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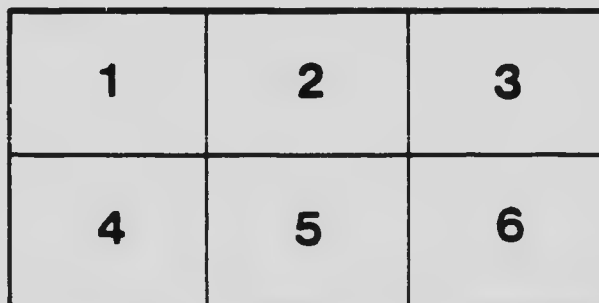
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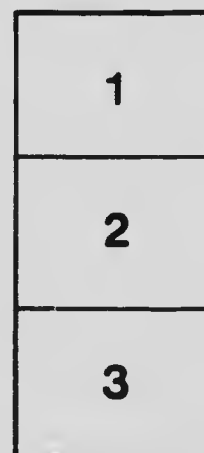
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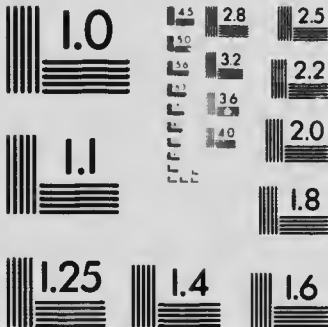
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Commission of Conservation
CANADA

COMMITTEE ON FORESTS

Forestry Progress in
Canada in 1917

BY
CLYDE LEAVITT

*Chief Forester
Commission of Conservation*

Reprinted from the Ninth Annual Report of the
Commission of Conservation

OTTAWA—1918

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Committee on Forests

MR. CLYDE LEAVITT, Chief Forester of the Commission, reported on the subjects coming within the purview of the Committee on Forests, as follows:

In 1917 notable progress has been made toward the better conservation of our forest resources. That this has been possible, in spite of the fact that legislative bodies throughout Canada have been exceedingly busy with the consideration of problems arising directly out of the war, is a guarantee that the public generally is realizing as never before the vital importance of our forest resources in peace and war alike. The fact that fully one-third of the foresters of the country are serving overseas, renders all the more remarkable the very material progress that has been made.

Much credit is due the Canadian Forestry Association for the vigorous and intelligent campaign of educational publicity which has been conducted through its Secretary, Mr. Robson Black, particularly for the purpose of securing better protection against forest fires.

DEVELOPMENTS IN NEW BRUNSWICK

Forest Survey

The forest survey and land classification of New Brunswick Crown lands have been continued, a total of 1,200,000 acres having been covered since the project was initiated nearly two years ago. About 1,000 acres have been covered during the year ending October 31st, 1917, at a cost of 2½ cents per acre for the field work alone. Through co-operation with the J. B. Snowball Company, the data secured by the Company's forest engineer have been collected in such form as to be available for the purposes of the Land survey.

The demands upon New Brunswick forests are heavy, especially for spruce for the manufacture of paper and lumber. There is good reason to raise the question as to whether the cut of coniferous species does not now exceed the annual growth. This is one of the problems which the investigations now under way will be expected to solve, together with answering the question as to what practical measures are necessary to keep the forest area in as productive a condition as possible.

**Overcutting
Conifers**

The amount of annual growth upon a given area of forest land is vitally affected by the methods adopted and restrictions imposed in carrying on logging operations. On a poorly managed tract, the production may be nearly or quite at a standstill. The Government of New Brunswick wishes, eventually, to manage the provincial Crown lands on a permanent instead of a temporary basis, by harvesting each year only the equivalent of the annual growth. The vital importance of this from the viewpoint of the future is plain when it is considered that the estimated amount of spruce and balsam in New Brunswick is equivalent to only about 30 times the present annual cut of these species for lumber and pulpwood. This statement, of course, disregards the annual growth, the amount of which is purely conjectural, but is known to be much less than would be the case under good management. This only serves to emphasize the urgent necessity for increasing production and eliminating unnecessary waste. It is well known that a vast amount of material is wasted in the woods, much of which could be utilized with proper care, thus relieving to that extent the heavy demands upon the forest. Further, the coniferous species, or soft woods, are being heavily over-cut in proportion to the hardwoods. There is urgent need for the development of hardwood-using industries, to equalize the strain. To form the basis for a policy calculated to solve these various problems, is the principal object of the forest survey.

**Reorganizing
Forest Service**

To assist further in accomplishing the same object, the Provincial Government is now considering the entire reorganization and combination under a single head, of the various lines of forestry and fire protection work. This would mean the establishment of a genuine provincial forest service, with a co-ordinated staff handling fire protection, scaling, enforcement of cutting regulations on Crown lands, and the continuation of the forest survey and land classification. It would include the handling of forest fire protection by a permanent staff supported by adequate appropriations from the provincial treasury and, presumably, assisted by assessments levied upon timber owners, as is done in other provinces. Reorganization upon this basis would mark the beginning of a new era in forest conservation in New Brunswick, and it is greatly to be hoped that favourable action will be taken at an early date.

