

DEPARTMENT OF THE INTERIOR
DOMINION OF CANADA

REPORT

OF THE

SUPERINTENDENT OF FORESTRY

PART X, ANNUAL REPORT, 1905

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REPORT OF THE SUPERINTENDENT OF FORESTRY.

DEPARTMENT OF THE INTERIOR, FORESTRY BRANCH,
OTTAWA, September 26, 1905.

W. W. CORY, Esq.,
Deputy Minister of the Interior,
Ottawa.

SIR,—I have the honour to submit the annual report on forestry, for the fiscal year ending June 30, 1905, being the seventh annual report from this office.

Reports from the assistant superintendent, the inspectors of tree planting and others employed in forest protection and propagation will be found in the appendix.

With a view of studying on the ground the forestry methods at present in practice in certain European countries, I made a visit to them during the early summer. In addition to visiting the forests of Germany and France I also had the privilege of seeing the forest school at Cooper's Hill, in England, of Nancy in France and of Munich in Bavaria. The conclusion I formed was that the conditions in these older countries were so different from those existing in Canada that while we can gain very valuable information from them it would be impracticable and unwise for us, at present at least, to adopt their methods. The conditions existing in Canada differ so much from those of any other country, especially from those I have mentioned, that I am decidedly of the opinion that we will have to work out a system essentially our own. We have already made a start and to a certain extent laid the foundation of a service which I believe can be developed to very great advantage to the country in the future. It is, however, necessary for us to have skilfully trained men, and at present as we have no forestry schools in Canada we are compelled to engage those who have been educated in other countries. I believe the day has now come when a number of practical foresters would find employment in Canada if they had an opportunity of gaining a technical knowledge in a home forestry school and a practical knowledge by spending their winter vacations in our lumber camps. In addition to those who would obtain employment by the governments of the Dominion and the provinces, the lumbermen of the country would probably find it to their advantage to employ such men to examine their timber limits and make recommendations regarding the cutting of them and in many cases to superintend the work. The establishment of a forestry school, combining theoretical and practical instruction, should be the next step in our educational advancement.

Before dealing with the details of the work of the branch, it may be well at this stage, when we are endeavouring to develop a forestry policy, to consider what should be the aims for the future of those entrusted with this work. Whatever is done to-day should be on a plan capable of development in the future. We have only made a commencement in a vast field.

The existing forests under control of the Dominion are of immense extent, covering nearly a million square miles of territory, three-fourths of which is not adapted for agriculture and consequently should be left for the growth of timber. The vast northern forests of spruce, extending as a zone from ocean to ocean, if properly protected and utilized, will be the world's main supply for timber in the time of scarcity, which is not far distant. The nations of Europe are busy growing this tree from seed, and a period of a hundred years or more has to elapse before the time for cutting arrives, while here we have great areas of full grown trees ready for the axe; as well as others in every stage of growth, which with care in their protection and a proper system of harvesting will afford a perpetual supply. The white pine has hitherto been king in

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our Canadian forests, but the original white pine never extended over one-tenth of the area covered by the spruce, and it has now been so depleted by the axe and by fire as to render the future supply of that timber entirely insufficient for the demand. The spruce, while perhaps somewhat inferior for general use, is for building purposes one of the nearest substitutes we have to offer, and is now largely used in its place.

It is unfortunate that this tree is so easily killed by fire and that the conditions prevailing in our northern country owing to the thin soil covering and the growth of moss on the rocks render fires when once started there very destructive. These forest fires originate in various ways. In some cases they are caused by lightning, but much more frequently from carelessness on the part of those travelling through the country. The appropriation granted for forestry purposes has enabled the department to employ a limited number of forest fire rangers during the past few years, and the results have been very encouraging. A good example of this is afforded in the railway belt in British Columbia. This belt consists of a tract of land about 500 miles long by 40 miles wide, 20 miles on each side of the main line of the Canadian Pacific Railway, so situated as to be more liable to fire than perhaps any other part of the province of equal area. Five years ago this territory was divided into a number of districts and every season since rangers have been employed during the dry summer and autumn months, one ranger having charge of each of the districts. Prior to the introduction of this system scarcely a season passed without the destruction of millions of feet of valuable timber within the belt, whereas since the establishment of the service, notwithstanding that we have had a number of very dry seasons, practically no loss has been sustained within the belt, while outside of it very great destruction has taken place.

Various estimates have been made of the quantity of merchantable timber on land under the control of the Dominion government, but the information at present is so meagre that any calculations on the subject can only be regarded as mere estimates drawn from very limited data, but there can be no question that the total quantity is enormous, and though the quality in some cases may be inferior for lumber purposes it is well adapted for pulp. When we remember that the whole country abounds in streams affording excellent water-power, there seems little doubt that the great wilderness lying north of our fertile land which may appropriately be termed Canada's wood lot will yet furnish through its forests alone employment for a considerable population, and with proper management should continue to be a permanent source of wealth to the country.

Though the climatic conditions of our far northern regions, as above stated, render them unsuited for the labours of the husbandman, the example afforded by the Yukon teaches us that products of the mineral kingdom are not confined to southern latitudes, and it is impossible to foretell the stores of mineral wealth that may yet be found in those regions; and one of the great requisites in mining is timber. Dr. David T. Day, of the United States Geological Survey, stated in a paper read before the American Forest Congress last January that a fair estimate of the whole quantity of timber used in mining in the United States would be 400,000,000 cubic feet a year. Another essential in successful mining, especially in gold mining, is a continuous supply of water, but we are here touching on a subject of very wide application, namely, the forest as a conservator of water supply. As I have said elsewhere, if we permit the destruction of this forest by fire or otherwise the results will be disastrous in many ways. To say nothing of the evil effects on the climate of the fertile lands farther south that would result from the destruction of this barrier against the northern air currents, the severe winter of those high northern latitudes will be made almost intolerable by the winds that will blow uninterruptedly over the denuded land; the streams bereft of the present natural reservoirs which the forest covering at their sources affords will then be torrents in the spring time and dry in the summer and winter months, causing destruction to the fish and to navigation; the fur-bearing animals and game will practically disappear, and instead of having a land with many possibilities we will have an arctic desert.

Second only in importance to protection from fire is a proper system of cutting.

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The practice of setting aside and reserving certain tracts for timber purposes, known as timber reserves, has been in force for some time, but the object of intelligent forestry is not simply to preserve the forest, but to utilize it so as to produce the greatest benefit to the public. There is no more reason for refusing to cut and use the full grown tree when there is a demand for it and when, thereafter, it would only deteriorate in value, than in refusing to cut and use any other product of the vegetable kingdom. A great work for forestry in Canada, in addition to forest protection, will be forest utilization; in directing the way so that the public will receive the fullest benefit that can be derived from the use of the product. A very important work too is in gaining information and setting aside certain timber tracts as timber reserves. Any timbered districts unfit for agriculture should be so set aside. As soon as possible these reserves should be carefully examined and an inventory taken of the different varieties of timber growing on each reserve, and also of the dead timber. Regulations should then be made to suit each individual case and carried out under the supervision of the Forestry Branch. A commencement has been made in this direction this season in the Turtle Mountain timber reserve. The work is being done under the supervision of Inspector Craig of this branch, and Mr. H. R. McMillan, with an assistant, is doing the work in the field. When the field work is completed a plan will be prepared variously coloured to show the timber on each section. In addition to this we will have tables showing quantities and varieties of wood, rate of growth, &c., and also the estimated quantity of dead timber. With this information we will be able to determine what portions will bear further thinning without permanent damage to the reserve as a timber producing district. Encouragement will be given to settlers to remove the dead and decaying timber rather than as heretofore cutting the young growing trees. In other words the object aimed at will be to make this tract of land of the greatest possible utility in the growing of timber for the use of the settlers on the surrounding prairie. It is expected that this work will be completed in time to make a beginning on the Moose Mountain reserve before winter sets in, the work there to be continued next season.

FOREST TREE PLANTING.

The system of co-operation between the department and the settlers on the plains of Manitoba and the North-west Territories in the growing of forest trees, which was started in 1901, is now assuming large proportions. The reports of the Assistant Superintendent and the inspectors employed in this work will be read with interest as showing the gratifying results that have followed the carrying out of this plan. These plantations not only benefit the individual and the people living in the neighbourhood where the work is done, but in addition they afford object lessons in tree cultivation to the settlers in all parts of the prairie region.

There have been distributed from the nurseries to the settlers this season 1,860,000 seedling trees and cuttings. This makes a total distribution since this work was started in 1901, of 5,102,750. Besides this a considerable quantity of seed has been given out during the same time. The applicants to be visited this season number about 2,900. Of these 1,400 reside in Manitoba and 1,500 in the Territories.

FOREST NURSERY STATION.

The Assistant Superintendent's report gives details of the year's work at our new nursery station at Indian Head. In a year or two more the whole work of growing stock for distribution will be centralized at this station. In addition to the growing of this nursery stock it is proposed that different varieties of trees will be raised here in small plantations under forest conditions from which valuable data will be obtained for the use of settlers who are engaging in tree culture in the country.

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PLANTING IN THE SAND HILLS ON THE SPRUCE WOODS TIMBER RESERVE.

