

DEPARTMENT OF THE INTERIOR, CANADA

HON. CHARLES STEWART, MINISTER

W. W. CORY, C.M.G., Deputy Minister

E. H. FINLAYSON, Director of Forestry

REPORT

OF THE

DIRECTOR OF FORESTRY

FOR THE FISCAL YEAR ENDED MARCH 31

1925

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OTTAWA  
F. A. ACLAND  
PRINTER TO THE KING'S MOST EXCELLENT MAJESTY  
1926

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# FORESTRY

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## REPORT OF THE DIRECTOR OF FORESTRY, E. H. FINLAYSON

This report covers the work of the Forestry Branch for the fiscal year ended March 31, 1925. During the earlier part of the year the duties of the Director as secretary of the Royal Commission on Pulpwood provided an opportunity for this branch to render service to the Commission by furnishing much information relating to the subject of its inquiry, and by facilitating its work in many ways.

During the fiscal year the total revenue has shown an advance of over 30 per cent compared with the previous twelve months. The revenue for the year is the largest in the history of the branch; the amount of dues collected for timber cut on the forest reserves is four and a half times that collected in 1923-4, and is much larger than that collected in any previous year. The larger part of this increase is due to the greater number and value of timber sales, while the prevailing depression in the stock industry is indicated by a further decrease in the revenue from grazing and hay permits.

One of the most encouraging features of the past year has been a noticeable quickening of public interest in forestry. While greater activity in publicity work is undoubtedly responsible for a measure of this increased interest, it is mainly due to the fact that the public is at last becoming seized of the gravity of the timber situation in Canada and of the necessity for the prompt application of such measures as will so decrease the appalling annual wastage and encourage natural regeneration as to preserve a balance between consumption and increment. Of the various publicity measures undertaken during the year, perhaps the most outstanding was the "Save the Forest" week campaign, covering the period from April 27 to May 3. An important feature of this campaign was an essay contest, open to all school children in Canada under the age of sixteen years, the carrying out of which was greatly facilitated by the hearty support of the press. This contest secured the interest not only of the children competing, but also of their parents and teachers; the essays submitted showed considerable literary merit, and the extent to which the idea of forest conservation had taken root in the minds of the children. The prize-winning essays were subsequently printed as a regular publication of this branch; editions were printed in both English and French and distributed throughout the schools of the Dominion.

While the essay contest was the main feature of the campaign, other means of gaining publicity were not lost sight of. A program of exercises was printed and distributed to schools all over the Dominion. The co-operation of various service clubs was obtained, the regular weekly meetings during the week in question being devoted to addresses on the forest situation; special speakers were secured to address the clubs in many cases. Radio entered largely into the campaign, addresses being broadcasted by the Prime Minister, the Minister of the Interior, several of the provincial premiers, and by the members of the

Dominion and provincial forest services. Special cancellation stamps bearing the words "Help Prevent Forest Fires" were used by the Post Office Department during the week, and two of the largest retail organizations in Canada enclosed in all their outgoing mail in the same period fire-warning slips supplied by this branch.

Exhibits were made by the branch at the Provincial Exhibition at Regina, and the Calgary Stampede, and at the Western Canada Soils Products Exhibition at Winnipeg. The most important piece of work in this direction was, however, in connection with the British Empire Exhibition at Wembley. The exhibit of Canadian timbers and forest products shown in the Canada pavilion was designed by an officer of this branch and was erected under his supervision; he remained in charge until the close of the exhibition. This display was the subject of favourable articles in a number of British trade journals and other periodicals.

The British Association for the Advancement of Science held its meeting at Toronto in August, 1924, and it is gratifying to be able to report that forestry was, for the first time, officially recognized by the Association, a permanent forestry sub-section being created. Three papers were read at this meeting by officers of the branch, as follows: "The Facts and Possibilities of Silviculture in Canada", by Mr. E. H. Finlayson; "Forest Fire Protection in Canada", by Mr. D. R. Cameron, and "The Economic Aspect of the Canadian Forest Supplies", by Mr. R. D. Craig. Mr. Craig also collaborated with Mr. Fraser Story of the British Forestry Commission in a paper entitled "The Problem of the World's Timber Supply".

#### FIRE PROTECTION

As a whole the season of 1924 gave a fire hazard above the normal. Saskatchewan is the only province where a normal fire season was reported. In Manitoba, especially in the northeast, the hazard during both spring and autumn was above normal and in the latter season the danger period in the north extended to November, which was much longer than usual. While the number of fires was greater, the area burned over, and hence the timber loss and the expense of extinguishing the fires, was less. Much help was given by local volunteer fire groups. Southern Alberta had comparatively little fire-risk, but in northern Alberta the hazard was serious until the middle of July. Early snowfalls relieved the situation in the autumn. Drought conditions in the autumn of 1923 and the spring of 1924, added to an unusually small snowfall in the winter, were responsible for the serious fire-risk both in Alberta and British Columbia. In the latter province there were two seasons of bad fire-hazard, culminating, respectively, in early May and July; in regard to the number of fires, there was little difference between the season of 1924 and the previous one, though the number of fires was less than the average of the previous four years. An encouraging feature of the British Columbia situation was the fact that few fires were due to incendiarism, for some years a very troublesome cause of fire.

Aeroplanes were again used in Manitoba and Alberta on fire-patrol, and proved very valuable. In the former province, particularly, it was found to be possible to detect and extinguish in a few hours fires that some years ago would have burned for days, even for weeks, undetected.

The total number of fires reported was 1,487; the number of large fires, 495 (33.3 per cent of the total); the total area burned over, 1,185,345 acres; area covered with merchantable timber, 239,320 acres; and the area covered with young growth, 513,012 acres.

## FIRES WITHIN FOREST RESERVES

Cause	1924		1923		1922	
	Number	Per cent of total	Number	Per cent of total	Number	Per cent of total
Unknown.....	28	12	61	35	60	11
Campers and travellers.....	44	20	21	12	51	9
Settlers.....	95	42	43	24	28	5
Railways.....	8	4	30	17	388	66
Lightning.....	5	2	4	2	12	2
Lumbering.....	4	2	2	1	.....	.....
Incendiary.....	32	14	8	4.5	34	6
Brush disposal other than by settlers	3	1	1	0.5	1	.....
Other known causes.....	7	3	7	4	8	1
Totals.....	226	100	177	100	582	100

## FIRES OUTSIDE FOREST RESERVES

Unknown.....	168	13	236	22	292	14
Campers and travellers.....	278	22	193	18	314	15
Settlers.....	322	26	298	28	705	35
Railways.....	300	24	203	19	486	24
Lightning.....	77	6	73	7	105	5
Lumbering.....	22	2	15	1	11	.....
Incendiary.....	60	5	26	2	76	4
Brush disposal other than by settlers	4	.....	12	1	32	2
Other known causes.....	30	2	25	2	30	1
Totals.....	1,261	100	1,081	100	2,051	100

## TOTAL OF ALL FIRES ON DOMINION LANDS

Unknown.....	196	12	297	24	352	13
Campers and travellers.....	322	22	214	17	365	14
Settlers.....	417	28	341	27	733	29
Railways.....	308	21	233	18	874	34
Lightning.....	82	5.5	77	6	117	4
Lumbering.....	26	2	17	1	11	.....
Incendiary.....	92	6	34	3	110	4
Brush disposal other than by settlers	7	0.5	13	1	33	1
Other known causes.....	37	3	32	3	38	1
Totals.....	1,487	100	1,258	100	2,633	100

## IMPROVEMENTS

The reports from both Manitoba and Alberta state that a large amount of improvement work was done during the year; Saskatchewan reports indicate one of the heaviest seasons in the history of the district in this regard. There was comparatively little to report from British Columbia owing to the fact that the original program of major improvements has been practically completed. The following is a summary of the season's improvements:—

	Number		Miles
Ranger station houses.....	2	Telephone lines.....	296
Cabins.....	23	Roads.....	131
Stables.....	9	Trails.....	633
Other buildings.....	25	Fireguards (cleared).....	180
Bridges.....	5	Fireguards (ploughed).....	92
Lookout towers.....	8		
Lookout stations.....	4		
Seed-extraction plant.....	1		
Corrals.....	9		



PLATE 1.—THE ANGLER'S SUPREME MOMENT. (Forest Service Photo. No. 17555).

The scene was photographed in the Bow River forest, Alberta. The fish just landed is a vigorous specimen of cut-throat trout. The picture gives an idea of the opportunities offered to the angler in some of the forest reserves.



PLATE 2.—EROSION DUE TO DESTRUCTION OF FOREST GROWTH. (Forest Service Photo. No. 6426).

One of the first functions of forests in the mountains is to check the washing down of the soil. When the forest growth is destroyed, the soil no longer retains the moisture derived from the fall of rain and the melting of snow. The water runs away unobstructed, washing the soil to lower levels. Instead of a gradual flow of the water the result is torrents in the mountains and floods, often disastrous, in the low lands. The photograph from which the illustration was made was taken in the Banff Forest among the Rocky

## GRAZING

Reports from the Prairie Provinces show a decrease in the use of the forest reserves for grazing; the reason for this is general business depression, added to the fact that the past few seasons have been favourable for the ranging of animals outside the reserves. In British Columbia, where the grazing policy has been inaugurated only within recent years, the use of the reserves for this purpose is increasing, and the ranchers are working toward co-operative grazing under community grazing associations.