It should be noted that the provincial authorities have already had occasion to make considerable use, on other lines of technical work, of the expert services of the foresters engaged on the forest survey, and that the valuable character of the services thus rendered

is apparently to result in a material increase in the responsibility to be placed upon the provincial forester and his staff in the administration of Crown timber lands. Already, it has been definitely decided that the Forestry Division is to assist in the supervision of the scaling and logging operations on Crown lands during the current season.

NOVA SCOTIA

There has been no change in the forestry and fire protection situation in Nova Scotia. The administration of the Forest Protection continues to give good results, and the forest fire loss during 1917 has been almost negligible.

SITUATION IN QUEBEC

**Co-operative
Forest
Protection**

The striking feature of the year's developments in Quebec has been the remarkable growth of the co-operative or association idea in forest fire prevention and control. The pioneer in this movement in Canada, the St. Maurice Forest Protective Association, has continued and strengthened its work. The territory of the Lower Ottawa association has been more than doubled through the inclusion of the Upper Ottawa drainage, extending westward to the Ontario boundary, and the name has been changed to Ottawa River Forest Protective Association. Two new organizations of a similar character have also been formed, the Laurentian and Southern St. Lawrence Forest Protective Associations. These are situated to the north and south of the St. Lawrence river, respectively, in the eastern portion of the province. The province of Quebec now has some 70,000 square miles of forest lands under co-operative fire protection. This area comprises about 80 per cent of the licensed Crown timber lands of the province, as well as a large area of Crown-granted lands. The Provincial Government is a partner in the arrangement, in each case, and contributes toward the support of the associations, in consideration of the protection afforded unlicensed Crown lands. The greater portion of the support comes, of course, from the timber owners, who are assessed on an acreage basis, by the management of the respective associations. There has been a notable increase in efficiency in the prevention of fires through educational methods, and in the prompt discovery and extinguishing of such fires as occur in spite of the precautions taken. In the construction of lookout stations, much progress has been made, and valuable experience has been gained in the development and use of pumps and other mechanical equipment

for the extinguishing of fires. The permit system of regulating settlers' clearing fires continues to give admirable results.

**Reforestation
of Denuded Lands**

The reforestation of denuded lands continues to make progress, though still on a relatively small scale. The provincial forest nursery at Berthierville is to be materially extended to fill the increasing demand from pulp and paper companies and others requiring tree-planting stock. The reforestation work of the Laurentide Company is particularly worthy of notice. Planting on a smaller scale is also being done by the Riordon Pulp and Paper Company. The planting operations of the Pejepscot Company have been discontinued. It should be noted that all these companies employ technically trained foresters. Some years ago, the Belgo-Canadian Pulp and Paper Company made a forest plantation and now has under consideration the resumption of this policy. The Perthuis seignory also adopted a consistent planting policy, with excellent results. Price Bros. & Co. are considering the adoption of an extensive reforestation programme.

Thus far, practically all forest planting has been done on privately-owned lands. The provincial Government has under consideration the systematic reforestation of at least the more accessible areas of denuded Crown lands. The rapidly increasing values of timber suitable for the manufacture of pulp and paper render favourable action in this direction highly desirable from every viewpoint.

PROGRESS IN ONTARIO

**Forestry Branch
Established**

A new era has begun in the matter of protecting Ontario's forests against fire. The Forest Fires Act has been remodelled on modern lines, and a forestry branch has been established, in charge of technically trained foresters, with full jurisdiction over the various lines of fire protection work. The total staff of the Forestry Branch at the height of the past fire season aggregated about one thousand men—easily the largest single fire-protective agency on this continent. Generous appropriations have been made available by the Legislature, and the interest and co-operation of the timber owners have been further assured by the imposition of a fire tax to assist in covering the cost of protection on licensed Crown lands.

In the matter of mechanical equipment for the discovery, reporting and extinguishing of fires, an excellent start has been made. Five automobile trucks with fire-fighting equipment have been provided for districts where roads to the settlers exist. Some