Last year between nine and ten thousand seedling Scotch pine were planted in the sand hills on the Spruce Woods timber reserve. Owing to the very dry weather last season more than half of these died, but this spring some thirteen thousand more were planted under more favourable conditions, and as the weather has not been nearly so dry as it was last season much better results have been realized. A recent examination shows that over 90 per cent of these are now living and appear hardy. A more detailed account of this work will be found in the report of the Assistant Superintendent.

LECTURES.

As heretofore this branch has endeavoured to comply with frequent requests made for lectures on forestry. During the past year the Farmers' Institute meetings in the west have usually been attended by an official from this branch, and I have addressed meetings in Winnipeg, Toronto and several other places on the subject.

CANADIAN FORESTRY ASSOCIATION.

This association continues to gain steadily in membership and influence. It is exceedingly gratifying to the promoters and to the friends of forestry throughout the country to witness the increasing interest from year to year that is manifested in the great forestry problem in this country. At the beginning of the year a forward step was made by the association in starting a forestry quarterly which is already doing excellent work, and probably it will not be very long till the directors will feel warranted in changing it to a monthly publication.

FOREST FIRES.

So far this season no serious forest fires have been reported. In Manitoba and the territories there has been considerable rain at intervals which has resulted in fewer fires than usual. In British Columbia, however, very little rain fell up to the middle of August, and it was only through the efforts of the rangers that disastrous fires in Dominion timber were prevented.

Your obedient servant,

E. STEWART,
Superintendent.

APPENDIX No. 1.

REPORT OF NORMAN M. ROSS, ASSISTANT SUPERINTENDENT.

INDIAN HEAD, ASSA.,
August 19, 1905.

E. STEWART, Esq.,
Superintendent of Forestry,
Ottawa.

SIR,—I have the honour to submit my fifth annual report of work carried out under your direction, dating from September 25, of last season.

On October 5 we commenced at the nursery to dig up the young ash seedlings, which were counted, tied in bundles of 25 each and heeled in ready for distribution the following spring. A start was made at the maples on the 11th, these being treated in the same manner; some 400,000 being dug up; 75,000 cottonwoods were purchased from North Dakota and heeled in at the same time. Besides those from Brandon a total of about 990,000 seedlings were then ready for shipping early this season.

The fall of 1904 was a most exceptional one, the weather remaining open much later than usual, so that it was possible to work on the land as late as November 18. This permitted us to accomplish a great deal of work on the new nursery which otherwise would have been delayed for another year. After sowing 9 09 acres to ash seed and two acres to maple, work was commenced on gravelling the drives and putting in necessary culverts. About 200 loads of gravel were put on the roads, and the work just completed before the freeze up.

On December 2, according to your instructions, I went to Banff and then to New Westminster to arrange for a collection of British Columbia timbers to be used as a forestry exhibit to be set up in the museum at the former place. After arranging with Mr. Leamy for the timbers to be sent up I returned to Indian Head, and on December 15 started for Ottawa, where I remained in your office during the winter. On March 18 I returned to Indian Head in order to get everything at the nursery arranged for spring work. The latter part of the winter in the west was very open and comparatively mild with no snow on the ground. Consequently the seedlings which had been heeled in last fall became almost dried out, so that it was necessary to thoroughly soak them with several tanks of water. This was done on March 25. During this month about 75 pounds of maple and 75 pounds of ash seed were distributed to settlers, in two-pound lots.

On April 3 we commenced shipping out the seedlings; last year we did not commence till the 22nd. The distribution was completed on the 24th, when the regular work of planting and sowing seed was commenced.

The tree planting inspectors started work early in June; Messrs. Craig, Wallin and Stevenson working in Manitoba, and Messrs. Caldwell, MacIntosh and Mitchell in the Territories. Mr. Caldwell this season will inspect the main line of the Canadian Pacific Railway from Fleming to Regina, the Kirkella extension and the Arcola extension from Regina east to the Manitoba boundary. Mr. MacIntosh covers the main line from Regina west to Caron, the Prince Albert branch, and the Soo line running south-east from Moose Jaw. Mr. Mitchell will take everything west of Caron.

The trees sent out from Indian Head this spring were distributed among 458 settlers in Assiniboia, Saskatchewan and Alberta. About 75,000 additional seedlings were sent to the Alberta Railway and Irrigation Company, at Lethbridge. These trees

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were to be planted on lands in the district irrigated by the company's ditches, the company guaranteeing that the trees would be properly planted and well looked after. In all about 1,000,000 seedlings and cuttings were sent out from the Indian Head nursery, and about 860,000 from Brandon. The varieties consist as in the past of, approximately, 75 per cent maple and ash, the remaining 25 per cent being made up of Dakota cottonwoods, Russian poplars, willows and a few elms.

The reports already received from the inspectors as to the progress of the plantations are most satisfactory. The trees sent out this spring have done exceptionally well, the season so far having been most favourable. The older plantations came through the winter without the least damage; even the cottonwoods, which almost invariably kill back at the tips, were uninjured. It seems strange that this should have been the case as, during the winter, there was practically no snow, the ground being almost bare with the exception of one month; the trees consequently had no protection whatever, and it appeared that conditions were very favourable for winter killing. However, everything started in the spring without sign of injury, due, I think, largely to the exceptionally moist condition of the soil last fall before the freeze up.

This summer, as before stated, growth has been very rapid, the ash having shown up exceptionally well. I am very glad to report that this tree now seems to be coming into more general favour with planters. Formerly the impression held by most people here was that the ash is such a slow grower that it is hardly worth while to plant it; consequently there has been some difficulty experienced in the past in inducing the settlers to put them in the plantations. Although not by any means such a fast grower as the cottonwood or willow, still the ash forms a very fair-sized tree in a comparatively short time, and as the wood is hard and capable of being put to many uses it is one which should be largely planted on the prairies.

On the list sent up from Ottawa this spring there were 1,500 names of applicants to be visited in the Territories during the summer, as compared to 1,009 last season. The larger number of fresh applications seem to be coming in from the Prince Albert branch, south of Saskatoon, the new Arcola extension and the newly settled part of the main line between Caron and Swift Current. These districts are practically just opening up, and it is very encouraging to see such an interest being taken by the new settlers in this work. Though many applications are also received from the older districts the same general interest in tree-planting does not seem to exist. I feel confident, however, that as soon as the plantations now being set out prove successful the demand for trees will, in these districts, be largely increased.

PLANTATION IN SPRUCE WOODS TIMBER RESERVE.

As stated in my last report, a few thousand seedlings of one and two year old Scotch pine and a few pounds of seed were planted in a very rough manner on the reserve at a point a few miles south-east of Sewell. The one-year old seedlings proved to be too small, only a very small percentage coming through. The two-year olds, however, did better and showed that under fairly favourable conditions good results may be expected by using plants of this size. Last season the planting was not done until too late, and immediately following there was a spell of very hot dry weather, so that the seedlings did not have a very good chance.

This year an additional 13,000 two-year old seedlings were set out, the manner of planting being somewhat different from that employed last spring. Furrows running east and west about four inches deep and twelve wide were ploughed out of the sod. These furrows were opened out about every four feet. The planting this year was commenced on May 2, and the soil was very moist and in good condition to receive the seedlings. The young plants were set immediately the sod had been turned; a hole being made with a planting iron by one man, followed by two others who put the seedlings in the ground. The plants were set as close to the south side of the furrow as

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possible, as it was found last year that those seedlings which had the advantage of some slight shade had done much the best. According to the progress made at this planting a gang of three men after the furrows had been drawn out should easily plant 3,000 seedlings in 10 hours. If planting should be undertaken on a large scale with a large and well organized gang, planting could be done in this manner at a cost of less than \$8 per acre. After planting there was considerable wet weather and since that time the season has been very favourable. I have not yet had an opportunity of revisiting this plantation, so unfortunately cannot, at present, make a report as to the result.

EXHIBIT AT BRANDON.

As usual an exhibit of native timbers, pressed leaves, seed, seedlings growing in boxes, and photographs of plantations was prepared for the annual fair held at Brandon during the early part of August. This year I was able to secure half a cord of excellent native maple wood which had been grown from seed planted thirteen years ago. The wood was as large and of as good quality as that usually used for fuel in this country, and showed beyond doubt that trees may be planted with some certainty of a profit being returned before the end of one's lifetime. During the fair it was suggested by one of the officers of the exhibition that the Forestry Branch should make use of a small portion of the grounds upon which a practical demonstration of the growth of our hardy varieties could be made, and possibly also show on a small scale the methods used in the nursery for raising the seedlings. If some such arrangement could be made with the management of the fair an exhibition of this nature would undoubtedly afford much interest and information to the public.

NURSERY WORK.

No stock is being grown this season at the Brandon Experimental Farm. All this work in the future will be carried on at Indian Head. We are still making use of the sixteen acres on the experimental farm here, which was kindly put at the disposal of the Forestry Branch four years ago. Next year will probably be the last one in which it will be necessary for us to use this ground, as by that time it is hoped to have ample land in a suitable state of cultivation on the new nursery station, and also a fair degree of shelter.