## TIMBER OPERATIONS

Saskatchewan officers report one of the best years on record in this use of the forest reserves. The quantity of timber cut under timber sales was over 24,000,000 feet board measure, while the permits increased from 1,092 to 1,500. Manitoba reports show an increased demand, over 1,800 permits having been issued. There was a large demand for permits to cut diseased poplar. A considerable increase in the public demand for timber sales is reported from British Columbia. In Alberta the amount of timber removed was about the same as in 1923, a decrease in the saw-timber being offset by the increased cut of mining timber; the permit business, however, showed a decrease. In all provinces there was a good observance of the brush-disposal regulations and an increased appreciation of their advantages.

## SEEDING AND PLANTING ON FOREST RESERVES

Approximately 21,000 transplants and seedlings of white spruce, jack pine, and Scotch pine were set out in experimental plantations on certain reserves. One hundred and fifty-one acres were also seeded with white spruce and a small quantity of lodgepole pine and Douglas fir.

## RECREATIONAL USES OF FOREST RESERVES

Manitoba reports show increased use of the forest reserves as summer resorts. There are now five resorts within the boundaries of three forest reserves in this province. There is a continual demand for more accommodation, and a new resort was opened during the year at Clear Lake in the Riding Mountain forest reserve. In Saskatchewan, also, in response to a keen demand, a new resort was opened up at Waskesiu Lake, in the Sturgeon forest reserve. In British Columbia an active demand for summer-resort lots is noted, especially at Paul Lake, in the Niskonlith forest reserve.

In Manitoba small game was abundant, especially prairie chicken. In British Columbia fishing was reported good in Paul lake, and improving in Trout lake, in the Long Lake forest reserve. Several lakes in the forest reserves were restocked with pickerel.

## SURVEYS

Surveys of two kinds were in operation on the reserves during the season, namely, working-plan surveys and stock-taking surveys. The former are of a specially intensive character, intended to lead up to the management of the reserves on a sustained-yield basis. Such surveys were run on the Sandilands forest reserve, in Manitoba, the Nisbet forest reserve, in Saskatchewan, and the Cypress Hills forest reserve, in Alberta. Surveys of a less intensive nature, known as stock-taking surveys, were conducted on the Duck Mountain forest reserve, in Manitoba, the Brazeau forest reserve, in Alberta, and the Monte Hills forest reserve in British Columbia.

## SEED COLLECTION

Sitka spruce seed was collected in the Queen Charlotte islands, and 360 pounds were sent to the British Government for their reforestation work. A shipment of 100 pounds of lodgepole pine seed was made to the Korla forest experiment station in Finland; other lodgepole pine seed will be used in experimental planting in the prairie reserves. A new seed-extraction plant was erected at Prince Albert to serve for the extraction of seed collected on the prairie reserves.

## TREE PLANTING ON PRAIRIE FARMS

The number of broad-leaved trees sent out in the spring of 1924 was somewhat larger than the number sent out in the previous spring, and the number of conifers increased over fifty per cent as compared with the number sent out in the spring of 1923. Interest in the growing of fruit trees and ornamental shrubs has been stimulated by the more general realization that such trees and shrubs can be successfully grown in prairie districts when protected by shelter-belts. Practical demonstration of this fact was given by the fruiting this year of ten varieties of standard apples in the small demonstration orchard attached to the Indian Head nursery, notwithstanding a most unfavourable season.

Especially noteworthy during the past winter has been the number of applicants for trees who, having already made successful plantations some ten or a dozen years ago, are seeking to extend them. Some discouraging features, however have been encountered. Unseasonable spring weather caused much winter-killing, especially in southern and central Alberta and southwestern and central Saskatchewan. Subsequent cold weather and drought during the spring caused unusually heavy loss in the cutting stock distributed in the spring of 1924. These weather conditions were particularly unfavourable for nursery work, especially at the Sutherland nursery, with the result that the seedling trees this spring are smaller than the average. The damage done by tent caterpillars was worse during the summer of 1924 than it was during the previous season. Reports by the promoters of tree-planting show that the care of the shelter-belts is well sustained.

## FOREST PRODUCTS LABORATORIES

The outstanding event in the year's work of the Forest Products Laboratories has been the agreement reached between the department and the pulp and paper manufacturers providing for co-operation in the maintenance and extension of the work of the laboratories relating to pulp and paper. The laboratories are winning the confidence of the public to an ever-increasing degree, as is evidenced by the demand for scientific and technical information, which continues to grow steadily from year to year. An illustration of the usefulness of the laboratories is their being entrusted, at the instance of the Canadian National Railways and the province of Alberta, with the task of testing the claims of the Bache-Wiig process of making paper out of straw, which was completed during the year. Methods of evaluating pulps are being developed at the laboratories, and tests for strength and freeness have been worked out and accepted by the Technical Section of the Canadian Pulp and Paper Association. A great deal of the work of the laboratories consists of projects the completion of which will occupy several years. A typical project of this nature is the investigation of the mechanical and physical properties of Canadian woods; in this study tests have been carried on for some years, and the information so gained has been recorded and made available for distribution to the public as the progress of the work continued. Work on the refining and recovery of paper stock from condemned paper currency has also continued for several years, and as a result, certain improvements in the machinery used were sug-

gested. Machines embodying these improvements have been installed in the Department of Finance under the supervision of the officer in charge of the Pulp and Paper Division of the laboratories, and are giving gratifying results. Other major projects undertaken are dealt with by the superintendent in his section of this report.

#### SILVICULTURE AND RESEARCH

An important step was taken for the advancement of forestry by the inauguration of working plans for certain reserves in the West and for the Peta-wawa experimental station in Ontario. Local market conditions dependent upon these reserves have become such that a continuous supply of wood must be provided. Working plans are therefore being prepared, so that the annual cut may be regulated in accordance with the annual growth.

A thinning experiment was conducted in a number of overcrowded stands of lodgepole pine on the Cypress Hills forest reserve, and the results indicate that the cost of operations of this nature may be practically covered by the sale of the timber so removed to farmers in the vicinity.

Experimental seeding and planting has been materially extended in the western provinces and in Eastern Canada. The deductions derived from this work in Manitoba now warrant proceeding with a planting plan for at least one of the reserves.

The investigation of the possibilities of seeding burned-over areas, conducted on behalf of the National Advisory Council for Scientific Research and in co-operation with the New Brunswick forest service, was continued this year. Certain of the methods investigated indicate encouraging possibilities.

Experimental cutting areas have been established on some of the western reserves and on the limits of certain pulp and paper companies of Quebec and New Brunswick, the object being to determine cutting methods most favourable to reproduction, and to the growth of the remaining stand.

Various forest surveys have been undertaken to obtain reliable information on the net rate of growth of timber stands, with particular reference to coniferous species. This study is being conducted on the basis of small permanent sample plots which will be remeasured at stated intervals.

The regular permanent sample-plot studies have been extended materially in all the fields. Such studies as reproduction of desirable species, possibility of converting stands to more desirable species, effect of thinning on dense stands of young growth, and the yield per acre that may be expected on cut-over lands are being conducted by this method.

Some consideration has been given to the possibility of combining an aerial survey with a ground survey in estimating timber. Undoubtedly the amount of ground work required by an ordinary survey can be reduced very materially by the combined method, and at the same time greater accuracy will be secured. The reason for this is that area and type boundaries can be much more accurately determined on an aerial photograph than from an ordinary ground survey. The possibility of improving the present system of estimating timber (the strip system) is also under investigation.

Further work has been carried on in connection with the preparation of standard volume tables in units of cubic feet, board feet by various log rules, cords and ties. Tables for jack pine have been completed, and tables for lodgepole pine, red pine, white birch, and yellow birch are in course of preparation.

#### FOREST RESOURCES AND STATISTICS

The preparation of statistics relating to the forest resources, amount of timber cut, and trade in forest products for the Royal Commission on Pulpwood was an important feature of the work of this division. Information as to the



PLATE 3.—A STAND OF WHITE AND RED PINE BEFORE THINNING. (Forest Service Photo. No. 16188).

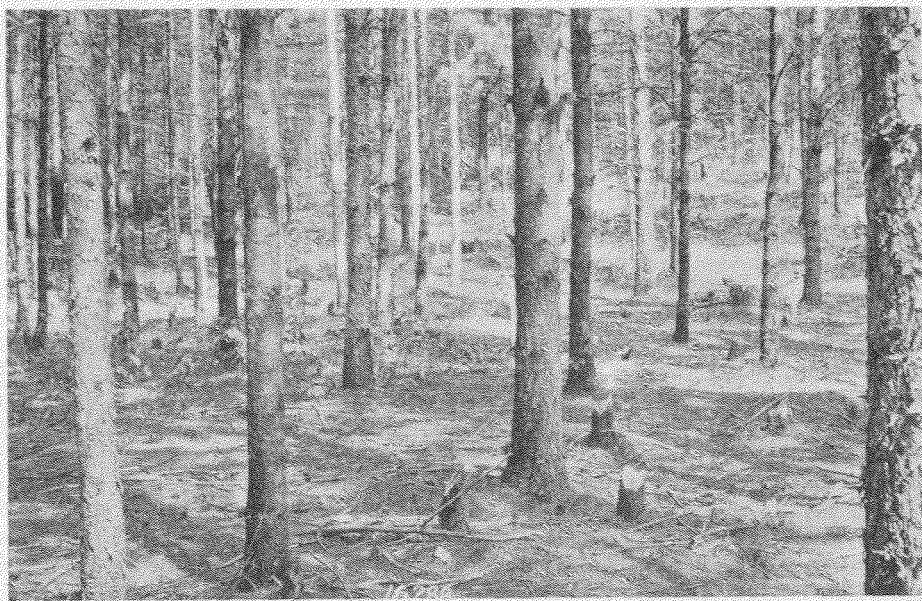


PLATE 4.—THE SAME STAND AFTER THINNING. (Forest Service Photo. No. 16288).