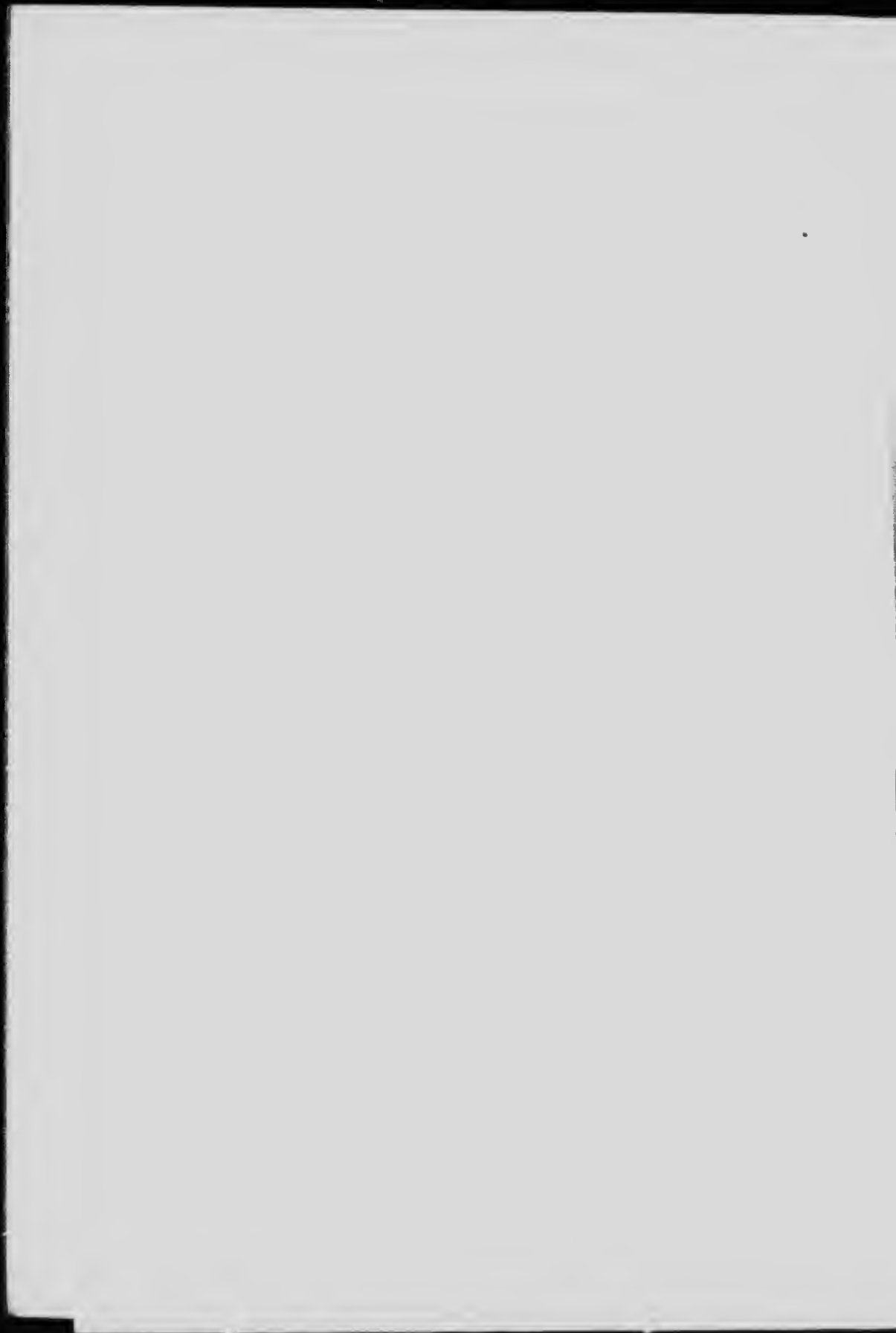
ON THE SAND DUNES NEAR LACHUTE, QUE.

Note how the sand has blown away where there is no vegetation to hold it in place



A PROMISING CROP

Scotch pine, white pine and Norway spruce planted on shifting sand near Lachute, Que., by the Quebec Forest Service in 1912 and 1913. This photograph was taken in 1917.



1,031 miles of old trails and canoe routes have been cleared out, and 514 miles of new trails and portages opened. Eighty-five lookout towers have been built, and some 45 miles of telephone line erected.

**Permit System
Adopted**

The permit system of regulating settlers' clearing fires has been put in effect in Northern Ontario, 3,886 permits having been issued during the season.

While there have necessarily been some convictions for burning without permit, the new measure has been remarkably effective, with comparatively little friction. For this, the tact and good judgment of the head office and field staff of the Forestry Branch are entitled to great credit. There is good reason to believe that the north country will not, in future years, suffer a repetition of the terrible fire disaster of 1916, which resulted in the loss of not less than 223 lives.

**Increased Value
of Pulpwood**

It should be noticed that the greatly increased values of pulpwood have resulted in tremendously simplifying the matter of fire protection in the new settlements of both Ontario and Quebec. This is because the settler no longer finds that he can not make reasonable wages by marketing his timber in the form of pulpwood, as was formerly the case in many of the more remote settlements. On the contrary, he finds his pulpwood a distinct asset, which it is decidedly worth his while to conserve. Therefore, there is less inclination to set fires indiscriminately or to let fires run at large.

This situation is resulting in the stimulation of settlement in the northern portions of both Ontario and Quebec. Great care must, however, be taken, lest the demand for timbered lands for settlement purposes result in the opening up of areas containing valuable timber where the soil is unsuited to permanent agricultural production. This is a real danger in all the provinces of eastern Canada.

**Supervision of
Cutting
Operations**

It is to be anticipated that when conditions become more ripe for such action, the logic of organization will bring about the transfer to the provincial Forestry Branch of supervision over cutting operations on Crown lands. This would permit the organization of the staff on a permanent basis and do away with unnecessary duplications, to say nothing of the all-important matter of securing more thorough enforcement of scientific restrictions upon logging operations with a view to securing the adequate reproduction of the forest on cut-over lands. It should be noted, in this connection, that foresters are now in charge of cutting operations on Crown lands in British

Columbia and Quebec and in Dominion forest reserves, exclusive of licensed lands. The proposed reorganization in New Brunswick will presumably bring all cutting on Crown lands definitely under the provincial forest service, a start in that direction having already been made. In the United States, the Forest Service has full charge of both fire protection and technical forestry practice on the National Forests. The trend toward placing these matters in the hands of specially trained men is very distinct and should be strongly encouraged.