This summer we have 32.95 acres under broad leaf seedlings; and probably an acre more devoted to conifers. The above total is made up as follows:—

		Acres.	Acres.
Maple	2 year seedlings..	5.65	
"	1 "	8.57	
		-----	14.22
Ash	2 "	6.89	
"	1 "	9.09	
		-----	15.98
Elm	1 "	2.75
		-----	32.95
	Total.	32.95

Up to the present it has not been possible, owing to the rapid growth of weeds, to find time to make an accurate estimate of the stock in the nurseries. This is usually done by counting the seedlings in several rows in each plot. An average is then struck upon which an estimate can be based. Judging from the appearance of the stand and the yield per acre that has been obtained in past seasons an approximate estimate is as follows:—

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Maples large enough for distribution.. . . .	1,215,000	
Ash large enough for distribution.. . . .	800,000	
Russian poplar large enough for distribution..	5,000	
White birch large enough for distribution.. .	5,000	
Elm large enough for distribution.. . . .	15,000	
	<hr/>	2,030,000
Ash too small for distribution.. . . .	900,000	
Elm too small for distribution.. . . .	100,000	
Birch too small for distribution.. . . .	15,000	
	<hr/>	1,015,000
European larch—		
2 year transplants.. . . .	3,500	
1 “ “	20,000	
2 “ seedlings.. . . .	30,000	
	<hr/>	53,500
Scotch pine—		
2 year transplants.. . . .	15,000	
1 “ “	15,000	
2 “ seedlings.. . . .	40,000	
1 “ “	50,000	
	<hr/>	120,000
Jack pine—		
2 year seedlings.. . . .	13,000	
1 “ “	15,000	
	<hr/>	28,000
Pinus Montana, 1 year transplants.. . . .	3,000	
Pinus flexilis, 1 year seedlings.. . . .	2,000	
Pinus ponderosa, 1 year seedlings.. . . .	2,000	
Pinus excelsa, 1 year seedlings.. . . .	200	
Pinus cembra, 1 year seedlings.. . . .	200	
White spruce—		
2 year transplants.. . . .	2,600	
2 “ seedlings.. . . .	2,000	
1 “ “	4,000	
	<hr/>	8,600
Picea pungens, 2 year seedlings.. . . .	32,000	
Picea excelsa, 1 year seedlings.. . . .	10,000	
Picea excelsa septentrionalis.. . . .	20,000	
Abies balsamea.. . . .	4,000	
	<hr/>	
Total estimated stock.. . . .		3,328,500

Referring to your own report of last year, page 5, it will be seen that the estimate for last year was given as 4,229,557, which would make it appear as though the stock last season was larger than this year. The estimate on the trees large enough for distribution was only a rough guess sent down to you early in the season, the maples and ash being greatly overestimated. On page 12 of my own report a more accurate estimate is given, based on a fairly careful count, but even this was almost 100,000 too much. The estimate given above of this year's stock is, I think, rather below than above the actual number. In the past it seems that the tendency has been to overestimate, due chiefly to the fact that when the first count is made everything is put down; but when the seedlings are pulled up many of the small ones are left in the ground. The bundles also, which in the actual count are considered to contain 25 each, really are made up of from 27 to 30, so that there may be no danger of any of them being short. For reasons such as these an absolutely accurate estimate of the seedlings

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growing on 30 acres is almost an impossibility. As the work progresses, however, we shall in a few years be able to estimate more closely as the yield of past years can then be averaged up and should give a better idea as to the amount of stock growing on a given area.

NEW NURSERY STATION.

Permanent Plantations.—As stated in last report, a belt of 5 rows of trees, consisting of maple, willow and cottonwood, was planted in 1904 along the east and part of the north boundary of the nursery, a total length of about three-quarters of a mile. Besides these a plantation of native spruce and tamarac three-quarters of an acre in size was also set out. All of these trees have done exceptionally well; there has been no winter killing, and fully 95 per cent of the plants set out are now alive. The growth has been most vigorous, the outside belt now averaging 5 feet in height. The spruce and tamarac plantation, though on new land and absolutely without protection, has made most satisfactory progress, the growth on the tamarac being in many cases over 2 feet this season.

This spring planting was continued; an acre of native tamarac, spruce and Scotch pine was set out, the trees being 3 feet apart each way, the arrangement being: every alternate row tamarac, the remaining rows alternately Scotch pine and white spruce. The Scotch pine were three years old and obtained from France, where they are grown in very large quantities and at a very small expense. Should these plants prove hardy in the west it will be cheaper to import them than to raise them from seed here, manual labour being so high in this country. At present this plantation looks very well, very few failures being apparent at this date. About five acres of mixed plantation of maple, elm, cottonwood and European larch, 3 by 4 feet apart, were set out to fill up odd corners and side slopes which could not be utilized to better advantage. A large number of willow and cottonwood and caragana from seed have also been planted in single rows for shelter and hedges, where a quick growth is desired.

Next season planting will be continued on the main belt round the boundaries of the nursery which it is at present proposed to plant altogether with conifers, principally Scotch pine and white spruce. It is also the intention to set out several sample plots of the broad leaf varieties from which reliable data may be obtained in the future. The area which can be devoted to permanent plantation cannot, however, be very large at present, as the greater part of the land now under cultivation must be devoted to the raising of nursery stock.

Sixteen acres are this summer under nursery, and considering that the land is quite unprotected the stand of seedlings and the growth they have made is remarkably good. About four acres of maple sown late in the spring of 1904, which last season only made a growth of about 6 inches, are now considerably over 3 feet high; they are splendid plants, but rather too large for handling economically. The two-year ash average 2 feet high, one-year maples about 14 inches, making very good stock for distribution. The one-year ash are about 7 inches high, and will of course remain in the nursery for another season. The land in future devoted to nursery purposes will be divided up into acre plots in the shape of narrow strips running north and south, separated by hedges of caragana which will not be allowed to grow more than 6 feet high. The seed of the caragana was sown in the permanent position last fall at the same time as the tree seeds were put in. The young plants are now nearly a foot high, and should next season make a growth of 2 feet, so that two years from now we should have some very well sheltered plots. An additional eleven acres has been well cultivated this summer on land that last year grew a crop of oats. This will be divided up into plots and sown to tree seed in the fall.

Buildings, drives and ornamental grounds at present occupy about ten acres. In the spring about 6,000 hardy shrubs grown in French nurseries, were planted along the drives and borders of the lawns. The varieties consist largely of Siberian dog wood,

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lilacs, hardy spireas, rugosa roses, dwarf mountain pines, junipers and some others. These shrubs arrived after being over six weeks on the road, and seemed to be very badly dried out and moulded; however, soon after planting we had some very heavy rains and cool weather, making the conditions as favourable as possible, so that nearly all of the young plants have survived and made good growth, the percentage of losses being very small. Some two acres were seeded down to lawn grass, which is now covered by a thick sod, the borders of the lawn being planted with perennial plants and shrubs. Some hundreds of cottonwoods and maples 8 to 10 feet high were planted irregularly among the shrubs and around the buildings and already make a very good effect. These trees were grown from seedlings in our own nurseries, having been kept continually pruned to a good shape. The ornamental grounds should be made as attractive as possible, as already many people drive up to see the place, and in a very short time we shall undoubtedly have a large number of visitors. When it can be seen what great changes may be effected, even in a single season, by a small amount of planting, at comparatively little expense, a great deal of encouragement will be afforded to many who might otherwise be sceptical as to the results of such work. At present it is somewhat difficult to get the settlers here to see the practicability of planting trees for profit; but most are anxious to improve the appearance of their farms, and could be more easily induced to plant for that purpose. It matters little, however, what the incentive for planting; once the trees are set out under fairly favourable conditions they are bound to grow, and in a few years the planter and his neighbours must realize that it does not really take such a long time after all to produce wood large enough for fuel and other purposes. In a country where wood is a comparatively scarce article this knowledge must have the effect of increasing the numbers of plantations.

During the summer thirty more acres have been broken and backset, and the land is now being worked up for cropping next season. Seventeen acres of oats sown this spring on last year's breaking have yielded a very heavy crop which will supply all the grain that will be necessary to keep the horses for the next twelve months. This land will be summer fallowed next season, divided up into plots and sown to tree seeds in the fall. Eight acres are now under rye grass, six of which were sown this spring. Sufficient hay has been put up from this land to last until next summer; during the winter months the horses are fed on oat straw entirely, with the addition of a little grain. There still remain unbroken forty-five acres, fifteen under fence for pasture; the remaining thirty to be broken up as soon as possible.

Conifers.—Conifers have only been grown on a comparatively small scale up to the present chiefly owing to a lack of suitable soil, facilities for shading the seed beds and the comparative difficulty of obtaining the seeds. I do not know of any place in the west where conifers have been raised from seed in any numbers, with the exception of Mr. A. P. Stevenson's nursery at Nelson, Manitoba, where Scotch pine have been grown very successfully. Many of the nurserymen and other authorities on tree growing seemed sceptical as to the possibility of raising these trees from seed in this climate, so that it was thought best to go slowly before trying to raise evergreens in any large numbers. Our experiments so far prove that there are many varieties which can be raised most easily. We now have in the nurseries three year old Scotch pine, European larch and native spruce which are just as strong, healthy plants as I have ever seen raised elsewhere. Our three-year old Scotch pine are certainly much better and stronger than those obtained from the French nurseries, though as stated before, they cost us far more to raise. The Colorado blue spruce (*P. pungens*), now two years old, has grown splendidly in a very heavy stand, and will be a good size for transplanting next spring. The native Banksiana and Murryana pines have also done very well. This spring some *pinus flexilis*, *pinus ponderosa*, *pinus cembra* and *pinus excelsa* were sown in small quantities. The Norway spruce has been planted in the west in several places with, up to the present, small success; however, there are some good specimens growing in different parts of the country, and at both experimental farms. Thinking that possibly seedlings raised in the west might prove more suitable for prairie planting,

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a few pounds of the common picea excelsa and also a few pounds of a variety supposed to be more hardy, picea excelsa septentrionalis, collected in north Finland, were sown, and have produced a splendid catch of seedlings. Nothing definite can be reported as to these for a few years. The Scotch pine, white spruce, Colorado blue spruce and native tamarac may, I think, be said to be perfectly hardy and adapted to western conditions. Careless handling of the young plants before being set out is, I am sure, the cause for nearly all the failures in planting conifers of the above named varieties, in this country. Another cause for failure is using plants that are too large. Four years old should be the limit, although trees of a much greater age can be successfully moved, but only at considerable expense.