In intensive forestry, the predominant operation is that of "thinning" the forest at intervals. This operation consists in removing inferior and diseased stems so as to give the remaining trees more food and light, thus affording them the best possible opportunities to produce the maximum quantity of high-quality wood. Occasionally a large tree which has itself reached harvestable size and is cutting off the supply of light and moisture from other thrifty trees is removed. Comparison of the two photographs will show how much better chance the trees left after thinning will have than they would have had in the original crowded condition of the stand.

amount of timber of the different species utilized in the form of various forest products, the amounts of timber cut and manufactured in the different provinces, and the trade with foreign countries is kept up to date; and numerous requests for information on these subjects have been answered. Information regarding the losses due to forest fires is secured from the forest-protective organizations throughout the Dominion and compiled so as to show the total area burned each year, the amount and value of the merchantable timber and young growth destroyed, the causes of the fires, and the amount spent in forest protection. A bulletin on the wood-using industries of Quebec is being prepared from information supplied by these industries. At the request of the British Air Ministry, the conditions affecting the production of Sitka spruce lumber for aeroplane construction in British Columbia were investigated and reported on.

#### PUBLICATIONS

The most important publication issued was the Forest Research Manual, which formulates the experience of several years in research work in forestry and will be valuable as a guide for future work. While primarily intended for the officers of the branch, this publication is also proving useful to other Canadian forest services and to forestry officials of private concerns in their investigations.

Two new bulletins were issued during the year, namely, No. 75, "Wood-using Industries of Ontario", and No. 76, "The Pulping Qualities of Fire-killed Wood".

The prize-winning essays from the different districts in the "Save the Forest" week essay competition of 1924 were published both in English and French.

Reprints of Bulletins Nos. 1, "Tree-planting on the Prairies", and 72, "Successful Tree Planters", were issued; both of these relate to the work of tree-planting on the prairies.

The series of "Tree Pamphlets" was continued; eight of these pamphlets have now been issued in both English and French.

A new series of publications, to be known as "Forestry Topics", was also inaugurated. These are issued in inexpensive form, and treat of timely forestry subjects. To date three of these have been issued as follows: No. 1, "Canada in Relation to the World's Timber Supply"; No. 2, "Forest Fire Protection in Canada", and No. 3, "Silviculture in Canada".

#### THE TREE-PLANTING DIVISION

*Norman M. Ross, Chief*

The season of 1924 has been on the whole the most unfavourable both for nursery work and general tree planting over the three Prairie Provinces that has been experienced since the co-operative tree-planting scheme was started in 1901. In the late winter some very unseasonable weather, warm and springlike, occurred, causing the buds to start opening on several kinds of trees in many districts. This was followed by a period of intense cold during which the snow-cover was very scant. In the spring it was found that, as a result of this exceptional weather, there had been some very serious winter-killing. The districts most affected were south and central Alberta and southwestern and central Saskatchewan. While such winter injury is discouraging, most of the trees made a good second growth during the season and should recover completely in the course of a few seasons. Of the broad-leaved varieties in the shelter-belts, ash and caragana did not seem to be affected, and no ill effects were observed in the case of hardy conifers.

The spring was cold, with very little precipitation till well on in June. Consequently growth was very backward under these conditions. Cutting stock had a hard time and the losses in this class of stock were much heavier than usual. The rooted seedlings mostly survived, but made very little growth. Plantations already well established came along quite satisfactorily. During the growing season the southern portions of Manitoba, Saskatchewan, and Alberta received a good amount of rainfall, but generally north of the main line of the Canadian Pacific Railway rain was very scarce. Reports covering the three provinces, however, in spite of the very unfavourable conditions show that on an average 90 per cent of rooted stock and 77 per cent of cutting stock survived in the new plantings.

Special reports made on 5,468 plantations of various ages showed that 73 per cent were in good healthy condition, 20 per cent in fair shape, and 7 per cent failures owing to neglect or unavoidable causes.

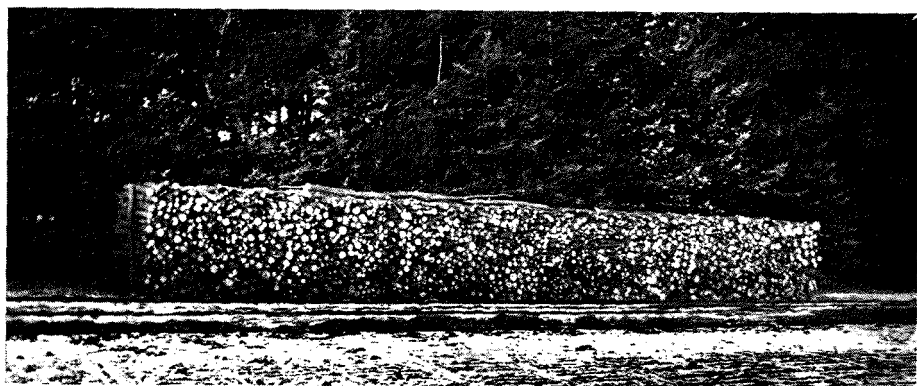


PLATE 5.—PRAIRIE-GROWN FUEL-WOOD. (Forest Service Photo. No. 18321).

The pile of cordwood shown in the illustration measures four and a half cords. The wood is Scotch pine. It was grown in one of the permanent plantations at the Indian Head Nursery, which was planted in 1906. Only suppressed and damaged trees were removed. The area of the plantation is about three-quarters of an acre.

On the whole, great interest is being shown in tree planting and horticultural development. Fruit-growing is receiving increased attention, and wherever a good shelter-belt has been established the farmers are found to be very anxious for information regarding fruit trees suitable for prairie planting, and ornamental shrubs and plants to improve the home surroundings. The department does not supply ornamental trees or fruit stock but it is understood that at present the demand for hardy northern-grown fruit trees is much greater than the available supply.

A feature particularly noticeable this year is the very large number of letters received from men who planted a few trees eight, ten, or fifteen years ago. These men have experienced benefits from tree planting, and are now anxious to extend their shelter-belts.

The tent-caterpillar infestation increased considerably over last year, when it was mainly confined to an area centering on the Moose mountain in Saskatchewan and the district immediately surrounding Edmonton, with smaller centres in the Qu'Appelle valley and between Qu'Appelle and McLean. In these areas native poplars again suffered very severely, trees over large districts being entirely defoliated. The trees, however, leaved out again later in the season. Egg-masses this winter (1924-25) were found at Saskatoon, Regina, and many points farther west. Consequently a much more widespread

infestation may be expected during the coming season. The only other insects reported as doing much injury are the blister beetle, which attacks principally the caragana, and in some districts the poplar and willow leaf-beetles. All these insects can be fairly easily controlled in the plantations, however, if proper steps are taken to spray at the right time.

On the nursery at Indian Head spraying was done for tent caterpillar and larch sawfly, also for the aphid affecting poplar and willow, which seems to be increasing very rapidly almost everywhere. The only insect trouble at the Sutherland station was the larch sawfly, which was controlled by spraying. A small white scale on the spruce seems to be spreading, and may possibly do considerable damage, as it seems very difficult to control. Some badly affected trees at Indian Head were treated on several occasions with different preparations, but without very good results.

According to reports rabbits this past winter did very serious damage in farm shelter-belts, especially in southern Alberta and south and west-central Saskatchewan.

*Nursery Work.*—As previously mentioned the season was most unfavourable. Conditions at Indian Head were much better than at Sutherland, where quite a severe drought was experienced. The stand of seedlings at Indian Head was good, but the growth much less than in normal seasons; therefore the stock to be sent out this spring will average considerably smaller than usual. There will, however, be sufficient stock to supply applicants on the lists.

*Distribution of Broad-leaved Stock.*—The broad-leaved stock available for distribution this spring at Indian Head and Sutherland is as follows:—maple, 1,226,000; green ash, 1,260,000; Russian poplar, 611,250; laurel willow, 603,500; acutleaf willow, 223,500; red willow, 120,000; cottonwood, 5,000; caragana, 1,357,500, making a total of 5,406,750.

*Distribution of Conifers.*—Coniferous stock is available for distribution from the Indian Head nursery in the following numbers: white spruce, 62,720; Scotch pine, 25,835; jack-pine, 4,180; lodgepole pine, 900—a total of 93,635 trees.

Last spring (1924) shipping of broad-leaved stock commenced April 28 and was completed May 9. Evergreens were shipped from May 10 to 20. Of the broad-leaved varieties 5,215,800 were sent out, and the evergreen trees totalled 73,290. In addition to this, 25,600 were shipped for planting on forest reserves, making a total shipment of 5,314,690 of all varieties. There were 4,593 individual shipments of broad-leaved stock made and 436 shipments of coniferous stock.

In the summer of 1924 inspectors from the branch visited 9,358 applicants for trees. Approximately 2,500 new applications have been received during the past twelve months for stock to plant in 1926.