DOMINION LANDS

Improvement in Fire Laws

The principal development with reference to Dominion lands consists of improved fire legislation by the provinces of Saskatchewan and Manitoba. In each case, provision is made for the regulation of settlers' clearing fires under the permit system, administered by provincial officials. In Manitoba, arrangements have been made whereby officers of the Dominion Forestry Branch are deputized by the Fire Commissioner to issue such permits in forest sections where such officers are available. It is hoped that a similar arrangement may be made in Saskatchewan.

Change Needed in Alberta

In Alberta, the situation urgently demands a revision of the Prairie Fires Ordinance. The existing legislation does not fit the conditions in the forested northern portion of the province, where considerable settlement is under way. During the season just passed, for example, a number of serious fires have occurred, due to the spread of settlers' clearing fires, and much damage to forests and private property has resulted. In all of the other forest provinces of Canada, the permit system of regulating settlers' clearing fires is wholly or partially in effect, and similar action is urgently needed in Alberta.

Crying Need for Merit System

So far as action by the Dominion Government is concerned, there has been practically no change. As indicated in previous reports of the Committee on Forests, the situation urgently demands the adoption of the merit system of appointment in the field service of the Forestry Branch and the adoption of adequate administrative measures for the enforcement of the technical cutting regulations applicable to operations on licensed timber berths, especially those in Dominion forest reserves. The Forestry Branch, a technical organization, has no administrative connection with such cutting operations, though the timber berths comprise the great bulk of the merchantable timber standing on Dominion Crown lands. Section 58 of

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NEEDING THE FORESTER'S ATTENTION

These desirable young sugar maples have reached the stage when they should be encouraged by the removal of some of the older trees of less valuable species.



CUTTING CORDWOOD IN SECOND GROWTH FOREST ON THE PETAWAWA MILITARY FOREST RESERVE.

the Dominion Lands Act would appear to confer upon the Dominion Forestry Branch jurisdiction in such technical matters. However, if so, this provision has not been made effective as to licensed lands. Cutting on these lands is thus allowed to take place without due regard for the interests of the future, which demand that operations be conducted in such a way that the forest shall be perpetuated. The Dominion Government can take but partial credit for the practice of conservation upon its forest lands so long as this condition is permitted to continue.

It is noted with the greatest satisfaction that the Union Government is now definitely pledged to the bringing under the Civil Service Commission of all the outside services. This will be of the greatest possible benefit to the work of the Forestry Branch.

**More Reserves
Are Needed** It is greatly to be hoped that further extensions of the forest reserve area in the West may be made at an early date. None have been made since 1913, though very considerable areas have been found upon examination to be chiefly valuable for forest purposes.

**A Military
Forest Reserve** Nearly two years ago the Commission of Conservation co-operated with the Militia Department in the inspection of cordwood cutting operations on the Petawawa Military Reserve. A considerable extension of this work seemed advisable and, after full consultation, the project was transferred to the Dominion Forestry Branch, which had previously been kept in touch with the situation and had collaborated to some extent. Later, upon the recommendation of the Research Advisory Council, an appropriation of \$6,000 was made available for the establishment of a forest experiment station upon the 100 square miles of the reserve, which had been previously set aside by the Militia Department for this purpose. During the past summer, a party has been in the field making a preliminary survey of the area in question, which is almost entirely forested. A type map will be prepared and detailed studies made of volume, growth and reproduction. This information will be of great general value, since the reserve is in a district which is typical of large areas in Ontario and Quebec. The Forestry Branch is also advising with reference to the conduct of cordwood cutting operations on the reserve, with a view to securing the adoption of good forestry practice. Both the Militia and Interior Departments are to be congratulated upon this interesting and valuable development.

**Merit System
Adopted**

In British Columbia, the outstanding development of the year has been the adoption of the merit system of appointments in the field force of the Forest Branch. This matter is referred to at greater length, under another heading.*

**A New
Forest School**

At the last annual meeting of the Commission, reference was made to the urgent need for the establishment of a forest school in the University of British Columbia. The University authorities have now definitely decided upon this course, but final action has been unavoidably postponed because the forester selected to head the proposed new department is engaged upon war work of an exceptionally urgent character. It is to be hoped that when this special demand is fulfilled, the establishment of the school may take place without further delay. Such a school would strengthen immeasurably the whole forestry situation in the West.