On the whole the past season has been the most favourable we have yet experienced for every kind of work. It is an extremely fortunate thing that the first years of the work of the Forestry Branch in western tree planting have been so propitious. There are seasons which of course are very dry, when tree planting might not have proved so successful, and had we started with one or two dry years it is probable that the general interest now being taken in tree planting would not have been so apparent as we now find it. The plantations already set out under the co-operative scheme have now got such a good start that a dry year or two would not do them any injury, so that they are bound to remain as object lessons to those in the neighbourhood as to the possibilities of tree growing under proper conditions.

Your obedient servant,

NORMAN M. ROSS,

Assistant Superintendent.

APPENDIX No. 2.

REPORT OF ROLAND D. CRAIG, B.S.A., F.E., ASSISTANT IN FORESTRY.

CARLYLE, SASK., September 9, 1905.

E. STEWART, Esq.,
Superintendent of Forestry,
Ottawa.

SIR,—I have the honour to submit herewith the second annual report of work carried on under your directions.

At the time of writing my last report I was in Brandon looking after the heeling in of the nursery stock on the experimental farm. When that was completed I returned to Ottawa where I remained until April 7. On April 11 I commenced the distribution of seedlings from the Brandon nursery to Manitoba farmers. We sent out from this nursery 468,425 Manitoba maples, 300,000 green ash, 73,000 cottonwoods and 5,000 willow cuttings, a total of 846,425 in all. The number of applicants to receive trees from the Brandon nursery was 664.

On May 1 Mr. Wallin and I went to the Spruce Woods Forest reserve, and with the assistance of a man and team planted 12,000 two-year old Scotch pines in the sand hills. We selected for this year's planting a piece of land which had been broken up about ten years ago but which, since it was too light for grain, had been allowed to revert to prairie. The old spruce trees which are scattered about this locality are too far apart to effect natural reproduction. Last year's experience taught that where the young pines were protected on the south from the sun they succeeded better, so this year we adopted the following system in planting: Furrows 4 feet apart and about

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4 inches deep were ploughed from east to west, throwing the sod to the north. The seedlings were then planted with a dibble close to the land side. We found that with one man making the holes with the dibble and two planting, we could put in 4,000 seedlings per day.

A heavy snow storm came before planting was finished and wet the ground thoroughly so that the plantation had every chance to succeed.

The pines planted in 1904 wintered well and showed good growth for the first year.

INSPECTION.

I have already inspected the plantations from La Rivière to Lyleton, Brandon to Pierson and Sinclair and have yet to do the Glenboro branch. I have found the trees on the whole well cared for and the people enthusiastic about their success. I have noticed very little damage this year from the cottonwood rust or other fungus diseases. Some of this year's maples killed back due partly to the fact that they grew too late in the fall and did not ripen before the winter came. This year two year old ash were sent out and they proved much more satisfactory than the one-year olds. Fully 85 per cent of all the trees planted are alive and growing well.

FORESTRY INVESTIGATIONS.

This summer a start was made in the systematic study of the Dominion forest reserves, and a party under my charge, consisting of H. R. MacMillan, chief, F. C. Hart, compass man, one caliper man and a cook, was sent to the Turtle Mountain timber reserve, with the object of finding the nature of the stand on the reserve and the best means to protect and improve it.

This reserve, as indicated on the accompanying map, consists of about 108 square miles in township 1, ranges 19, 20, 21 and 22, being about one-half of the area originally timbered.

We left Boissevain on June 2, and the party under Mr. MacMillan's charge spent until September 1 in the reserve. I stayed with the party most of June, and returned several times during the summer for week ends. Heavy and frequent rains, especially during the month of June, greatly interfered with the work.

The Turtle mountains consist of a rolling country, the highest hill being not more than 400 feet above the prairie. Fully one-third of the land is under water in lakes or sloughs. In many places the sloughs have been caused by beavers damming up the streams. The drainage is chiefly towards the north, and as a glance at the map will show, nearly all the streams in south-western Manitoba rise in these hills.

The soil is chiefly of a clay or clay loam with very little rock exposed. The underlying rock appears to be limestone, but the boulders which are scattered about are chiefly of granite and gneiss. A few of the hills are gravelly.

The forest is composed of aspen (*Populus tremuloides*) with an admixture of about 10 per cent balm of gilead (*Populus balsamifera*), 5 per cent birch (*Betula papyrifera*), 1 per cent ash (*Fraxinus viridis*), 1 per cent oak (*Quercus macrocarpa*), 1 per cent elm (*Ulmus americana*), and a very little Manitoba maple (*Acer negundo*). The underbrush is composed of a great variety of shrubs, the chief of which are willow, hazel, Saskatoon berry and cranberry. Pea-vine forms the greater part of the ground cover and grows with great luxuriance, making walking through the brulés very difficult.

The aspen is found everywhere trees grow at all, and now that practically all the oak has been cut from the reserve is the most valuable wood. When dried it makes excellent fuel, but as saw material it is not very valuable.

The balm of Gilead is more frequently found where the soil is moist, while the birch and ash usually occur on the tops of ridges. The oak is gregarious in its habit and formed groves frequently on south slopes or level plateaux.

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Through fire and cutting nearly all the good merchantable timber has been removed and only on a few sections in the south-eastern part of the reserve is there anything like a virgin stand of green timber. From these places 50 to 75 cords per acre could be cut, but over the greater part of the reserve 1 to 5 cords per acre is all that could be found.

Small groves of trees one to ten acres in extent have here and there escaped the fire and these supply seed for reproduction. One could not wish better reproduction of aspen and balm than there is on nearly all of the reserve, and if protection is afforded in twenty to thirty years there will be a stand equal to or better than the original. On thousands of acres which were burned over in 1893 and 1897 there are stands of young aspen and balm, three to seven thousand per acre and 6 to 18 feet high. The trees in this young growth are even aged and even sized, and being so dense grow up straight, clean and tall, producing the best quality of wood.

There are a few sections on the east and west ends where the fires have been so persistent that the prairie condition has almost been reached. Once a heavy sod has been formed the poplars find it difficult to gain a foothold again.

Nearly every year fire burns over some part of the reserve, thereby reducing its value for timber production and the protection of the water-shed. The fires may be attributed chiefly to the following sources:—

1. Our American neighbours.
2. Squatters.
3. Farmers burning hay meadows on the reserve.
4. Farmers clearing adjacent bush land.
5. Half-breeds and Indians leaving camp fires lighted.
6. Lightning.

The land on the American side has been thrown open for settlement, and in clearing their land the settlers on that side frequently allow fire to escape to the Canadian side. Since their stock find considerable pasturage on our side it is said that fire is used to improve the grass. Whether this is so or not, the fact remains that fires are very frequent along the boundary.

There are in the reserve seven or eight squatters who, in defiance of orders from the department, continue to clear patches of land, and are endeavouring to open up the land for settlement. Since the forest is the great barrier to the achievement of this object they are not anxious to have it preserved.

The present system of leasing hay meadows is responsible for many of the fires, for the leaseholders make a practice of burning the meadows in the spring in order to improve the hay, and little or no care is taken to prevent the spread of the fire to the forest about.

Fires escape frequently also from the clearings along the north of the reserve. Since most of the land in township 2, ranges 20, 21 and 22, is timbered and undesirable for agricultural purposes it is to be regretted that the whole of the forest had not been included in the reserve.

Half-breeds and Indians who are continually passing to and from the United States through the mountains are said to have caused not a few fires by carelessness with camp fires.

Lightning is also said to have caused some, but in my opinion the danger from this source is slight.

SUGGESTIONS FOR THE PREVENTION OF FIRES.

1. All squatters should be removed from the reserve, and it should be thoroughly understood that the land is never to be opened for settlement. If this were done, and the reserve placed on a permanent basis the public sentiment in regard to timber preservation would be greatly changed.

2. A system of trails through the reserve should be established to enable the rangers to patrol the forest thoroughly, to reach a fire when it does start, and at the same time

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to act as fire breaks and vantage points in fighting fire. At present there are only three trails running into the reserve any distance which are passable during the summer, and in the spring it is almost impossible to get through on these. It would cost very little to make these first-class trails, and without much expense branch trails running east and west could be made, so that the ranger could ride from one part of the reserve to the other without going out six or eight miles to the prairie. A trail along the international boundary would be most useful.

3. Efficient patrol of the reserve during dangerous fire seasons in the spring and fall is essential. During these times two mounted men should be constantly on the lookout for fires. At present the ranger, Mr. C. A. Walkinshaw, is doing good service, but being hampered by the absence of trails he is unable to patrol the reserve as it should be done.