*Collection of Tree Seed.*—The season was not a good season for seed collection. In the Dauphin district 1,230 pounds of dry maple seed were collected. No ash seed could be secured, as the blossoms were destroyed by late spring frosts. About 600 pounds of caragana seed were collected on the nursery at Indian Head and about 100 pounds of maple seed.

About 14 bushels of Scotch pine cones were collected on the Spruce Woods forest reserve from trees set out there in 1905 and 1906. From these cones 6½ pounds of very good seed were extracted. Thirty pounds of red pine seed were obtained from cones shipped from the eastern part of Manitoba; twelve pounds of jack-pine seed were also secured from cones received last season.

The following stock was shipped for reserve plantings: 800 spruce to the Beaver Hills forest reserve, 3,000 jack-pine to the Manito forest reserve, 10,000 jack-pine to the Dundurn forest reserve, 800 spruce to the Duck Mountain

forest reserve, 3,000 jack-pine and 1,000 Scotch pine to the Riding Mountain forest reserve, and 6,000 jack-pine and 1,000 Scotch pine to the Spruce Woods forest reserve.

Measurements as usual were made in the permanent plantations at the Indian Head nursery.

Addresses were given at two meetings in Winnipeg, at Saskatoon, at Swift Current, and at Biggar.

*Visitors to the Nursery Stations.*—From the very large numbers of visitors to the nursery stations, especially at Sutherland, it is evident that the public is taking a keen interest in the subject of prairie tree planting.

## DOMINION FORESTS IN MANITOBA

*H. I. Stevenson, District Forest Inspector*

The Manitoba inspection staff is responsible for the administration and protection of the Dominion forest reserves in Manitoba, for the protection from fire of all Crown timber-lands in the province, and for the supervision, under the Board of Railway Commissioners, of railway fire patrols and the inspection of fire appliances on locomotives.

*Fire Protection.*—Weather conditions in Manitoba during 1924 increased the fire-hazard above normal, more particularly in the northeastern portion of the province. Owing to the very late spring and the rapid growth which followed, the fire-danger period in the southern and southwestern parts of Manitoba lasted only a few weeks, and little or no damage occurred on forest reserves in this area. During the latter part of the season and until the first of November conditions were extremely dangerous in the north, and a large number of fires was reported from northern districts.

The total number of fires reported in Manitoba during the season was 310. This was an increase in the number of fires over 1923 of almost 50 per cent, but, owing to increased efficiency in the fire-ranging staff and better equipment, the actual average area burned in 1924 was 54 per cent less than in the previous year, with a corresponding reduction in timber loss and in money expended for fire-fighting. Of the total number of fires, this year, 206 burned over areas of less than 10 acres in extent.

The percentages of the total number of fires due to different agencies were approximately as follows: campers, 26 per cent; unknown, 25; settlers, 18; incendiary, 11; railways, 11; lightning, 5; travellers, 2; and trappers, 2. The total area burned over was 48,000 acres, the greater portion of which was grass and muskeg lands of little value.

A great deal of credit for the small fire-loss on reserves in settled districts must be given to local volunteer fire-groups. These groups are composed of settlers near the reserve, organized under leaders or chiefs, who assume a measure of responsibility for a certain definite portion of the reserve. Immediately a fire is observed, these men proceed to it, in the meantime notifying the nearest forest ranger. By means of this organization fires are reached quickly and action for their suppression taken without delay.

Seaplanes or flying boats were again used in the Manitoba South and Manitoba North fire-ranging districts. Six machines were available for this work for the greater part of the season, and the officer commanding and staff of the Royal Canadian Air Force in Manitoba rendered valuable aid in the detection of fires and in carrying fire-fighting crews for their suppression. The time spent on flying totalled 1,015 hours, during which some 70,000 miles were covered.

The season of 1924 again demonstrated the excellent results to be obtained in fire protection, over timbered areas in Manitoba, by use of seaplanes. Fires

were detected in the incipient stage, and fire-fighting crews and equipment were placed on the fire-line within one or two hours in almost every case. When it is considered that under the old canoe system fires often burned for days before being observed, and that it sometimes took days or even weeks to place crews on them, the great advantage of using seaplanes is clear.

*Improvements.*—A large amount of improvement work was done during the year. Five cabins and four stables were built on different reserves. Tool and equipment sheds for the storage of fire-pumps and other fire-fighting equipment were erected at different points.

Twenty miles of new telephone line were built, and poles were cut and distributed for a further twenty miles of new line which will be erected during the summer of 1925. Eighty miles of old line were repaired, requiring the replace-



PLATE 6.—A FOREST FIRE WARNING. Forest Service Photo. No. 18278).

The automobile, rendering possible visits to localities hitherto difficult of access, has thus greatly increased the forest-fire risk. Road signs erected at danger points on the roads through the forest reserves bear also cautions with regard to starting forest fires. The other side of the sign in the above picture bears the words "Danger. Go slow".

seventy-five miles of road were widened and repaired. This work required the building of forty-nine new bridges, ranging up to thirty feet in width, and a large number of culverts. Ninety-nine miles of fireguard were ploughed sixteen feet wide, and forty-five miles of old guard disked twice. In addition to this, forty-seven miles of new boundary were cut, varying from eight to sixteen feet wide, and forty-two miles of boundary, cut out some ten years ago, were recut.

*Silviculture.*—The demand for lumber, fuel, posts, etc., increased greatly during the year. Over eighteen hundred permits were issued to settlers in the ment of one thousand poles. Thirty miles of new road were cut, five and one-half miles of which were graded for automobile traffic. One hundred and neighbourhood of the forest reserves, and the quantity of material per permit has averaged greater than any previous year. There has been a large demand for free permits for mature diseased poplar, which it is desirable to remove from the reserve.

The work of investigation of forest conditions and study of growth, density, site, etc., of the different species has continued, and much valuable information has been collected and recorded.

Further experimental plots have been planted under various conditions both with stock from the Indian Head nursery and with plants grown in small seed-beds by the rangers at their stations. Particularly good results have been obtained with locally grown stock.

Special attention has been given to seeding experiments, as it is thought that if a successful means of reproduction by some method of seeding can be discovered it will prove much more rapid and economical than reforestation by planting, which is both slow and expensive.

*Surveys and Estimates.*—An intensive working-plan survey was commenced on the Sandilands forest reserve, the intention being to place this reserve on a sustained-yield basis. Work was continued during the summer months, and a survey of 105 square miles completed. In this connection some 475 miles of strip survey were run, and 111 permanent sample plots were established; maps in detail were prepared and the information collected recorded.

A small survey party working on a stock-taking survey on the Duck Mountain forest reserve covered some fifty square miles.

*Recreational Use of Forest Reserves.*—There is a steady increase each year in the use of the forest reserves for recreational purposes, and this past year the demand for lots at summer resorts was greater than usual. There are already five different resorts situated at large lakes on three of the reserves, and there is a continual demand that other summer resorts be opened and sites laid out. Arrangements have been completed for the survey of an additional resort at Clear lake on the Riding Mountain forest reserve, and an automobile road has been partially constructed which will connect the resort with a number of towns on the northern side of the reserve.

The construction of good automobile roads in the surrounding districts has largely accounted for the increased number of people visiting the resorts.

*Game and Fish.*—There is abundance of small game such as prairie chicken, partridge, etc. Prairie chicken particularly seem to be very plentiful, though they are reported scarce in the open prairie districts. It is probable that as farming is now carried on close to the timber reserves food is easily obtainable. This, together with the fact that small bluffs of timber in the prairie country, which they formerly occupied, have been burned or cut down has changed their habitats to the forest reserves, where both shelter and food can readily be secured. Rabbits are very numerous, and other fur-bearing animals which subsist on them have greatly increased, and can be seen in large numbers.

During the last year several of the lakes on forest reserves were re-stocked with pickerel fry, and fish may now be caught in any of the larger lakes.

*Grazing.*—A still further falling off in the number of cattle and horses grazing on forest reserves is reported. This is accounted for by the fact that farmers have gone out of cattle owing to low prices. There is excellent range and the charge per head for grazing is small, yet not one-twentieth of the range is used. The stock grazed on the reserve were taken off during the autumn in excellent condition.

*Publicity.*—Particular attention was paid to publicity during the year, as it is felt that only in this way can the intelligent co-operation of the people of the province be secured, without which all efforts at fire prevention can accomplish little. The work consisted in distributing to the schools during "Save the Forest" week a program of exercises dealing with the importance of forest conservation. This reached 4,000 teachers and 145,000 pupils in Manitoba, and, as reports indicate, was well received and widely used. A forestry display was arranged at the Western Canada Soil Products Exhibition. Samples of all commercial timbers, fire-fighting equipment, etc., were shown, and fire-prevention literature distributed. Over 200,000 people visited the display and showed keen interest in the work. Fire-prevention literature was dis-

tributed to such organizations as the Western Retail Lumbermen's Association, service clubs, and others, and their co-operation in the work secured. The excellent results obtained from publicity work can be observed in the very different attitude of the people toward forestry work. Where formerly little interest was shown, sympathetic co-operation and assistance is now received from the people.

#### DOMINION FORESTS IN SASKATCHEWAN

*C. MacFayden, District Forest Inspector*

Although no outstanding advance was made in any one line, the work of the year under review has been generally satisfactory.