**Timber-testing
Plant Needed**

Sight should not be lost of the need for a timber-testing plant on the Pacific coast, with facilities for the investigation of other local problems connected with the utilization of timber which it is not feasible to have handled by the Dominion Forest Products Laboratories at McGill University, Montreal. For example, if such a plant were now in existence in British Columbia, it could render an exceedingly important war service by testing timber for airplane manufacture, of which large quantities are now being secured in British Columbia. Possibly it may not be too late to secure the establishment of such a plant at Vancouver, for this purpose. Presumably, such action should come about through co-operation between the Dominion Forestry Branch and the province. The Imperial Munitions Board and the Research Advisory Council of Canada have also had this matter under consideration, and it is understood that there is an excellent prospect of favourable action.

WOODLANDS SECTION OF PULP AND PAPER ASSOCIATION

Of great general interest is the recent organization of a woodlands section of the Canadian Pulp and Paper Association. This section has for its objects the stimulation of interest in more economical and efficient methods of protection and utilization of raw materials for pulp, paper and lumber industries; the providing of means for the interchange of ideas among its members, and the encouragement of investigation of woodlands problems. It will thus concern itself definitely with the production of the forest crop,

*See page 11.

just as the technical section of the same association concerns itself with the manufacture or utilization of the crop, after it is produced. This is a notable step in advance, since it involves definite recognition through specific action on the part of the private interests most directly affected, that the forest is a crop which may be reproduced time after time upon the same soil; that the rate of production of this crop may be stimulated or retarded, depending upon whether the methods of cutting are favourable or unfavourable; that the determination of such methods may be facilitated through investigation, co-operation and free discussion; and, finally, that such action is made necessary by the depletion of the most accessible supplies of pulpwood over large areas in all of the provinces of eastern Canada. It is to be anticipated that the Commission of Conservation will be able to secure valuable co-operation from the new section, in connection with the continuation of Dr. Howe's investigation of conditions on cut-over pulpwood lands.

THE PATRONAGE EVIL

Those familiar with the situation know that the greatest single obstacle to the efficient conservation of our forest resources has been the patronage system of making appointments in so many of our fire-protective organizations.

British Columbia Abolishes Patronage The first definite step, through legislative action, toward doing away with this evil in the field services handling fire protection work, has taken place in British Columbia through the adoption of the merit system, under civil service regulations. A Forest Appointment Board has been designated, upon which the lumbering interests are represented, and all appointments are based upon the results of civil service examinations calculated to demonstrate the applicant's fitness or unfitness for the position in question.

Dominion Forestry Should Benefit So far as Dominion lands are concerned, the Commission of Conservation has repeatedly called attention to the urgent need for civil service reform in the outside service of the Forestry Branch. Without it, the efficient protection of Dominion forests is absolutely impossible. As already noted, the Union Government is now definitely pledged in this respect with reference to all branches of the public service. The placing of all appointments in the Forestry Branch strictly on the basis of merit will prove of incalculable benefit in the administration and protection of Dominion Crown lands. The Forestry Branch should be one of the first to benefit by the new dispensation.

**Evil Overcome
in Quebec**

In Quebec, the patronage evil in forest fire protection has been largely overcome by the organization of co-operative associations of limit holders and land owners. These associations have been assisted financially by the provincial Government, and their staffs have been deputized as officers of the Crown. Appointments are thus made on the basis of merit only, with the most satisfactory results.

**Ontario Should
Get in Line**

In Ontario, the newly-organized Forestry Branch has been given a very free hand in the selection of its staff, and the results thus secured have been so satisfactory that the definite and full adoption of the merit system, based on civil service examinations, would seem entirely logical.

In New Brunswick, the contemplated reorganization of the forestry and fire protection work should be taken as the opportunity for definitely eliminating all considerations of patronage in appointments to the proposed new Forestry Division.

THE RAILWAY FIRE SITUATION

As in previous years, the requirements of the Board of Railway Commissioners relative to fire protection along railway lines have been well observed on the whole, and the loss to our forests for which the railways can be held responsible comprises but a small fraction of the total forest fire loss due to all causes.

**Less Clearing
Accomplished**

The shortage of labour has been general and has affected the railways seriously. As a result, considerably less than in normal times has been accomplished in clearing rights-of-way of the annual growth and of inflammable material. However, patrols have, for the most part, been well maintained and railway employees have accomplished excellent results in extinguishing fires, for many of which the railways were in no wise responsible.

**Commission
Responsible for
Reform**

It should be noted that the Commission of Conservation was largely instrumental in securing a considerable portion of the legislation upon which this work is based, and has, during the past six seasons, co-operated effectively with the Railway Commission in its administration. This relationship has brought the Commission into direct contact with all the forestry and fire protective organizations throughout Canada, in a way which would have been impossible otherwise, and this contact has been of the greatest possible value in furthering the work of the Committee on Forests.

**Government
Railways**

The jurisdiction of the Railway Commission now extends to approximately 85 per cent of the railway mileage of Canada. Of lines not subject to the Board's jurisdiction, the most important, from a fire protection viewpoint, are the 4,087 miles of Dominion Government railways and some 350 miles of provincially-chartered railways in Alberta. The legislative requirements with respect to these two classes are in no wise comparable to those imposed upon the Dominion-chartered, privately-owned lines. Legislation was proposed at the last session of Parliament, placing the Dominion Government railways under the jurisdiction of the Railway Commission. Favourable action was, however, not taken, and it is to be hoped that this failure will be remedied at an early date. Representations have previously been made with respect to the provincially chartered lines in Alberta, with a view to the imposition of requirements by provincial authority substantially equivalent to those in Dominion-chartered railways. These representations have continued until the situation is adequately provided for the lines in question run, for the most part, through the forests of northern Alberta, where adequate protection against fire is of the greatest importance.