4. A system of telephones could be used to advantage, and if three farmers living near the edge of the reserve were supplied with telephones connected with the ranger's cabin in the reserve and with the town of Boissevain it would greatly facilitate the location of a fire and the summoning of assistance to fight it if necessary. Local telephones are rapidly being established in that part of Manitoba, and it would cost the government very little to co-operate with the farmers around Boissevain when a system is introduced there.

A fire break of 100 feet wide and about 5 miles long has been cut along the western end of the reserve, and if ploughed annually late in the summer should be considerable protection. It is a question, however, if a well kept trail would not be more effective in protecting from fire.

There is almost everywhere in the reserve an abundance of dead and down timber which is a constant menace to the young forest, not only in supplying fuel for forest fires, but in harbouring destructive insects and fungi. This should be removed as quickly as possible, and from this point of view the limiting of holders of wood permits to twelve cords seems a mistake. It is desirable also that the reserve be self-sustaining, and there seems no good reason why farmers as well as others should not pay at least 25 cents per cord, and be allowed to take as much as they wish at that price.

There has been very little green timber cut in the last two or three years, due no doubt to the difficulty of securing it and to the fact that the country adjacent has been settled for about twenty-five years, and the people have got beyond the log building stage. Now the cutting of green timber is entirely forbidden, which is a wise regulation as long as there is plenty of sound dead or down timber to be had.

It is expected that from the data collected an estimate of the wood productive power of the reserve can be obtained and a working plan formulated. If managed conservatively there is no reason why the Turtle Mountain reserve should not supply fuel for all time to the country as far as it would pay to haul it, and at the same time act as a reservoir to supply the streams which flow out of it and water the fertile prairies of southern Manitoba.

MOOSE MOUNTAIN FOREST RESERVE.

We are now at work in the Moose Mountain forest reserve and find conditions somewhat similar; fires have destroyed most of the virgin timber, but the reproduction is excellent. The public opinion seems very favourable to the preservation of the forest, and with the assistance of the North-west Mounted Police, the ranger and fire guardians have been able to prevent disastrous fires during the last few years.

Hoping that the progress of the work under my charge may meet with your approval.

Your obedient servant,

ROLAND D. CRAIG.

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APPENDIX No. 3.

REPORT OF HUGO CLAUGHTON-WALLIN, F.M., TREE PLANTING INSPECTOR.

VIRDEN, June 30, 1905.

E. STEWART, Esq.,
Superintendent of Forestry,
Ottawa.

SIR,—I have the honour to submit to you the following report:

I left Ottawa April 7, for Brandon, Manitoba, where I assisted Mr. Roland D. Craig in the shipment of trees to applicants in Manitoba. On May 1, when through with the distribution, Mr. Craig and I went to Sewell, where we met Messrs. Norman M. Ross and A. P. Stevenson, and together with them continued last year's planting of Scotch pines (*Pinus sylvestris*) on the Dominion government forest reserve there. The plants were two years old, strong and hardy looking, and ought to do well.

After finishing the planting I left for Indian Head, where I worked on the forestry farm till June 9, when I started on my inspection.

Up to the present date I have, of the district allotted to me, inspected the Miniota branch, Forest extension and part of the Canadian Pacific main line west of Brandon. One hundred and ten farmers have been visited by me. We had an unusual amount of rain during the early part of the summer and the trees have as a rule made very good growth already. Very few misses are found, and those met with are, in my opinion, due to bad planting. Some men seem too much in a hurry when setting out the trees, which are not planted deep enough. The earth is not packed around the roots; consequently, when a heavy rain comes and the ground sets, part of the roots get exposed to sun and wind, and in nine cases out of ten the tree dies. The tops were frozen on some of the maples sent out last spring on account of the lack of snow in the winter of 1904, but most of them start from buds on the lower part of the stem, or from the root.

Maple, ash and elm are all perfectly hardy, but the two latter are slower growers, at least for the first years, and seem to depend more on a thorough cultivation than the maple. I would like to mention that the other day I saw some ash, planted in the spring of 1904, which could boast of a growth of fully 2 feet already this year, which I consider very good, especially as they were planted on a wholly shelterless piece of land.

The cottonwood has two enemies—the frost and the rabbits. But it is in only a few places that the frost seems to cause damage by killing back the tree for a piece, and as a rule the cottonwood is a hardy and fast growing tree, rendering a quick shelter. The rabbits are very fond of eating the cottonwoods off at the roots.

Taking all over, I consider 90 per cent of the trees sent out last spring are living; the largest percentage of dead being on the maples.

Your obedient servant,

HUGO CLAUGHTON-WALLIN.

APPENDIX No. 4.

REPORT OF A. P. STEVENSON, TREE PLANTING INSPECTOR.

NELSON, MANITOBA, July 1, 1905.

E. STEWART, Esq.,
Superintendent of Forestry,
Ottawa.

SIR,—I have the honour to submit the following brief report on the work done by me under your instructions as tree planting inspector in connection with the work carried on in this province by the Forestry Branch of the Department of the Interior.

On April 3 of this year I went to Brandon to make arrangements for our spring's distribution of trees. Very little snow having fallen in this district during the past winter we had in consequence an extra early spring. A large tent was secured for the packing and handling of the trees. This was hired from a party in Brandon, together with a stove, at a very nominal charge. An examination of the trees heeled in last fall and for distribution this spring showed that notwithstanding the almost entire lack of snow they had come through the winter in fairly good condition. The maple showed some signs of killing back at points of growth. This arose, I think, from the extra late soft growth made late last fall. Messrs. Craig and Wallin arrived from Ottawa on April 9, to take part in the work of distribution of trees from Brandon. All arrangements were completed by the 11th, and the first shipment of trees was made on April 12, just 21 days earlier than in 1904. Mr. Craig was left in charge of the work of distribution and packing of trees. This was carried forward in a vigorous manner and completed about May 1.

On May 1, in company with Messrs. Ross, Craig and Wallin, the spruce woods, south-east of Sewell, were visited for the purpose of planting a further quantity of Scotch pine seedlings. An examination of those planted in the spring of 1904 showed that the trees planted in a slight depression or where partially shaded from the sun had made good vigorous growth. This fact having been noted it was decided to draw plough furrows running east and west, then plant the young seedling pines in the bottom. This would afford the necessary protection from sun and wind till the young trees would get thoroughly established.

I began the work of inspection June 1. Mr. Craig took up the work of inspecting from Pilot Mound west to Estevan; Mr. Wallin the north-west part of the province, and the district to be covered by myself is the Red River valley and west on the Canadian Northern Railway to Elgin and Souris districts. The spring was an ideal one for tree planting, there having been no extended periods of drouth. The condition of the trees sent out in previous years was very good indeed. No signs of winter killing on any of the varieties was noticed. Trees that were injured a year ago by winter killing have nearly all recovered and are showing up well this year. Ninety-five per cent of the trees sent out in the spring of 1904 are alive and in fine, thrifty condition. It was noted again this year the growing favour of the ash tree with planters. I have also noted the extreme hardiness of this tree, that on dry, exposed knolls where snow did not lie in winter and maple, elm and cottonwood were killed out the ash alone came through without injury. The usual objection to this tree in the past has been its slow growth. There is some truth in this if the tree is given plenty of room to spread, but where planted closely with varieties such as maple and elm we find the growth about the same as of these. Of the trees sent out this spring

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over 95 per cent of the ash are growing, 75 per cent of the maple, and 85 per cent of the cottonwood. The poor showing made by the maple arose, as has already been noted, from the late, soft, immature growth made last fall. This, together with an almost snowless winter, weakened their vitality.

In accordance with instructions received from you I addressed a series of Farmers' Institute meetings, beginning on June 5, at St. Jean, St. Pierre, St. Charles, St. Eustache, Plumas and Gladstone. The meetings throughout were well attended, from fifty to eighty being the average attendance. The audiences were largely made up of French-speaking people, but nearly all could understand English. They were all very much interested indeed in hearing pretty much for the first time of the Dominion government's co-operative tree planting scheme. The question of fruit growing came up, but it was clearly shown that to those living on the prairie little or no success would attend their efforts in this line without first planting a good shelter belt. This was the first and one of the main essentials to success in fruit growing here in the west.

Concerning the general condition of the trees planted out under Forestry Branch supervision, I take great pleasure in reporting on the splendid appearance the trees are now making. Trees in some of the groves planted out in 1902 are now by actual measurement from 13 to 14 feet in height. Cultivation ceased in these groves a year ago, the trees shading the ground so effectually that no grass or weeds of any account give trouble, except couch and brome grass. These grasses will almost kill out any grove if they once get established among the trees.

Pruning and the proper time to prune appear to be a subject that troubles the average planter's mind a great deal. The question of cultivation he listens to reluctantly and puts off till the last minute, but mention pruning and his eye brightens at once and he feels for his jack-knife, eager to start in at once. It usually takes from half an hour to an hour's lecture to convince these men of the folly of cutting up their young trees, and when it is done it is with a sigh of regret that the jack-knife is dropped back into the pocket.

In planting for shade and ornamental purposes and planting for a windbreak and shelter belt the management is not the same. With the first judicious pruning is necessary; with the latter none is necessary, is in fact an injury, and in the sheet of directions I would suggest that this fact might be emphasized a little more. I also note that the Russian and white willow are coming much into favour and giving fine satisfaction. A great many willow cuttings were sent out by the Forestry Branch in 1902 and later. In many localities these have done exceedingly well and are now furnishing thousands of cuttings to people in the neighbourhood who desire them and rather prefer to get them in this way, as they are sure to get them fresh.