The area of the forest reserves remained practically unchanged; some small parcels were withdrawn as being of agricultural value, but these in the aggregate are so small that they do not affect the general situation. The proposed Big Stick forest reserve in the southern part of the province, which has been under the administration of this office for several years, was withdrawn from reservation as being, for the present at least, best suited to grazing. The classification of the land within the Pasquia and Porcupine forest reserves extending for some distance on each side of the railway between Peesane and Hudson Bay Junction, was completed during the year, but the matter of the recommended withdrawals from the reserve is still in abeyance.

*Fire Protection.*—The fire season may be said to have been a normal one or perhaps a little more hazardous than normal, but the situation was well met in all directions. The total number of fires reported was 248, the greatest number since 1914, although the resulting loss was very materially below the average for the past ten years. Fires reaching ten acres or over still form a regrettably high percentage of the whole, although in the aggregate they burned over only 0.6 per cent of the total area of the reserves, as against an average of almost 4 per cent per year in the past ten years.

A tabulation of causes shows that the carelessness of settlers ranks first, fires from this cause being 45 per cent of the whole, campers and travellers rank next with 24 per cent.

*Improvements.*—The program of improvements undertaken and completed during the year was one of the heaviest in the history of the district. There was an abundance of labour so that the costs of the different improvements were kept within very reasonable figures. Ten buildings were put up on seven different reserves, but, with the exception of two barns costing \$900 each, these were of an inexpensive nature. On the Nisbet reserve, close to Prince Albert, a small seed-extraction plant was erected at a cost, complete with equipment, of \$983. This plant is capable of supplying the requirements of the Forestry Branch as regards jack pine and white spruce. The heaviest improvement work was the construction or improvement of 341 miles of roads and 287 miles of trails. This work, of course, was not confined to one place or reserve, but was scattered over all the larger reserves and the two fire-ranging districts. The cost averaged \$42 per mile for roadwork and approximately \$17 per mile for trail work.

During the year there were constructed 138 miles of telephone line, averaging \$53 per mile. At the close of the year arrangements were made for the construction of some 70 miles of telephone line (grounded tree-line) along the Saskatchewan river and Sipanok channel in co-operation with The Pas Lumber Company. An eighty-foot steel lookout tower with an enclosed crow's nest was erected on a high hill toward the centre of the Porcupine forest reserve; it commands a view of the greater part of this reserve and a good portion of the Pasquia reserve to the north.

This tower cost, complete, \$1,028 and is expected to be of great assistance in the protection work on this reserve. Two inexpensive wooden towers were

erected by the fire rangers, one in each of the two districts. Following the policy adopted a few years ago considerable work was done in the construction of cleared and ploughed fireguards. There are now in the district 327 miles of guard ploughed to a width of 12 to 14 feet, and 85 miles cleared ready for ploughing when the old stumps have sufficiently rotted.

*Grazing.*—Owing to the unsatisfactory conditions existing in the stock industry, the number of stock grazed on the reserves decreased even in comparison with last year, and amounted to barely one-half of the grazing carried on a few years ago. Altogether 638 permits were issued, these representing 20,257 head of stock, of which 13,688 were cattle. During the year 234 permits were issued authorizing the cutting of 5,538 tons of hay.

*Timber Sales and Permits.*—As regards timber operations the year was one of the most active on record. Five major sales, totalling 11,074,000 feet board measure and 815,000 railway ties, and eight smaller sales were made during the year. Altogether there were 35 sales in good standing, and for the most part actively operated, with a combined cut of nearly 24,000,000 feet, besides some 22,466 railway ties and 1,513 cords of wood; these yielded a revenue of somewhat over \$80,000.

Approximately 1,500 permits for the cutting of various classes of timber were issued during the year. Ninety-seven of these were free of dues, and 1,367 were paid permits at the regular rates. They included, in round numbers, 1,000,000 feet board measure of sawlogs, 156,000 linear feet of building logs, 59,000 fence-posts, 480,000 linear feet of poles and rails, 20,000 cords of wood for fuel, and 30,000 railway ties. As far as possible permits were given for dry or fire-killed material only.

In all timber operations it was required, as in the past, that all brush and other debris be piled and burned, so as to reduce the hazard ordinarily resulting from logging operations. This requirement was carried out without any trouble in practically every instance and the work performed in a highly satisfactory way. A close study was made of the cost of this work and the result shows that 60 to 65 cents per thousand feet, log scale, is an average cost where operators are accustomed to the requirement and look upon the work as a regular part of logging operations.

*Silviculture.*—For the first time jack pine and spruce cones collected on the different forest reserves were treated and the seed extracted and cleaned at the Prince Albert extraction plant, instead of being forwarded to Indian Head as heretofore. There were 504½ bushels of white spruce cones collected, yielding 337 pounds of cleaned seed, and 231¼ bushels of jack pine yielding 113¼ pounds of cleaned seed.

Nursery work was pushed ahead on practically all the reserves and some really good results are being obtained, particularly with Scotch pine and the native jack pine. White spruce is proving a little more difficult to propagate, but the results are far from causing discouragement. A year from now sufficient transplant stock will be on hand to permit of some extensive plantations being started on the southern and more open reserves.

A very detailed survey and inventory was made of a portion of the Nisbet forest reserve with a view to placing some 40 square miles under a definite working plan. The field-work at the close of the year was about complete and the compilation of data well in hand, and it is hoped that the first cuttings under the final plan will be made during the coming winter.

*Miscellaneous Uses.*—There is a very marked and growing demand for use of the reserves for recreational purposes. Residents of the prairie districts are more than ever casting about for summering places within the province. As a result of this interest in the local lakes there was a subdivision made of a small area on the shore of Waskesiu lake within the Sturgeon forest reserve for summer-resort purposes.

## DOMINION FORESTS IN ALBERTA AND BRITISH COLUMBIA

C. H. Morse, *District Forest Inspector*

## ALBERTA

Out of the total area of 18,700 square miles in national forests in Alberta, over 13,000 square miles are to be found on the east slope of the Rockies. There is one large forest of 5,000 square miles in the Lesser Slave Lake country and the other two are smaller tracts with a total area of only 237 square miles. Unfortunately, much of the national forest area was burned over years ago and is now for the greater part covered only with young growth. The young timber is important, however, not only because of its future value but also on account of its effect in protecting the headwaters of streams. As all the important rivers which water the prairies have their sources in the national forests on the eastern slope of the Rocky mountains, it will be realized that these forests are of inter-provincial importance, for on their maintenance depends the evenness of stream-flow.

*Forest Fires.*—The fire season of 1924 was an unusual one in that portions of the province had normal conditions throughout the summer, while others had a bad fire-hazard persisting over a long period. The fall of 1923 had been very warm and dry, the ground being almost parched when winter set in. Snowfall during the winter months was not heavy and the usual rains did not follow the spring break-up. In the north country there was a serious fire-hazard from early in April until the middle of July, but in the south country rains came in the middle of May and continued at satisfactory intervals throughout the season. Fortunately, the fall hazard, usually a very dangerous one, was relieved by a general snow-storm in September.

In the entire district there were 641 fires. The number for 1923 was 669, and that for 1922 was 1,758. At first glance it would appear that the forests fared much better than in previous years; but such was not the case. In 1922 many of the fires were small ones set by railways, but in 1924 there were very few due to this cause, as the mines were closed and very few shipments of coal were made over lines within forest districts. A comparison of areas shows an increase in acreage burned in 1924 over the two previous years. Instead of fires being broadly distributed over the whole province they were concentrated on a particular district in northern Alberta where the facilities for dealing with them, such as exist on organized forest reserves, were not at hand. It is significant that only 20 fires occurred on the national forests, and that 13 of these were on the less organized portion of the Lesser Slave forest reserve. The other forests had a total of 7 fires, which covered an area of less than 30 acres. Railways caused 32 per cent of all fires, although most of them were small. Settlers were responsible for 30 per cent and campers 21 per cent. Only one-half of 1 per cent of the fires were caused by lightning.

*Air Patrols.*—The detection and reporting of fires on and adjacent to the Crowsnest and Bow River forests is the special work of the Royal Canadian Air Force station at High River. Last year the number of fires reported was small, there being none that originated on the national forests concerned. It is felt, however, that the work done is of great importance. Not only do the patrols pick out any fires which occur, but it is also certain that they are an important factor in fire prevention. Campers and travellers who might otherwise be careless are warned of the danger of fire when they see the aeroplanes sailing overhead. The work of this station was well conducted during the season.

*Improvements.*—A large amount of improvement work was undertaken during the year to open up the forests and to secure more rapid communication.