WHITE PINE BLISTER RUST**Expenditure
for Eradication**

The seriousness of the pine blister disease on the continent is indicated by the fact that in the United States the Federal Government has found it necessary to appropriate, on this account, for expenditure during the current fiscal year, the sum of \$300,000. In addition, the provinces of the white pine region have appropriated some \$200,000, of which more than two-thirds was expendable during the current year. In Canada, the Dominion Government appropriated \$25,000 for the year's work of discovery and eradication, supplemented by an approximately equal amount from the provinces of Ontario and Quebec, the work being handled on a co-operative basis. In both of these two provinces, some twenty scouts were busy during the summer season discovering and eradicating the disease where found on the white pine or on the alternate hosts, the currants and gooseberries, both wild and cultivated.

**Less Serious
in Quebec**

In the province of Quebec, the occurrence and spread of this menace to our white pine forests has fortunately proved less serious than had been feared. Thus far, it has been found only in the counties of Nicolet, Arthabaska, Lotbinière, Jacques Cartier and Two Mountains, and there only on the black currant. Continued vigilance will, however,

be necessary for an indefinite period, on account of the wide distribution of the disease to the south of the international boundary.

Serious Situation in Ontario In Ontario, the problem is proving more serious than had been anticipated. The infection is very general throughout a radius of about one hundred miles surrounding Toronto, with the worst infections in the Niagara district. The infection in the northern counties of Simcoe, Victoria, Haliburton and Peterborough is reported as being in dangerous proximity to the pine area of the Trent watershed. Taken as a whole, the situation in Ontario is unquestionably very serious, and unremitting effort will be necessary if white pine is to retain an important place in the forests of the future. The most serious feature of the situation is the fact that the small seedlings of white pine are most susceptible to the attacks of the disease. Thus, the large areas of natural white pine reproduction are at once threatened, and the policy of planting white pine on a large scale on cut-over and burned-over non-agricultural lands is rendered of doubtful value.

Plant Pathologists Are Needed Competent authorities consider that it is not feasible from a practical viewpoint, to eradicate the disease from the districts already heavily infected. It is, however, believed that much may be done to control or retard the spread of the disease to areas where it is not already found and to minimize its injurious effects where its occurrence is apparently threatening the white pine forests of a given district. To this end, the most vigorous action is imperative by the Dominion Government, as well as by the Provincial Governments concerned. The continuation and extension of the co-operation previously in effect between these agencies is indispensable for the future. It is felt that the Dominion Government should provide additional plant pathologists for this work, and also for conducting investigations of other diseases of trees, especially from an economic viewpoint.

REPORT ON FORESTS OF BRITISH COLUMBIA

The report on the forests of British Columbia, prepared for the Commission, has been completed by Dr. H. N. Whitford and Mr. R. D. Craig, and is now in course of publication. The essential features were referred to at the last annual meeting of the Commission, and it is not necessary to repeat them. The report contains a vast amount of exceedingly valuable data relative to the extent, administration, protection and exploitation of the forest resources of British Columbia, and will unquestionably fulfil an important function in facilitating the intelligent use of these great resources.

Such wide and more intelligent use will tend directly toward the increase of the wood-using industries, on our Pacific coast, thus supporting a larger population, increasing provincial revenues, developing the country generally, and strengthening and increasing the sources of Dominion revenue from which the great war debt must ultimately be paid.

Value of Work Demonstrated

Possibly the question might be raised that work of this kind should not be undertaken during the war. The position of the Commission has, however, been that fundamental information with respect to our natural resources constitutes an essential element in preparedness for war as well as peace. The best possible exemplification of this has occurred within the last few weeks. The successful prosecution of the war demands the construction of airplanes in enormous numbers. For such construction large quantities of wood of specific kinds and of the highest possible grade are indispensable. Sitka or silver spruce is the species for which a very large demand has arisen, in connection. This spruce grows only on the Pacific coast of North America. The production from the United States is sufficient to meet only a small part of the demand from the Allies, aside from the needs of that country, and it has become imperatively necessary to increase the output of airplane spruce from British Columbia to a point never before thought possible. The Imperial Munitions Board, accordingly, requested the Commission of Conservation to furnish information as to the situation and ownership of all important bodies of this timber in Canada. By virtue of having completed the forest survey of British Columbia, the Commission was in a position to furnish the desired information at once, and there is no possible question but that this action has measurably decreased the delay that would otherwise have been unavoidable in getting under way the stimulation of production to a scale commensurate with the imperative demands of the situation. Beyond any doubt, this one service has been worth many times the cost of the whole project. As a matter of fact, the value of any service which tends measurably toward shortening the war can not be measured in mere dollars and cents.