Your obedient servant,

A. P. STEVENSON.

APPENDIX No. 5.

REPORT OF ARCHIBALD MITCHELL, TREE PLANTING INSPECTOR.

MACLEOD, ALBERTA, August 31, 1905.

E. STEWART, Esq.,
Superintendent of Forestry,
Ottawa.

SIR,—I have the honour herewith to submit the following report of my work under the Forestry Branch in 1905, up to June 30.

On February 20, after instructions from you, I joined the deputation which was conducting stock judging schools and institute meetings in Alberta. The places

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visited were Lethbridge, Magrath, Cardston, Macleod, Pincher, Claresholm, Nanton, High River, Okotoks, Didsbury, Olds, Innisfail, Red Deer, Strathcona, Fort Saskatchewan, Edmonton, Wetaskiwin, Ponoka, Lacombe, and Medicine Hat, the tour ending on April 2. At most of the places two meetings were held and, as a rule, they were well attended. At several meetings there were over two hundred present. It was very gratifying to find the attendance at places where meetings were held in 1904 nearly always about double what it was in that year.

At Lethbridge, Magrath and Cardston, Mr. Harcourt, Superintendent of Fairs and Institutes, Territorial Department of Agriculture, Regina, was present with his stereopticon and a series of forestry slides. These were a very great assistance in presenting to the audiences the advantages of tree planting on the prairies. A series of large photographs with which I was furnished by you were very useful in the same direction at the other points.

The ground covered at these meetings, besides actual forestry subjects, usually embraces soil moisture, horticulture and fruit growing. The last two subjects are usually taken up in questions and answers, and in discussing them I am able to state just what I have seen succeeding in different parts of Alberta.

I may say that the plantations set out under the auspices of the Forestry Branch are, I believe, going to have quite an important influence in developing the country in this direction. Most of the plantations are arranged with a view to sheltering a future orchard, and nearly every planter purposes planting quantities of such small fruits, apples and crabs, as are proving hardy in the country, just as soon as his shelter belt is high enough to afford the necessary protection.

In the northern part of the country I again pointed out some of the advantages an agricultural country derives from the presence of a fair amount of wooded land and showed the advisability of retaining a portion of the farm lands under trees.

On June 5 I commenced inspection work and have thus far covered only a small portion of the ground. I am pleased to say that the older plantations have never come through the winter better and that those planted this spring have made a very good start. The percentage of trees alive in the 1905 plantations is maple, 93; cottonwood, 93; and ash, 96. Most of the trees in this section arrived in a snow storm, and while the frost did not harm the trees the snow rendered the soil moist and in first-class condition for planting.

The district thus far gone over is from Macleod to High River, and I might here say that in no part of my territory has there been such a general interest taken in tree planting as along this, the southern portion of the Calgary and Edmonton line. In 1903 there were only twelve applicants between Macleod and Calgary; in 1904 there were 44, and this year there are 90. Many of the settlers in this locality are from the States and have had experience in prairie planting and know the benefit of it, and many of them, besides, are able at the very outset to afford the extra time and trouble entailed by a plantation, which the average struggling settler is not.

In a very short time, as soon as the first early years of settlement are over, I look for a great increase in the number of plantations in this district, and indeed, in the whole of the prairie part of Alberta.

Your obedient servant,

ARCHIBALD MITCHELL.

APPENDIX No. 6.

REPORT OF ANGUS MACKINTOSH, TREE PLANTING INSPECTOR.

DUNDURN, August 20, 1905.

E. STEWART, Esq.,
Superintendent of Forestry,
Ottawa.

SIR,—I have the honour of sending you my second season's brief report on the tree planting inspection work with which you again entrusted me.

About the middle of May Mr. Ross arranged that I should come to Indian Head, on June 1, which I did. He then gave me a list of applicants for trees, to the number of 370, on whom I was to call.

The territory assigned to me extended from North Portal on the boundary line in the south, to Rosthern, Battleford and Lloydminster, in the north-west.

The first district that I visited was that lying between Regina and Caron; the next that fertile but treeless country on either side of the Soo line, and I am now working along the Prince Albert branch, having reached as far as Dundurn.

I might say that the state of the plantations all over the districts I have visited is more or less satisfactory. The plantations made in the spring of this year are singularly free from failures. Taking them all over I do not think the loss exceeds 5 per cent. The older plantations are also as a rule in a very flourishing state; any of them that suffered from the severity of the winter of 1903-4 having quite recovered. The showery weather at or shortly after the time of planting, and the frequent rains since contributed much to the success of the former, and the mild nature of last winter was all that could be desired for the recuperation of the latter.

The growth the trees have made this summer is extraordinary. About the beginning of July I found maple that had made a growth of 3 feet and ash 2½ feet, in the Moose Jaw district; and since then have found that that is by no means exceptional. In the neighbourhood of Pense I found coniferous trees doing exceedingly well, and I believe that tamarac, Scotch pine and white (and other) spruce will in the future be found more remunerative as timber trees on the plains of the North-west, than deciduous trees.

You will find, when my books reach you at the end of the season, that as I anticipated in my last report, the number of trees required for the country over which I am at present travelling will greatly exceed that of last year. It is the same, you will doubtless find, along the Soo line, and one may safely predict that the demand will year after year go on increasing.

Wherever I go there is no lack of desire amongst the settlers to have shelter belts, indeed many of them would like to rush into tree planting before they had ground in anything like a fit shape. Settlers from the United States, of which there are many along the Prince Albert branch, are as a rule enthusiastic over trees, and are quite alive to the necessity of preparing the ground and giving them every care. Many of them know from experience on the other side of the line what tree planting means, and the value of shelter on the treeless plains.

Your obedient servant,

ANGUS MACKINTOSH.

APPENDIX No. 7.

REPORT OF JOHN CALDWELL, TREE PLANTING INSPECTOR.

VIRDEN, August 21, 1906.

E. STEWART, Esq.,
 Superintendent of Forestry,
 Ottawa.

SIR,—I beg to submit to you the following report of my work for the season of 1905.

The territory assigned to me was the Canadian Pacific Railway main line, from the Manitoba boundary to Regina, Kirkella extension to Lipton, and the Arcola line from Regina back to the Manitoba boundary.

I began work on June 19, and expect to finish about the end of October.

Inspections so far have been very satisfactory indeed; farmers are taking great interest and pride in their young plantations. Of all the trees that have been set out since the work began, about five years ago, so far as I have seen about 90 per cent are living and making good growth.

The varieties planted so far would be about as follows: Manitoba maple, 40 per cent; native ash, 30 per cent; cottonwood, 20 per cent, and about 10 per cent made up of elm, Russian poplars and willows. The cottonwood, poplars and willows are the fastest growers, the cottonwood is liable to freeze back some the first year or two, but soon overcomes that tendency; the elm grows slowly and does not seem to hold its own as well as the others; the ash is likely to do well and is a valuable tree. Our old standby the Manitoba maple is very useful and satisfactory in a mixture for shelter belts. For the first twenty years the Petrofsky Russian poplar is a very pretty and fast growing tree. The dry climate of the west is likely to suit them better than the moister climate of the east. I have had quite an experience with the different varieties of willows, and the more I see of them the better I like them. The willows should be planted more extensively and are safest sent out in slim cuttings rooted.

Most farmers are very anxious for shelter around their buildings, but when it comes to planting two to five acres for the growing of fuel and fence posts, they are very slow and will require educating along that line.

A few of the main points to be observed in this work are:—

1. Insist upon the land being in a good state of cultivation before planting.
2. Guard against planting too close to the buildings, which would cause snow to lie where it is not wanted.
3. A couple of rows planted 30 yards outside of the break would hold most of the snow from the main break and save damage.
4. Advise deep planting, as we see considerable shallow planting, which is a fatal mistake.
5. A short talk on the mode of planting is very useful. I find that a good many trees have been dibbled in with a crow-bar, which is very slavish work. For two-year olds the plough is best, and for yearlings, either the plough or a light iron dibble.
6. When trees are received in the spring it is a good plan to soak them in water a few days.
7. Guard against giving too many trees at a time. A good many are inclined to take more than they have time to look after.
8. Every farmer should have a one-horse cultivator; doing the work by hand is too much work, and the cultivation not so good.

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9. A few photographs of nice plantations, hedges, or groves, would be very pleasing and interesting.

10. I find the general public very much in favour of this work, as it makes life on the farm more homelike, attractive and cheerful. Agriculture is the foundation of our country. If the farmer prospers we will all prosper, and this forestry work is looked upon very favourably by all classes of the people.

11. Of course the most important part of this work is the growing of the stock to supply the demand. In looking over the stock a few days ago at Indian Head, with Mr. Ross, I was more than pleased to see such large quantities of healthy young trees grown at a very low cost. The work in this respect is certainly very encouraging.

Your obedient servant,

JOHN CALDWELL.

APPENDIX No. 8.

REPORT OF JAMES LEAMY, CROWN TIMBER AGENT.

NEW WESTMINSTER, B.C., September 1, 1905.