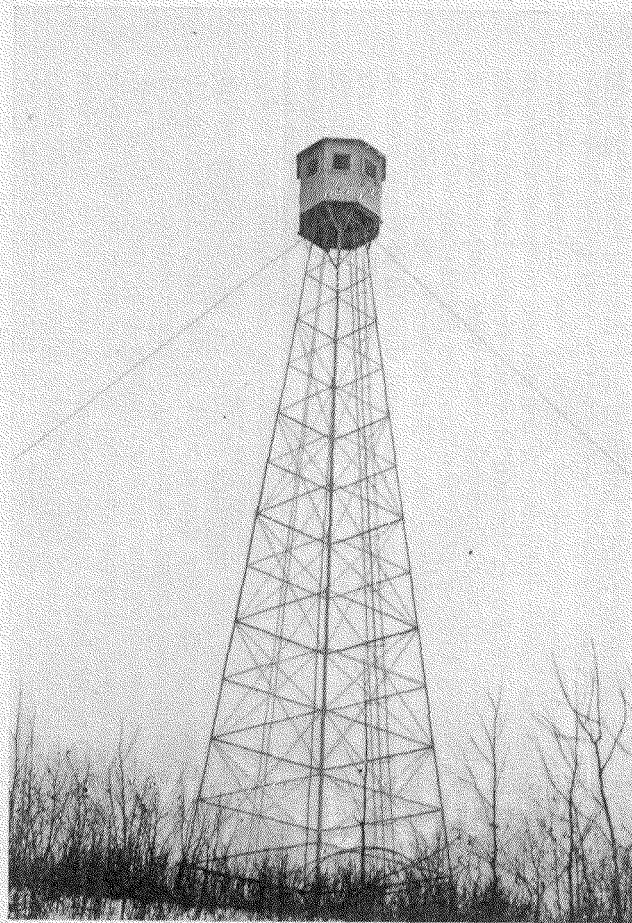


PLATE 7.—THE LATER TYPE OF LOOKOUT TOWER.—(Forest Service Photo. No. 18439.)



PLATE 8.—AN EXPERIMENT IN THINNING. (Forest Service Photo No. 17248).

There were 13 cabins constructed, a seed-extraction plant and some smaller buildings. The system of trails was extended, there being 225 miles of new construction and 130 miles of old trails reconstructed. There were also 12 miles of new road built and 12 miles of old road reconstructed. Seventy miles of new telephone line were constructed. The system of railway fireguards was extended by the construction of  $2\frac{1}{2}$  miles of new fire-lines, and around nurseries and plantations 2 miles of guard were ploughed. Two lookout towers were constructed in the Lesser Slave Lake country.

*Silviculture.*—Two surveys were carried on during the year, one a stock-taking survey on the Brazeau forest and the other a working-plan survey on the Cypress hills. The Brazeau party covered 120 square miles, the data collected being used in the preparation of an inventory of the present and potential stock of that forest. The other party worked on a more intensive scale, the object of the survey being to secure information for the management of this forest on a sustained-yield basis.

The amount of timber removed under authority of timber sales was about the same for 1924-25 as during the previous fiscal year. There was little demand for saw-timber, and sales of this class of material fell off appreciably. On the other hand, sales of mining timber increased, although a large part of the increase was due to the operations of one company which took out an exceptionally large cut in order to fulfil its contract with this branch. Fourteen timber sales are at present in operation, compared with twenty-one at the same time last year. Five new sales have been made, only one of which involves over 1,000,000 feet.

There was a slight decrease both in the quantity of timber removed under permit and in the number of permits issued. This was due to slackness in the lumber market and to labour strikes in the coal-mining areas. Considerable quantities of fire-killed timber were removed under permit, although the more accessible areas of burned timber have already been salvaged. All cutting operations have been very satisfactory with regard to utilization and brush disposal.

Thinnings for the improvement of crowded stands of lodgepole pine on the Cypress Hills forest reserve which were started two years ago in an experimental way have been continued on a larger scale and have been very successful. About fifty acres have been thinned out during the year, and 550 cords of dead and dying trees removed. This material found a ready market as fuel, fence-props, fence-posts, and poles, and was disposed of at a price which approximately covered the cost of thinning. All the thinned material was sold to settlers.

Most of the reforestation work done during the past year was carried out on the Cooking Lake forest reserve. About 150 acres were planted or seeded during the spring of 1924. Of this area about twenty acres were planted with young seedlings of spruce and Douglas fir grown in the local nursery. The remainder was planted in seed-spots. On the mountain reserves small nurseries have been maintained at certain locations for experimental work.

Considerable research work has been done during the year. The most pressing silvicultural problem for the district is the selection of the method to be used to ensure adequate reproduction of spruce on cut-over areas. A general survey and study of the conditions existing on certain cut-over areas was made and on the basis of the conclusions drawn several permanent sample plots were laid out for more detailed study. Much other work was done in connection with the study of brush-disposal costs, market conditions, and other problems of a like nature.

*Grazing.*—During the summer of 1924 there were 28,728 head of cattle and horses grazing on the Alberta forests. There has been a steady decrease in the number of stock under permit during the past four years. The reason

for this is chiefly the general depression in the stock industry but partly, also, the excellent seasons for forage growth, which have resulted in a great deal of feed on ranges outside the forest. The indication is that the number of stock grazed on the national forests will be increased next year.

#### BRITISH COLUMBIA

In British Columbia the area under the administration of the Dominion Forestry Branch is confined entirely to the Railway Belt and the Peace River Block. Owing to the geographical position of the Peace River Block, however, it is handled under the Alberta organization.

*Fire Protection.*—In the Railway Belt the weather conditions during 1924 produced two periods of extreme fire-hazard conditions, the peaks occurring in early May and July. The early spring hazard was unusual and seems to have been general for all the Pacific slope and parts of Alberta. Meteorological reports show a lack of precipitation during the late winter, with cool weather; these conditions were followed by high temperatures at the end of April and the beginning of May, with abnormally low humidity. These circumstances created an extremely dangerous fire menace which resulted in a number of fires getting out of control.

Of a total of 288 fires for the season, 91 (32 per cent) occurred in May, making it the peak month of the season. During the month of June precipitation was normal, but for the month of July hazard conditions again increased, resulting in a total of 88 fires, 30 per cent of the season's outbreaks. During the remainder of the season the occurrence of fire gradually fell off, owing to more favourable weather conditions. The number of fires fought and extinguished during the season shows the slight increase of fifteen fires over 1923, but there is a decrease of 178 fires compared with the average number of fires for the previous four years. Hazard conditions during the fire season were much greater than last season but not so great as in the dry years from 1919 to 1922. The proportion of fires attaining a size of ten acres or over was 33 per cent—practically the same as the previous year.

Sixty-four fires (22.2 per cent of all fires from all causes) were due to lightning, this being the greatest single cause. Not from the bad fire season of 1920 until this year has this cause been the largest. In 1920, 39.1 per cent of all fires originated from lightning. Most of the lightning fires this season occurred during a series of electrical storms in the month of July, but owing to the moist conditions of the forest floor all these fires were extinguished before reaching large proportions. Sixty-two fires (21.5 per cent) resulted from railway operation, but only 2 of these fires got beyond the incipient stage. Forty-eight fires (16.6 per cent) are attributed to settlers, nearly all of which occurred during the latter part of April and the beginning of May, and were the result of clearing operations.

Fires due to other causes were about normal and it is particularly gratifying to note that the fires due to incendiarism are again very low, being even less than in 1923, which season was in remarkable contrast with that of 1922 when 17.14 per cent of fires were recorded from this cause. The distribution of fire outbreak was fairly even for the entire Railway Belt. There were 72 fires in the Coast district. In the Dry Belt there were 28. This latter district includes most of the permanent forest reserves on which only 7 fires occurred, 4 of which were extinguished in the incipient stage. There were 94 fires in the Salmon Arm district and 72 in the Revelstoke or Mountain district.

While there was an increase of acreage burned over in 1924 as compared with 1923, comparison with the year 1922 shows a very favourable decrease. The following areas were burned over in the last three years, including merchantable timber, young growth, slash and old burn: 1924, 18,449 acres; 1923, 7,983

acres; 1922, 109,474 acres. The corresponding losses of standing timber were 21,911,000 feet board measure for 1924, 5,000,000 feet board measure for 1923, and 47,000,000 feet board measure for 1922. The comparatively small loss of timber and the reduced acreage burned over compared with other years of similar conditions indicate that fire-control methods are gradually becoming more effective.

*Improvements.*—During the year no large improvement projects were undertaken on British Columbia reserves. Sufficient primary roads, trails, and telephone lines have been completed in the past years to put the reserves in a state to meet the present demands for efficiency in the handling of timber, fire protection, and grazing and general supervision. However, to cope with problems in various local districts small secondary projects were undertaken. These comprised 27 miles of telephone line, 9 miles of new trail construction, and 2 miles of wagon road. Three small buildings were erected for use as machine shops at ranger headquarters. To facilitate the proper handling of stock on one of the grazing divisions, co-operation was extended to stockmen in the construction of five miles of drift fence.

All telephone lines on the reserves were gone over and put in good working order and many miles of trails were repaired and "brushed out". Work was continued on the improvement of pastures and meadows for handling and wintering government live stock.

In the Coast fire-ranging district two bridges were built over the Chilliwack river and two ranger cabins erected. In the Salmon Arm district the Joss Mountain lookout, which was started last year, was finished. This completes the program for the building of primary lookouts for this district. Three cache cabins were also constructed, and 17 miles of new trail completed. In the Revelstoke district a building was erected to serve as the headquarters office of the district fire ranger. Twelve miles of new trail were constructed. In addition to the construction of the above permanent improvements the usual maintenance work was done on trails, telephone lines, and buildings.

*Silviculture.*—The public appears to be taking more interest in forest-reserve timber and to be becoming familiar with the advantages of the branch's timber regulations, particularly in regard to the possibilities of securing small blocks of timber. During the year 27 timber sales were in operation as compared with 15 last season. Of these sales 7 were completed. In connection with all sales the regulations in regard to close utilization and brush disposal were satisfactorily carried out by the operators. The result accomplished in carrying on operations in accordance with regulations is having a salutary effect on the attitude of operators in the district. They are now realizing that not only is brush disposal inexpensive but that it makes skidding costs lower and leaves the forest free from fire menace.

