1919.

NEW ZEALAND.

DEPARTMENT OF FORESTRY:

STATE FORESTRY.

REPORT FOR THE YEAR ENDED 31ST MARCH, 1919.

Presented to both Houses of the General Assembly by Command of His Excellency.

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ANNUAL REPORT.

The Chief Officer to the Hon. the Commissioner of State Forests.

Sir,— Wellington, 1st August, 1919.

I have the honour to submit herewith the annual report of the Department of Forestry.

I have, &c.,

E. Phillips Turner,

The Hon. Sir F. H. D. Bell, K.C.M.G., K.C. Chief Officer.

REPORT.

PART I.—INDIGENOUS FORESTS.

Legislation.

The State Forests Act, 1908, has been found to be in several respects deficient; but, as under the exceptional circumstances of last session it was not advisable to introduce an amendment that would deal with all deficiencies, section 34 was inserted in the War Legislation and Statute Law Amendment Act, 1918, to deal with those which at the time were of most importance. Under this section power is conferred upon the Commissioner of State Forests to purchase and to hire sawmills and machinery, to cut and sell timber in State forests, and to purchase private lands for addition to or for the protection of State forests. Power is also conferred upon the Governor-General in Council to set apart by Proclamation any Crown lands as and for "provisional State forests." These provisional State forests differ from State forests which have been set apart under the State Forests Act, 1908, in that the Governor-General in Council has power by a further Proclamation to declare that a provisional State forest is required for settlement, and the effect of any such Proclamation is to remove the land from reservation as a provisional State forest.

Every afforestation purpose is declared to be a public work under the Public Works Act, 1908.

The Governor-General in Council is empowered to make, by Order in Council, regulations for limiting the export of timber from New Zealand, and prohibiting the sale of standing timber, or the granting of licenses to cut standing timber, on public or private lands except subject to conditions that may be prescribed.

Provisional State Forests.

With regard to provisional State forests it may be pointed out that the continuous alienation of forest lands and the rapid depletion of our timber-supplies made it imperative that speedy action should be taken to conserve as much as possible of our remaining forests. Regular forest demarcation could not be carried out under many years, and, as a substitute, power was obtained to make "provisional State forests." Lands that may be proclaimed provisional State forests will not necessarily be permanently locked up, for, as stated above, the reservation can be uplifted by a simple procedure. No doubt many of the reserves will contain land suitable for settlement, and when these lands have been properly defined they will be made available for settlement; but areas which are more suitable for retention under forest will be kept under reservation and used for the production of timber.

At the end of the year under review no provisional State forests had been proclaimed, but plans of areas totalling 1,800,000 acres (a proportion of this area is treeless mountain-tops) have been received from the District Offices, and these areas will shortly be proclaimed.

Limitation of Export of Timber.

As the dairy, fruit, and other industries which use a large quantity of white-pine were finding it impossible to obtain adequate supplies, measures were taken through the Board of Trade to limit the export of this timber to 40 per cent. of the total production. This action has met with strong opposition from persons in localities where a large export trade has been worked up, but, on the other hand, the users of white-pine in New Zealand have made strong representations that its export should be entirely stopped.

Control of the Sale or the Cutting of Standing Timber on Private or Public Lands.

Under the authority of subsection (6) of section 34 of the War Legislation and Statute Law Amendment Act, 1918, regulations were published in the *Gazette* of the 27th March, 1919, prohibiting the sale of standing timber, or the grant of licenses to cut standing timber, on either public or private lands without first obtaining a license from the Governor-General in Council. Before licenses are issued under these regulations information is obtained as to the kinds and quantities of timber on the land, and the character of the land. In some cases, where considered advisable, a condition that the timber shall be used solely within the Dominion is imposed. The regulations do not prevent a private owner from himself cutting or destroying the timber on his own land. The authority of Wardens in mining districts to grant licenses to cut timber growing, in many cases, upon land that is of little use for any other purpose has been limited to the power to grant licenses for cutting timber to be used solely for mining purposes. In this connection it may be pointed out that four different Royal Commissions have recommended that the control of timber in mining districts should be removed from the Wardens. Forestry is, of course, a subject in which Wardens have received no training, and, further, they have no staff to report on forests or to see that the forest regulations are carried

out. It is, of course, only reasonable that all forests should be controlled by the Forestry Department, which exists solely for the purpose of managing forests efficiently, and will have the trained staff necessary for that purpose. It will certainly be one of the duties of the Forestry staff to make sure that the forests are so managed that there will be ample supplies of timber both now and in the future for mining as for other purposes.

Financial.

Revenue received from Royalties, Sales of Timber, &c., from Indigenous Forests.

District.	State Forest.	Crown Land.	Land for Settlement.	National Endowment.
	£	£	£	£
Auckland	619	2,608	7	3,371
Hawke's Bay	..	107	..	..
Taranaki	53	438	..	1,126
Wellington	306	2,353	11	547
Nelson	46	377	..	799
Marlborough	1,403	304	81	..
Westland	..	177	..	7,370
Canterbury	536	..	..	..
Otago	130	259	..	..
Southland	1,844	1,492	..	11
Totals	4,937	8,115	99	13,224

From the statement above it will be seen that the largest amount of revenue from indigenous forests is received from national-endowment lands. The Auckland District returns the largest forest revenue, and Hawke's Bay the least.