E. STEWART, Esq.,
Superintendent of Forestry,
Ottawa.

SIR,—In reply to your letter of the 11th ultimo requesting me to send forward my annual report for the period ending July 1 last, I beg to report as follows: Commencing at the eastern boundary of the province and extending to Beaver Mouth, which district is under the charge of Mr. Frank Ashdown, fire ranger, no fires have occurred between Field and Golden up to the present time. From Golden to the southern boundary of the railway belt on the Columbia river a fire occurred on Limit No. 16, which was set by some unknown person or persons, and which burned the camps and offices belonging to the Columbia River Lumber Company on the said limit, but was promptly got under control, thereby doing no damage so far; there are a number of men still guarding the fire to prevent it from spreading beyond the site of the camps.

Another fire occurred 12 miles south of Golden, on the east bank of the Columbia river; it is burning in small growing timber, and has not reached the merchantable timber; a number of men have surrounded this fire and have prevented it spreading.

About two miles south of this another fire has been burning, but is being guarded, and has done no damage so far. South of the railway boundary large fires are burning on provincial lands and we are watching them carefully, in order to prevent them from extending into the railway belt; in view of the fact that we have had some little rain very lately, I do not think they will reach inside of the railway belt; I cannot tell of what extent those fires are, but am satisfied that they cover a very considerable area of country.

On the west side of the Columbia river, opposite Moberly, on Limit No. 15, a small fire occurred but was promptly extinguished and did not damage the timber to any extent.

On the Blaeberry river a fire occurred which is supposed to have been started by lightning, but it is confined to grounds already burned over, and has not reached the bank of the Blaeberry river yet, excepting at one point where about 300,000 feet of merchantable timber has been burned; men are still guarding this, and unless we have rain very shortly, it will be liable to get away and do further damage.

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An extensive fire is burning on the northern end of Limit No. 47, on the Black Water creek; it is still burning, but Mr. Ashdown is fighting it with a number of men, and has hopes of preventing it from doing damage to any extent; I have not as yet had a report from him in this regard.

The fires on Blaeberry and Black Water, we suppose were ignited by lightning, as we cannot trace them to any other source; I may here say that a number of fires all over the district have been caused in this manner, particularly in and about Revelstoke, where some 21 or 22 fires have been traced to this cause, as they were burning immediately after an electrical storm occurred in that neighbourhood, and were burning very high up on the mountain. It is a very difficult matter to fight fires that have been started by lightning, as one is not expecting them, and they occur in so many places at the same time that it is very difficult to get men to them in time to prevent them spreading.

Coming to Mr. McRae's district, which extends from Beaver Mouth on the east, to Sicomous Narrows on the west, a fire occurred on Beaver creek in the vicinity of Rogers Pass; it was attended to at once by the fire ranger, and men placed to prevent it from extending down Bear creek into Beaver valley, where there is a very large area of merchantable timber, and fortunately they succeeded in preventing it from getting out of control; it burned at Rogers Pass a considerable quantity of dead timber of no value at all.

From Glacier west to Albert canyon, a few small fires were ignited along the railway track, but were kept under control by the sectionmen in the employ of the railway, and did no damage.

At Albert canyon a rancher named Green started a fire for the purpose of clearing some land during the month of May last, and after the fire had done its work for him, he put it out, or supposed he put it out, and it smouldered in a small way until about August 23 or 24, when it broke out again.

Some tramps camped on the north side of the track and started a fire to cook food, or for some other purpose; this fire extended into the woods a short distance. I noticed this in passing, and immediately set men to extinguish it, and am pleased to say they were quite successful, as the fire did not do any damage, and I have since received word that it is completely out.

A fire started on Yale Columbia Lumber Company's limit 114, 18 miles south of Revelstoke, on the Columbia river; this fire was caused by sparks from the engine on the Arrowhead branch. The company, who maintain a watchman on this limit, gave notice to the fire ranger after the fire had been burning two or three days, but the watchman did not endeavour to put it out himself. Mr. McRae immediately proceeded to the scene of the fire and put men to work on it; it ran up the mountain, burning over a considerable area, but I am pleased to say that no timber of any value has been destroyed by this fire, as it was got under control shortly after they started to work on it.

A fire also occurred at Wigwam, burning over the flat, but it was confined to a logged-out area of Limit No. 118, and did not get into any merchantable timber.

Several fires occurred along the railway section towards Revelstoke, but did not do any appreciable damage.

North of Revelstoke, on the Columbia river, the only fire that occurred came inside the railway belt from provincial lands from the north, and burning to the mouth of Carnes creek at the north boundary of the railway belt; it did not damage the merchantable timber, being confined to an area which had been previously burnt over; it is, however, still being guarded.

In the Eagle Pass a large fire occurred at Malaka; after a severe struggle it was surrounded and prevented from doing any damage; this fire is supposed to have originated from sparks from a locomotive, though we are not sure of the cause, but it is now under control. In the district guarded by Mr. Reid, the only fire in the whole railway belt which did damage to any very large extent occurred at the head of Sey-

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mour Arm, on timber berth No. 241; I am sorry to say it has burnt over 4 square miles of the limit, and did considerable damage to merchantable timber, and to young standing timber, but the fire is now under control, and is being guarded, a considerable force of men having been employed in fighting it.

On Mara lake a would-be settler set fire to a point on the lake; the fire extended along the shore of the lake, and burned up a lot of young timber, but is now extinguished.

Numerous and extensive fires occurred in the valley of the Spillimacheen river, between Mara and Enderby, but were confined altogether to lands owned by the farmers in that vicinity, although it cost us considerable trouble and expense to prevent it from spreading into vacant Dominion lands.

On the Spillimacheen river up from Enderby to Mable lake, several fires occurred, two on limit No. 238, one or two on limit No. 237, but I am informed by the fire ranger, Mr. Alex. Reid, that little damage has been done by them. Several fires occurred on farmers' lands in the vicinity of Deep creek west of Enderby, but did not get on to Dominion lands. A fire was burning in the vicinity of Canoe creek, but it has since been extinguished, and I do not think any damage has arisen from it; I have not received any report concerning it as yet.

At Notch hill a fire was started by some ranchers, and burned into limit No. 239. In the vicinity of White lake a fire occurred on limit No. 306, a force of men were put on to fight it and they kept it confined to a small area and prevented it from doing any damage. It is still being guarded.

A fire also occurred on timber berth No. 379, on the north shore of Shuswap lake, but was extinguished without doing any damage. This fire was supposed to have been started by lightning. A small fire is still burning on timber berth No. 240, block 3, but men are watching it to prevent it from spreading. Another fire occurred at Adams river, but was promptly extinguished, and has not done any damage.

In the coast districts, commencing with Mr. Hughes' district, no fires have occurred between Yale and Agassiz, excepting a few small ones on Maria island on the Indian reserve. These were ignited by the sectionmen burning used-up ties. No damage, however, has resulted.

A fire occurred a very short time ago on limit No. 63, on the west side of Harrison lake, and it is reported that a considerable amount of damage has been done to this limit; I have not as yet received a report from the fire ranger, so I cannot say what damage has actually been done.

No other fire has occurred in Mr. Hughes' district, excepting one at the head of Stave lake, which comes within his care and that of Mr. Martyn. Mr. Martyn informs me that very little damage has been done by this fire. Numerous small fires occurred in both Mr. Hughes' and Mr. Martyn's districts, but practically no damage at all has been done.

In Mr. Johnson's district one fire is reported as having been started on limit 'B'; he has ascertained the party who set it and will prosecute him; I cannot ascertain the amount of damage done to the limit, but I do not think it amounts to much.

Several fires are reported by Mr. John Ball in his district, which extends to the American boundary line near Cultus lake, but no timber of any consequence has been destroyed in his vicinity.

Coming next to Mr. Fadden's district, no fires at all have been reported to me.

A large fire occurred on provincial lands on the Pitt river at the head of the lake some 4 or 5 miles outside of the railway belt; I learn that it has done considerable damage, as it has burned for a long time.

In conclusion, I have to say that the past season has been by far the driest since the inauguration of the fire ranging system, and in view of these circumstances, I consider that the system has once more proven a success in preventing fires which if once started, would have devastated the whole of the railway belt.

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The greatest difficulty that we have experienced this year has been in obtaining men to fight fires.

The dry season having continued for so long, there has been a great scarcity of water, the small streams usually to be depended upon for drinking purposes, having all been dried up, water had to be carried to the men from a great distance, and consequently men were unwilling to engage in the work of fighting fires at so great a discomfort and hardship.

SUGGESTIONS.

I would respectfully request you to urge upon the government the necessity of placing a power launch of some description, capable of carrying some eight or ten men, upon the large Shuswap lake; the reason of this request is, that we are unable to get men around to the fires; if you will look at the map and see the large area that can be covered by the means above suggested, you will appreciate this recommendation. The fire which did so much damage on Seymour Arm could have been easily extinguished had it been possible to get men to the scene of the outbreak at once; it was several days before men could be landed there, owing to the lack of transportation, and the fire had then assumed large proportions before anything had been done to prevent it spreading. I have already written the Deputy Minister on this subject, and would ask you to be good enough to endorse my recommendation.

This report embodies the operations of the fire rangers for the period ended August 31, last.

I have received very material assistance from the officials of the Canadian Pacific Railway in carrying men to and from fires on freight trains, and giving immediate information about the locality of any fires noticed by their engine drivers and their conductors.

Your obedient servant,

JAMES LEAMY,

Crown Timber Agent.