Airplane Spruce

The supply of airplane spruce is by no means unlimited. It is found only in the lower levels, and usually forms only a small percentage of the stand in any given locality. Only the highest grade of timber can be used for airplane construction so that but an exceedingly small proportion of the forest stands in any particular district can be made available for this vitally important purpose. In the southern

portion of British Columbia, it comprises only about 10 per cent of the stand where found in merchantable quantities; on the northern mainland coast, it averages about 25 per cent and, on the Queen Charlotte islands, about 35 per cent. Of the cut, however, only from 10 to 15 per cent is suitable for airplane construction. All this means simply that to secure the very large quantities of the class of material needed, the production of Sitka spruce lumber must be increased far beyond anything ever previously contemplated or thought within the bounds of possibility. Operations must be under way at many different points simultaneously, and to bring this about, specific information as to the location and ownership of all the commercially accessible Sitka spruce timber in British Columbia had to be secured.

**A Distinct
War Service**

As it happened, the Commission of Conservation had ready to hand a far greater amount of specific information along this line than any other agency had or could possibly secure in time to meet the present emergency. Hence this unusual opportunity to render a distinctively war service, of the value of which there can be no question. The services of Mr. Craig in this connection have been particularly valuable, especially in view of his previous contact with various features of the timber business in British Columbia. The highly specialized information which Mr. Craig has acquired has been found so valuable, in fact, that the Imperial Munitions Board has requested the Commission to loan his services for further work in British Columbia, and he is accordingly now in that province for the purpose of furthering this project, upon which another forester, Mr. H. R. MacMillan, is also engaged.

REPORT ON FORESTS OF SASKATCHEWAN

The completion of the report on the forest resources of Saskatchewan has been seriously delayed on account of the illness of Mr. Blumer, who conducted the field investigations for the Commission. It is, however, now expected that this report will be completed at an early date.

SURVEY OF FOREST RESOURCES OF ONTARIO

The Commission hopes to be in a position to begin soon a survey of the forest resources of Ontario, much along the lines of the investigations already made in British Columbia and Saskatchewan, and somewhat similar to the study of the forests of Nova Scotia made at the expense of that province, but the results of which were published by this Commission.

**Present Data
Fragmentary**

Only the most fragmentary data with reference to the forests of Ontario are now available to the public, and the information that exists is so widely scattered that no comprehensive idea of the situation as a whole can possibly be formed at the present time. There is, however, a vast amount of detailed information with respect to specific localities in the possession of timber owners, railway companies, government officers and others. There is reason to believe that a great deal of this information could be secured by the Commission, in the same way that similar information was secured in British Columbia and Saskatchewan, under a pledge that only totals and averages by large areas would be published, and the business secrets of the timber owner protected generally. This project will, however, require a very considerable amount of field investigation, since there are very large areas concerning which no satisfactory data can be secured otherwise. The forest area of the province is of enormous extent, and the collection of this data will be a very large undertaking. For this reason, it is to be hoped that adequate funds may be available for the project, in order that its completion may not be unduly delayed and the work in other provinces postponed indefinitely. Fortunately, the Commission has been assured of the hearty co-operation of the Ontario Government.

This project is too large for one man to undertake alone, with any hope of completing it within any reasonable number of years. Mr. Craig was to have had charge of this work, but his transfer to the airplane work of the Imperial Munitions Board will presumably be effective for not less than six or seven months, possibly more. The Commission must, therefore, consider the advisability of securing another forester, provided a suitable man can be found, to start the collection of data in Ontario at an early date, and to act as Mr. Craig's assistant when the latter's services are no longer demanded by the Imperial Munitions Board.

PULPWOOD STUDY IN QUEBEC

During the past summer, Dr. C. D. Howe has been engaged, for the Commission, upon an investigation of the reproduction and growth of the pulpwood species, after logging, in the St. Maurice valley, Quebec.

This study was initiated as part of a broad investigation, to determine what technical measures are necessary to ensure the perpetuation of the vast pulpwood forests of eastern Canada. This project will necessarily require a number of years for completion, since it will be necessary to place parties in the field in other portions

of Quebec as well as in typical districts of Ontario. Possibly similar work may later prove feasible in New Brunswick, although the investigations under way in connection with the present forest survey in that province will furnish at least a very considerable portion of the basic information necessary.

In connection with the investigation in the St. Maurice valley, the Commission was fortunate in securing extremely valuable co-operation from the Laurentide Company, whose forester had previously collected a large amount of information bearing on the project. The Quebec Forest Service has also furnished some co-operation, and a very considerable extension of this is assured for next year, assuming that funds will be available for the continuation of this project by the Commission.

**Hardwoods
Becoming
Dominant**

Dr. Howe's investigation shows that while the coniferous species comprise about two-thirds of the forest numerically, the proportion is practically reversed in the section of the St. Maurice valley investigated, when we consider the relative space occupied in the crown cover by the conifers and hardwoods. That is, the hardwoods monopolize the light to the extent of about two-thirds, while the softwoods fill but one-third of the crown cover. Thus, the hardwoods are biologically dominant, and this dominance is constantly being increased by the fact that practically all of the cutting is of the coniferous species, principally spruce and balsam. Practically no utilization of hardwoods has yet been found feasible on account of the heavy loss due to sinking when the logs are driven down the streams and lakes.

