that all the available timber in the region is covered by berths already granted and thinks that "there is yet vested in the Crown on the eastern slope of the Rockies a quantity of timber at least equal to what is under license", though the licences cover the timber that can be logged at least cost. "The records of the Department show," Mr. Margach also states, "that in the case of special permits granted to Messrs. D. R. Fraser & Co., the Edmonton Lumber Co., and John Walter, of Edmonton, the timber cut under these permits on an area of not more than eight square miles was over ten million feet, and, in my opinion, the same results can be obtained from all like areas."

In future every guide in Ontario must be licensed. Each guide will be held responsible for the extinguishing of all camp-fires set by the party of which he is in charge





[PHOTO BY N. M. ROSS

Sowing tree seed at Forest Nursery Station, Indian Head, Sask.

TREES FROM FULLY two and a half million trees were sent out this spring from the Forestry Nursery Station at Indian Head in the course of the usual spring distribution. The total number of names on the inspectors' lists this year is 5,723, as compared with 3,948 last year. Of this 5,723, the number of new applicants this year is 2,298.

FOREST PRODUCTS OF CANADA. The above is the title given to Bulletin No. 4 of the Forestry Branch of the Department of the Interior. Mr. A. H. D. Ross, M.A., M.F., lecturer in forestry at the University of Toronto, is the author. His task has been to collect all available statistics on lumber production and use, showing what is being done (and, by inference, what is neglected) in the way of collecting infor-

mation on these subjects by the federal and provincial governments of the Dominion. Figures are given for the exports, imports and forest production of the Dominion and for the area of the forest reserves under the control of the Dominion and the different provinces. Figures are also given, as far as available, for the different provinces with respect to their timber production, their export trade, and their chief wood-working industries. Mr. Ross's work is the first attempt that has been made in Canada in the special line of forest statistics. The author has done his work well, but the unavoidable incompleteness of the book, contrasted with the complete returns furnished by the Forest Service and Census Bureau of the United States, goes to show the need of work in collecting and tabulating this information, a work which is now being undertaken by the Forestry Branch.