APPENDIX No. 9.

REPORT OF THOS. YOUNG, FOREST RANGER FOR THE DAUPHIN DISTRICT.

DAUPHIN, August 31, 1905.

E. STEWART, Esq.,
Superintendent of Forestry,
Ottawa.

SIR,—I have the honour to make my report as forest ranger in the Dauphin district.

With the extension of the main line of the Canadian Northern Railway, and also the completion of the Prince Albert branch, greater facilities have been given to the timber operators for the removal of their lumber products to the enlarged market created by the opening up of the new districts.

This season has been drier than that of the past six years, and the logs cut on the river system of Lake Winnipegosis were not all driven to the mills on account of low water.

The cut of lumber has been about the average, but with the prospects of an abundant harvest there will be a scarcity in the market to meet the local demand.

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There has been no great damage done by fire to the forest in this district during the past season, and the work of the forest fire rangers in the spring and fall has tended to greatly reduce the danger in this respect.

There has been a marked growth in the forests in the timbered areas during the past season, but with the exception of the tree planting done in the towns and villages no great attention has been given to forestry.

Your obedient servant,

THOS. YOUNG,
Forest Ranger.

APPENDIX No. 10.

REPORT OF C. A. WALKINSHAW, FOREST FIRE RANGER FOR THE
TURTLE MOUNTAIN TIMBER RESERVE.

BOISSEVAIN, June 31, 1905.

E. STEWART, Esq.,
Superintendent of Forestry,
Ottawa.

SIR,—I beg to submit to you my report on the Turtle Mountain timber reserve, for the past year.

This has been the best year since the reserve was formed, not only for the splendid growth of the young trees all over the reserve, but for the scarcity of fires inside the reserve. In some parts of the reserve which a few years ago were almost bare, a dense forest of young trees is now found, from 10 to 15 feet in height. I am sure from six to eight years from the present we will have a splendid forest, but it will have to be diligently patrolled, and every precaution taken against fire. Should fire get into the reserve this fall or next spring, with the tremendous growth of vegetation this year, it would pretty nearly clean off the reserve.

I am happy to say that the farmers and others in this district are beginning to take a keen interest in the preservation of the reserve. In my opinion the department should do something towards making at least two good trails through the reserve, running north and south, so that in cases of fire the rangers could bring in help with the least possible delay. Any of the trails at present are almost impassable. I hope that you will give this suggestion your consideration. I assure you I will do everything in my power to keep our fine young forest free from fire.

Your obedient servant,

C. A. WALKINSHAW.

APPENDIX No. 11.

REPORT OF JOS. E. STAUFFER, FOREST RANGER.

DIDSBURY, ALBERTA, August 18, 1905.

E. STEWART, Esq.,
Superintendent of Forestry,
Ottawa.

SIR,—I beg to submit a report on forest fire ranging in Alberta south of the North Saskatchewan river, for the year 1905.

I am pleased to state that we have had no fires this year that did any serious damage to standing timber. The fires that did occur were small and confined to **small** areas. According to the monthly reports of the rangers, these small fires were in **most** cases attributed to settlers clearing land. Violaters of the Fire Ordinance, where sufficient evidence could be obtained, were prosecuted.

The fire rangers under my supervision have been very energetic in their work of preventing fires, and considering they are all new at the work, they have been **quite** efficient.

Your obedient servant,

JOSEPH E. STAUFFER.



Scotch Pine, planted about 100 years ago, at entrance to Duke of Athol's grounds at Blair Athol, Perthshire, Scotland.



Mixed Stand of Silver Fir and Oak, 40 to 60 years old, near Sulzburg, in Baden, Germany.
Thinned out six years ago. In four years more a further and final thinning
will be made.



In the Forest on the Columbia River above Revelstoke, B.C. Showing a good specimen of a Western White Pine in the foreground.



Plantation set out under Co-operative scheme, on farm of George Harvey, Indian Head, in Spring, 1902. Photo. taken August, 1905. Cottonwood, Willow and Maple.



Plantation set out under Co-operative scheme on farm of Alf. Wilson, Indian Head, in spring, 1901. Photo. August, 1905. Cottonwood and Maple.

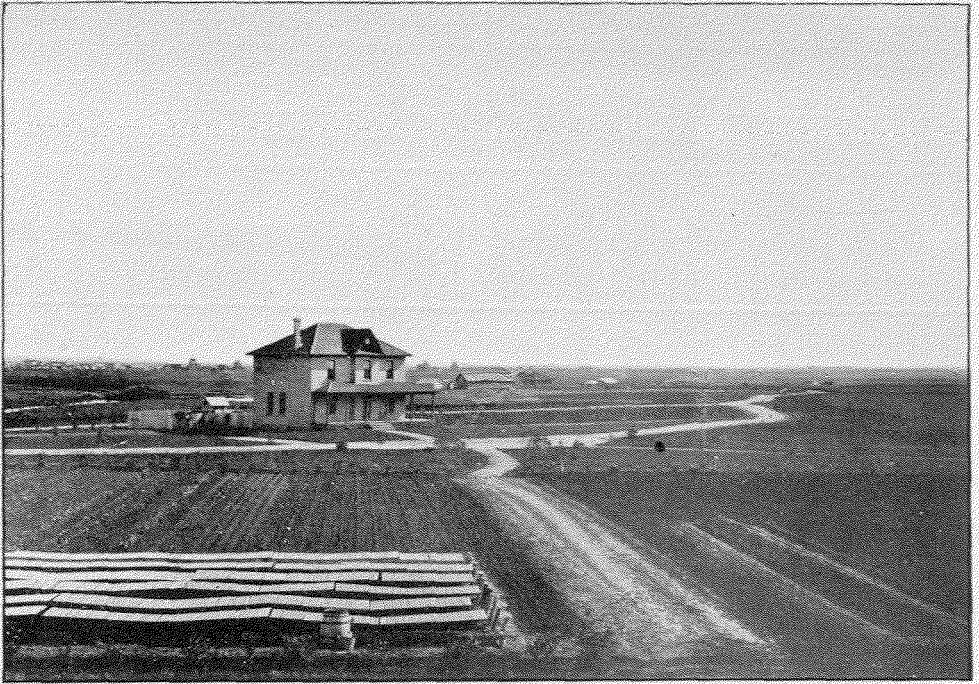


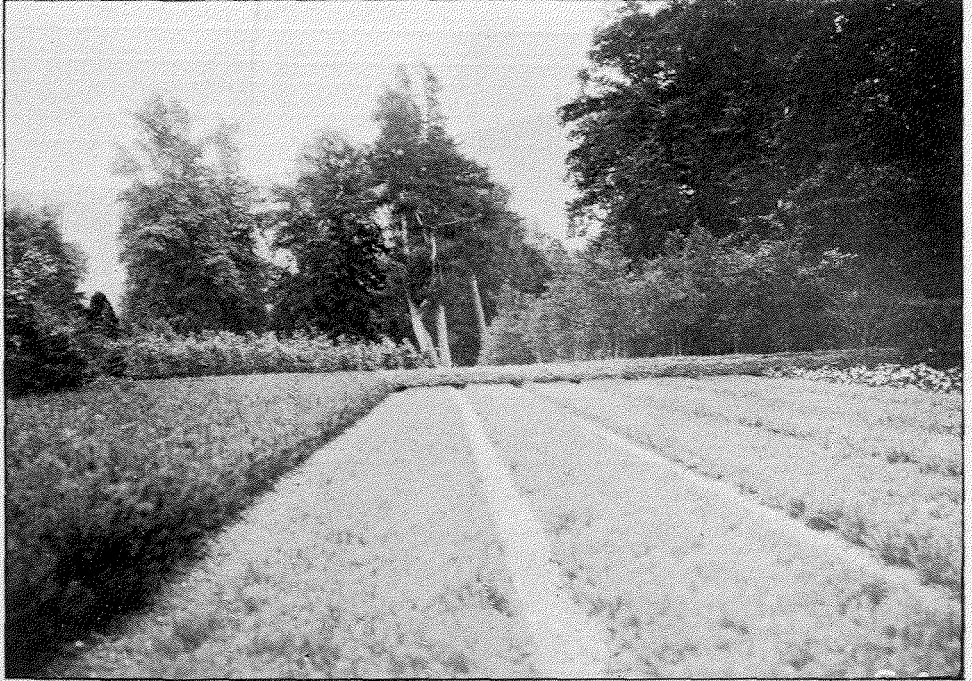
Photo. taken in June, 1905. In foreground Conifer seed beds. Shows lay out of grounds and house. Twelve months previous this was unbroken prairie.



Field of Ash Seedlings during second season's growth. Photo. July, 1905.
Nursery Station, Indian Head.



Part of Ornamental Grounds at New Nursery Station, at Indian Head, Sask. Photo. taken August 1st, 1905. In Spring of 1904 this was unbroken prairie.



Forest Nursery on estate of His Grace The Duke of Athol, near Blair Athol, in Perthshire, Scotland. In foreground are seedling trees of Larch, Scotch Pine, Oak and Elm. In background are three of the first Larch planted in Scotland by the Second Duke of Athol in 1738.



On Fish River, B.C., showing Cedar Logs and Donkey Engine used in drawing logs and water.



Cedar Trees on the Columbia River above Revelstoke, B.C.



In the Lumber Woods at Fish River, B.C., showing Donkey Engine used in drawing out Logs.