Most of the timber sales have been made in the Larch Hills and Mount Ida forest reserves, along the Shuswap lakes, and in close proximity to the main line of the Canadian Pacific railway. The bulk of the material removed was intended for railway ties and telegraph poles. About 60,000 ties and 2,000 poles were taken out, as compared with 29,000 ties and 1,200 poles during the previous year.

The production of tree seed has been low during the past season in the entire province, and the amount of seed secured per unit of cones has been much smaller than in former years. On the Queen Charlotte islands 434 sacks of Sitka spruce cones were collected and 360 pounds of seed extracted. This was shipped to the British Government to partly meet the needs of the Forestry Commission for seed of this species. A collection was also made of lodgepole pine cones, and 138½ pounds of seed extracted. Of this seed 100 pounds was shipped to the Korja forest experiment station in Finland; small samples were sent to various

individuals in Britain and Europe who are interested in experimental planting; the remainder was sent to the Prairie Provinces for use in tree planting. Germination tests indicate that the above-mentioned seed will give good results.

The forest survey was continued in the Monte Hills forest reserve and the amount of work planned has been completed.

Research work was again carried on to gather growth data of various species. Experiments were continued in planting of exotic species. Preliminary steps have been undertaken to determine the adaptability of native species to turpentine orcharding.

*Grazing.*—The ranching public appears to be realizing the benefits of controlled grazing under the forest-reserves grazing regulations. The grazing permits policy was inaugurated during 1923 and the increase in the number of stock permitted during the past grazing season after one year's trial indicates that there will be a demand for complete operation of the regulations on all British Columbia forest reserves in the near future. While there have been several individual permits issued for certain ranges, in other localities the ranchers are working towards community grazing under associations. Forage conditions on the reserves containing stock range were excellent, and live stock did well.

Permits issued during the past season amounted to 27, as against 20 the previous year, covering 1,822 head of cattle, compared with 726 the previous season; 99 head of horses, as against 50 head in 1923; and 1,159 sheep, as against 942 during the grazing period of 1923.

*Recreational Uses.*—In the fiscal year there was a great demand on the reserves for camping lots and also lots on which to build summer homes. This was particularly the case on the Paul Lake summer resort in the Niskonlith forest reserve. Plans have been made to survey additional lots to meet the needs of the public. Fishing conditions continue good in Paul lake; and in Trout lake, on the Long Lake forest reserve, fishing has improved.

## FOREST PRODUCTS LABORATORIES OF CANADA

*W. Kynoch, Superintendent*

The demand for scientific and technical information and for service generally, showed marked expansion as compared with the preceding twelve months, the number of inquiries dealt with exceeding those of any previous year since the establishment of the laboratories.

A notable forward step in research was taken during the latter part of the year when a co-operative arrangement was entered into with the Canadian Pulp and Paper Association, representing the pulp and paper manufacturers of Canada. This arrangement will render it possible to extend considerably the scope of the work of the laboratories so as to meet, to a greater degree than has yet been practicable, the immediate requirements of the industry.

By virtue of this arrangement it will be possible not only to bring the work of the laboratories into closer touch with actual conditions in the industry, but also to undertake the investigation of a much wider variety of problems, many of which are peculiar to this industry and which urgently demand solution. A definite program of work has been outlined, and it is expected, by this co-operation, to increase the usefulness of the laboratories to the industry, and through it to the public generally. The scheme becomes effective on April 1, 1925.

Material advances were made in investigative and related work, the principal problems dealt with being briefly reviewed below.

## DIVISION OF PULP AND PAPER

*Production of paper from straw by the Bache-Wiig Process.*—Object: To investigate the claims of the inventor of the process and to ascertain the nature of any technical difficulties likely to be encountered in applying it commercially.

The immense quantities of straw annually produced in the grain fields of Western Canada await industrial utilization. The attention of the Canadian National Railways and the province of Alberta having been attracted to the Bache-Wiig process as a possible means to this end arrangements were made

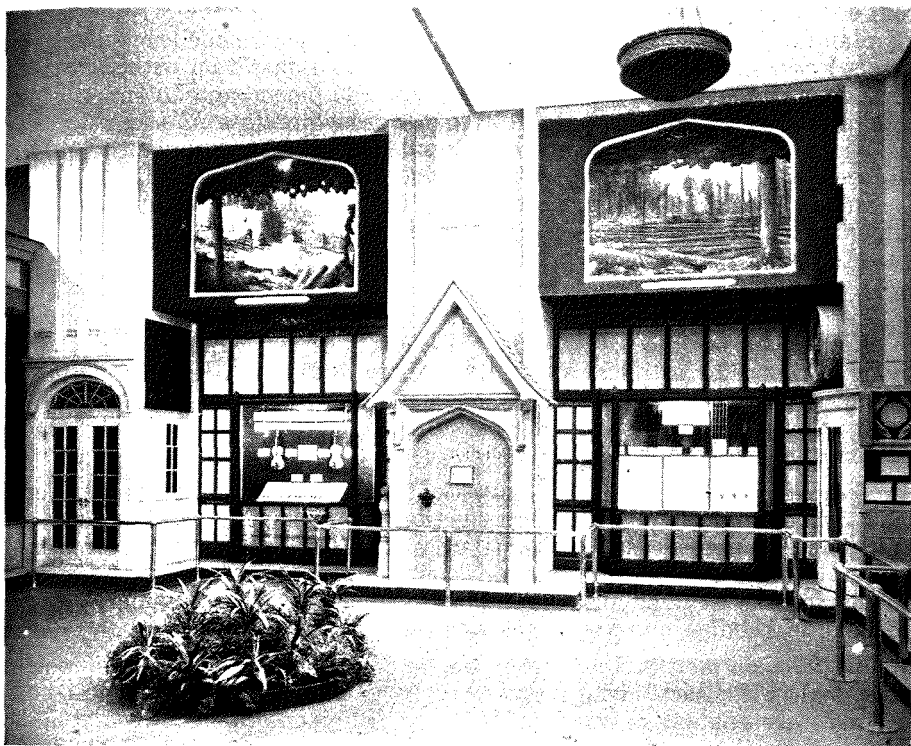


PLATE 9.—CANADIAN WOODS AT WEMBLEY EXPOSITION

This illustration shows a portion of the striking and educative exhibit prepared under the superintendence of the Forest Products Laboratories for the Wembley exposition. The method of demonstrating the suitability of Canadian woods for structural and industrial uses is well exemplified in the cut. Two of the four paintings depicting the history and progress of the lumbering industry are included in the illustration; a number of other pictures also showed lumbering and manufacturing scenes. Striking features of the exhibit not shown in the illustration were a model of a pulp and paper mill (made to scale), several rolls of paper twelve feet wide, and timbers (chiefly Douglas fir) of exceptional size—in length up to 64 feet, and in cross-section up to four and a half feet square, respectively. Various subordinate forest products were also included in the exhibit.

whereby the laboratories undertook an investigation of the process. The work, which was completed, involved extensive pulping trials and also the manufacture of a sufficient stock of paper of various qualities to substantiate the findings made, the whole being on a semi-commercial scale.

*A study of the resin in jack pine.*—Object: To make an exhaustive chemical study of jack pine resin with a view to devising an industrially applicable method of eliminating those features of the resin which prevent the utilization of jack pine for mechanical pulp. Serious difficulties were met with in the

research procedure. The work was steadily prosecuted throughout the greater part of the year, but a satisfactory solution of the problem has not yet been reached.

*Pulp Testing.*—Object: The development of a method of evaluating pulps which shall be sufficiently reliable to be adopted as standard by the pulp and paper industry. Proposed methods of testing for strength and freeness were formulated, submitted at the annual meeting of the technical section of the Canadian Pulp and Paper Association, and duly adopted.

*Refining of waste-paper stock.*—Object: To develop improved methods of recovering paper stock from the condemned paper currency officially withdrawn from circulation. The work done last year indicated that the existing macerating plant of the Department of Finance should be remodelled. During the present year the laboratories gave much time in co-operation with that department, to working out the details of the new equipment and to supervising its installation. This work was completed towards the close of the year. Trial operation of the plant gave excellent results, and the possibility of enlarging it to deal with Government waste paper generally was suggested.

In addition to the above miscellaneous investigations were conducted by the Pulp and Paper division. These included dealing with improvements in the processes and products of the pulp and paper industry.

#### DIVISION OF TIMBER PHYSICS

*Kiln-drying.*—Object: To study the essential principles involved in the drying of timber by artificial means and to improve present kiln-drying practice. In continuation of previous work a systematic study of drying-kilns was carried out at some thirty plants, and co-operation was given in dealing with practical problems encountered in the drying of woods.

*Wood-bending.*—Object: To investigate the principles involved in bending wood with special reference to the reduction of breakage. A preliminary study of bending equipment and practice was made at several factories. At the request of a large manufacturing concern, attention was then given to the problem of the bending of oak implement-handles. A preliminary study of breakage in bending elm keg-hoops was also conducted.

*Equilibrium moisture content of Canadian woods.*—Ten species of wood are being dealt with, each being represented by a number of selected test-boards. The moisture content of each board is carefully determined weekly, a large number of weighings and subsequent calculations being involved.

Other work conducted by the division included the compilation of a detailed report presenting the results of a study of decay in pulpwood, a considerable number of wood identifications made in the course of the work or in response to requests from firms or individuals, and a preliminary study of fibre length in slow-growing black spruce.