This region was first lumbered lightly for white pine squared timber between 50 and 60 years ago; then, more closely for white pine and spruce sawlogs about 30 years ago. Since then, practically the whole area has been cut twice, and some of it three times, for sawlogs or pulpwood or both.

The object of the investigation was to determine the condition of these cut-over lands with respect to the regeneration and rate of growth of the present pulpwood-producing species, namely spruce and balsam, with a view of estimating the future crop.

**Using Up
Capital**

The results of the investigation show that the optimistic attitude of lumbermen and limit holders in regard to the reproducing power of this type of forest is not justified. The good yields of pulpwood material at the end of each of the several cuttings in the past 30 years do not represent the amount of growth accrued during the intervals between cutting periods, but are obtained by cutting successively smaller trees, and, in general, lower grade material, and also by including a

larger proportion of balsam in each cut. For example, the spruce stumps were measured and classified according to the age of the cutting on sample plots, totalling 50 acres, and the results are here stated: In cuttings from 15 to 20 years old, the average diameter of the stumps was 15 inches; cuttings 10 to 15 years old, 12 inches; while in cuttings less than 10 years old, the average diameter was 11 inches. This shows a reduction of 4 inches in the average diameter of the trees taken within the past 15 to 20 years. The actual reduction, however, is doubtless greater, since the measurements record the present diameters of the stumps without making allowance for reduction in size by decay in the past two or three decades.

The tallying of the stumps on the sample plots showed the following increase in the proportion of balsam cut for pulpwood: On areas lumbered earlier than 15 years ago, no balsam was cut. In cuttings from 10 to 15 years old, 65 per cent and 35 per cent, respectively, were spruce and balsam. In cuttings 5 to 10 years old, 45 per cent of the stumps were spruce and 55 per cent balsam, while in cuttings less than five years old, the proportion is 22 per cent spruce to 78 per cent balsam.

Potential Pulpwood So far as numbers are concerned, this culled-over forest is well supplied with young growth of potential pulpwood material. The condition of the average acre is represented in the table below:

	Seedlings (trees up to 1 in. diameter)	Saplings (1 in. to 4 in. diameter)	Poles (4 in. to 8 in. diameter)	Trees (over 8 in. diameter)
Spruce.....	635	99	30	6
Balsam.....	3,972	161	59	6

The casual observer is in danger of being misled if he bases his prediction of an abundant future crop of pulpwood upon the number of young spruce and balsam trees beneath the forest. The amount of future pulpwood material, and the time of harvesting the crop, depend as well upon the rate of growth exhibited by the young trees now present.

Rate of Growth Over 2,000 trees were analyzed to determine their rate of growth in diameter, height and volume. While the results of this study have not yet been tabulated, they have gone far enough to justify the statement that within the forest type under consideration, it takes about 40 years for the little spruce trees to acquire a diameter of one inch; 100 years to make a six-inch tree, and 150 years to reach the minimum diameter



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limit of 12 inches, established by the cutting regulations in Quebec, for white and black spruce. Balsam grows somewhat faster. A one-inch tree is made in about 16 years, and it takes in the neighbourhood of 70 years to reach the Quebec diameter limit of seven inches at two feet from the ground.

These statements refer to the time required, under the given conditions, to make a merchantable forest from the seedling stage onward. It will be seen from the foregoing table that there are 30 spruce and 59 balsam trees from 4 inches to 8 inches in diameter already present on the average acre. They will furnish another crop of pulpwood material in time, but here again the time is long. The growth tables show that it will require about 70 years for the 4-inch trees and about 50 years for the 8-inch trees to reach the 12-inch diameter limit. The larger balsam, however, will be merchantable in 10 years or less.

**Cuttings Must
Be Delayed**

There are only six spruce and six balsam trees over eight inches in diameter, on the average acre in this culled forest. This number is too small to justify exploitation alone, so that the next cutting must be delayed until a sufficient number of the smaller trees reach merchantable size. Just how long this will be can not be determined until our figures are more completely digested, but we have certainly gone far enough to disprove absolutely the frequent assumption that such lands can be cut over every 20 years and the same amount of material secured as before. On these heavily-culled lands, it will probably be found that, henceforward, a period of from 30 to 60 years must elapse between cuttings, if only spruce and balsam are to be removed.

It is, of course, obvious from the foregoing that one of the fundamental problems most urgently demanding solution is some method of utilizing the very large quantities of hardwoods, principally yellow birch. If these could be removed, the rate of growth of the spruce and balsam would be accelerated, since the heavy overhead shade would thus be greatly diminished, making more light available for the pulpwood species. As long, however, as the tendency of every cutting operation is to convert the area more and more into a hardwood forest, as is now the case, the problem is exceedingly difficult, if not wholly impossible, of practical solution. Much further investigation will, of course, be necessary before final conclusions can be drawn as to what modifications are necessary in the silvicultural treatment of these forests, which have now become so valuable.