#### DIVISION OF TIMBER TESTS

*Mechanical and physical properties of Canadian woods.*—Object: To establish authoritative data on the strength and certain physical properties of all Canadian timbers of present or prospective industrial importance. During the period reported upon a total of nearly 6,000 tests and determinations was made. Results which are kept constantly up to date were widely distributed during the year in the form of blue-prints.

*Nail-holding power of woods.*—Object: To ascertain the relative capacity of the leading commercial woods to retain nails. Over 600 tests were made and the information obtained was in considerable demand throughout the year.

*Effect of age on the strength of casein glue.*—Object: To determine whether or not any change in the effectiveness of casein glue takes place with lapse of time. Some 250 tests were made at predetermined intervals. The results indicated that no diminution in strength occurs in properly made joints up to one year.

*Comparative strength value of Canadian woods for ties.*—Object: To secure adequate data in regard to woods which are now being used by Canadian railways for ties, or which might be so used. The investigation was carried on in co-operation with the Canadian National Railways, which supplied the ties. Ten different species of hardwood were studied. Some 1,300 tests and determinations were made, completing the work on the woods studied.

*Spike-holding power of jack pine ties affected by red stain.*—Object: To obtain reliable information as to the relative ability of red-stained and unaffected jack pine ties to hold railway spikes. A supply of ties showing typical red stain was selected and the work was well advanced by the close of the year.

Many miscellaneous studies and tests were made, including a study of the so-called "hazard machine" used in testing the strength of containers, a series of tests on telephone top-pins of native woods, tests of laminated-wood automobile bumpers, strength of hardwood flooring, preliminary work on the relative mechanical and physical properties of Baltic pine and certain Canadian woods, with reference to the possible use of these woods for paving blocks in Great Britain.

#### DIVISION OF WOOD PRESERVATION

*Relative penetrability of Canadian woods with creosote oil.*—Object: To secure reliable data as to the relative ease of penetration of commercial woods with creosote oil in pressure treatment. By the close of the year, seven hardwood species had been investigated.

*Service tests of jack pine ties affected by red-stain and red-rot.*—Object: To secure some reliable information as to the effect of red-stain and red-rot in jack pine ties on the life of the creosoted ties in the track. A plan for such service tests was developed by the laboratories in co-operation with the Canadian National Railways. Four hundred ties were selected by the representative of the laboratories at points in northern Ontario and forwarded to a creosoting plant to be conditioned for treatment. When treated these ties will be placed in track and inspected yearly, detailed information on all factors of importance being recorded.

*Scheme for test tracks.*—While not in itself an investigation, this scheme is designed to facilitate investigative work in connection with the life of ties in relation to various processes of treatment. As the result of an investigation carried out in co-operation with the Bureau of Economics of the Canadian National Railways a new scheme for test track was evolved and was submitted to the railway authorities for their consideration.

A considerable amount of miscellaneous work of an investigative or related character was also carried out by the division. This included co-operation with the Canadian National Railways in reaching a satisfactory working arrangement as to acceptance or rejection of jack pine ties affected by red stain and red rot; analytical examination of creosote and crude oils; relative merits of creosote oils of different specifications for the treatment of hardwood insulator pins; relative creosote absorption in birch, beech, and hard maple ties under the same treatment.

*Exhibits.*—During the greater part of the year the exhibit specialist was on transfer to the staff of the exhibition commissioner and was on duty at the

British Empire Exhibition at Wembley, England, where he was in charge of the timber and wood-products exhibit.

Requests from schools and institutions for authentic specimens of Canadian woods continued, and a number of sets were prepared and distributed in response. Fifty special sets were also prepared at the request of the Canadian Superintendent of Emigration, London, England, and duly forwarded.

*Other Information Furnished.*—The demand for scientific and technical information or advice concerning timbers and derived products is steadily increasing and the supplying of such information is an important service offered by the laboratories. The number of inquiries dealt with during the year exceeded 600, a greater number than in any previous year.

Technical service in the analysis of pulps and papers and the identification of woods, which is given without charge, was again in much request. Addresses were delivered by members of the technical staff at meetings of scientific and other societies and associations. The articles, bulletins, etc., issued from the laboratories since their inception, including this year's contribution, now exceed one hundred.

#### REVENUE, FORESTRY BRANCH, FOR THE FISCAL YEAR

The statement of revenue follows on page 31. Under "Timber Permits," the kinds, and total quantities of timber authorized to be cut from all reserves were:—

Poles or rails (Number).....	109,635
Fence-posts (Number).....	183,231
Saw-timber (Ft. B. M.).....	7,578,043
Railway ties (Number).....	15,991
Mine timber (Linear ft.).....	128,050
Building logs (Linear ft.).....	764,937
Fuel-wood (Cords).....	51,171

Under "Grazing Permits" the kinds and total numbers of stock ranged on all reserves were: cattle, 3<sup>a</sup> 461; horses, 11,197; sheep and hogs, 6,608.

**STATEMENT OF REVENUE, FORESTRY BRANCH, FISCAL YEAR ENDED MARCH 31, 1925**

Reserve	Number of timber sales operating	Revenue from timber sales	Number of timber permits	Revenue from timber permits	Number of grazing permits	Revenue from grazing permits	Other Sources of Revenue					Total revenue all sources
							Hay permits and seizures	Surface rentals	Special uses	Tree seed	Miscellaneous	
		\$ cts.		\$ cts.		\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.
Duck Mountain—Manitoba.....	1	248 15	259	2,914 23	18	235 75	142 50	365 71	85 00			3,991 34
Porcupine No. 1—Manitoba.....	1		75	1,184 17	1	16 00	10 90		114 00			1,325 07
Riding Mountain—Manitoba.....	3	15,094 76	1,780	12,844 47	37	266 60	588 50	433 20	903 00			30,130 53
Sandilands—Manitoba.....			51	433 02			44 75					477 77
Spruce Woods—Manitoba.....			32	105 25			76 75					182 00
Turtle Mountain—Manitoba.....			34	145 35	46	427 00	218 50	72 90	43 00			906 75
Beaver Hills—Saskatchewan.....			32	79 75	8	79 76	151 00		1 00			311 51
Big River—Saskatchewan.....	1	960 74	58	1,309 66	6	238 32	21 75		61 50			2,591 97
Big Stick—Saskatchewan.....					230	4,731 30			18 00			4,749 30
Dundurn—Saskatchewan.....			46	157 00	20	370 48			8 00			535 48
Elbow—Saskatchewan.....			94	245 25	100	947 90	37 00		135 10			1,365 25
Fort à la Corne—Saskatchewan....	5	750 82	200	1,181 05					74 00			2,005 87
Keppel—Saskatchewan.....			106	292 25	69	477 28	4 00		12 00		3 50	789 03
Manito—Saskatchewan.....			176	980 34	111	2,304 77			35 00			3,320 11
Moose Mountain—Saskatchewan....			197	954 20	41	392 36	170 25	174 65	275 00			1,966 46
Nisbet-Pines—Saskatchewan.....	3	413 27	366	2,749 06	23	163 08	2 50	27 00	180 95			3,535 86
Pasquia—Saskatchewan.....	23	54,959 25	166	2,429 74	10	56 24	7 00		91 15			57,543 38
Porcupine No. 2—Saskatchewan....	7	4,789 99	152	1,772 73	5	82 42			279 00			6,924 14
Seward—Saskatchewan.....					29	780 73	51 50		27 00			859 23
Sturgeon—Saskatchewan.....	2	751 73	28	131 90	6	59 00	19 75	10 00	65 00			1,037 38
Athabaska—Alberta.....			1	2 00	6	90 04			46 00			138 04
Bow River—Alberta.....	1	1,272 37	74	2,322 34	114	4,141 52	20 75	5 00	85 50			7,847 48
Brazeau—Alberta.....	9	8,889 06	46	1,180 23	51	173 46	1 75	1,576 20	154 00			11,974 70
Clearwater—Alberta.....	4	9,221 74	73	595 00	73	456 87	13 50	1,133 86	274 53			11,695 50
Cooking Lake—Alberta.....					40	388 02	77 75		2 00			467 77
Crowsnest—Alberta.....	3	991 12	228	1,155 87	175	7,211 51	2 50	45 29	479 00			9,885 29
Cypress Hills—Alberta.....			508	1,905 88	125	3,095 88	18 50	65 45	76 19			5,161 90
Lesser Slave—Alberta.....	2	9,835 56					68 25		14 00			9,917 81
British Columbia Reserves.....	20	6,975 01	49	249 94	19	447 70	46 75	280 41	212 84	12,395 47	36 92	20,645 04
Indian Head Nursery, Sask.....											3,201 75	3,201 75
Forest Products Laboratories.....											462 46	462 46
Petawawa Exptl. Station.....	1	1,250 00										1,250 00
<b>Totals.....</b>	<b>86</b>	<b>116,403 57</b>	<b>4,831</b>	<b>37,320 68</b>	<b>1,363</b>	<b>27,633 99</b>	<b>1,796 40</b>	<b>4,189 67</b>	<b>3,751 76</b>	<b>12,395 47</b>	<b>3,704 63</b>	<b>207,196 17</b>

NOTE.—In addition to the revenue of \$207,196.17 shown above, the sum of \$87,523.39 was receivable on account of timber sold on licensed timber berths within forest reserves and was collectable through the Timber and Grazing Lands Branch.