The total amount received as revenue from indigenous forests is £26,375, but of this only £4,937 is paid into the State Forests Account. Most of the forest revenue received from the Westland District goes to goldfields revenue, and this Department has no record of it.

Receipts and Expenditure.

The amount appropriated last year for expenditure upon State forestry operations was £69,257, and the expenditure amounted to £41,344, being a decrease of £508 upon the expenditure of the previous year.

This year's expenditure differs little from that of last year; in connection with Balmoral Plantation there is an increase of £1,776, and in connection with the war bonus an increase of £1,728. As £3,294 was expended last year in the purchase of part of the Balmoral Estate, a net decrease as above is shown.

It will be understood that as the area under plantations increases, additional expenditure is also required for the purpose of supervision, fire-protection, maintenance, &c. The present charges are incurred almost entirely in respect to planting operations.

Under section 32 of the Finance Act, 1918, authority was provided for raising £200,000 for forestry purposes. During the year £26,900 was raised and placed to the credit of the State Forests Account. In addition to this, £10,000 was contributed from the Consolidated Fund. The revenue from State forests amounted to only £5,294 2s. 8d., being only about half that received for each of the years 1916–17 and 1917–18. The revenue from the plantations and nurseries amounted to £2,235 7s.

It is anticipated that this year milling operations will be started in one or other of the kauri forests, that areas will be acquired for forestry, and that considerable increases in staff will be required; it will be necessary, therefore, that increased financial provision should be made to meet these new undertakings.

State Forests Account.—Receipts and Payments.

Dr.	£ s. d.	£ s. d.	*Cr.*	£ s. d.	£ s. d.
To Cash in hand, 1st April, 1918 ..	1,174 16 10		By Nurseries and plantations—		
Loan Account—Debentures issued ..	26,900 0 0		Salaries	5,163 15 5	
Consolidated Fund—Contributions towards forest-tree growing and planting	10,000 0 0		Buildings, planting, material, &c. ..	29,785 16 10	
Revenue from State forests—Rents, royalties, fees, &c.	5,294 2 8		Travelling-expenses ..	698 7 0	
Revenue from nurseries and plantations—	£ s. d.		Books, stationery, postages, &c. ..	204 9 7	
Trees	608 12 10		War bonus ..	3,309 4 7	
Seeds	84 19 5				39,161 13 5
Firewood	408 15 0		State forests—		
Poles	67 19 0		Management expenses	1,434 7 11	
Grain	536 12 10		Timber Control Committee	274 18 7	
Sheep	88 14 6		Bridges, &c. ..	372 10 2	
Wool	194 7 4		Report by D. E. Hutchins	100 0 0	
Grazing	231 19 2				2,181 16 8
Rent of cottages ..	13 6 11		Interest on debentures		1,861 10 11
		2,235 7 0	Cash in hand, 31st March, 1919 ..		2,399 5 6
	£45,604 6 6				£45,604 6 6

STATE FORESTS ACCOUNT.—LOAN ACCOUNT AS AT 31ST MARCH, 1919.

Dr.	£	*Cr.*	£
To Loan authority—		By Debentures issued—	
Section 50, Finance Act, 1916 ..	50,000	1916–17—Section 50, Finance Act, 1916	10,000
Section 32, Finance Act, 1918 ..	200,000	1917–18—Section 50, Finance Act, 1916	28,100
		1918–19—Section 50, Finance Act, 1916 .. .. £11,900	
		Section 32, Finance Act, 1918 15,000	
			26,900
		Balance of authority as at 31st March, 1919	185,000
	£250,000		£250,000

TRADE.

Though the returns received as to the output of timber are not complete, it is shown in the reports of the Conservators that the output of timber for the year is considerably less than that of last year. About the beginning of the New Year there was, however, a marked revival in the timber trade, and with the resumption of public works and private building no doubt there will be for some time a big demand for timber. Reconstruction in Europe will require huge quantities of American, Canadian, and Baltic timber, so a diminished import and the renewal of building in this country should bring a prosperous time to local mills.

As has been the case with other commodities, the price of timber has advanced during the year, and this advance has had the effect of bringing about a more complete use of the log of ordinary timbers and an increase in the output of silver (or Southland) beech (*Nothofagus Menziesii*) and *Pinus radiata*. There has been such a demand for *Pinus radiata* that a price of 17s. 6d. per 100 superficial feet has been readily obtained from the inferior material that is cut from trees grown in wind-breaks.

Import of Timber.

The following return, furnished by the Comptroller of Customs, shows the total quantity and value of the undermentioned kinds of timber and tan-bark imported into New Zealand, and the net Customs duty collected thereon, during the year ended 31st March, 1919 :—

Item.	Quantity.	Net Duty collected.	Value.
(1.) Round logs—	Sup. ft.	£	£
Ironbark	555,624	7	10,409
Other timbers	34,071	4	543
(2.) Hewn logs—			
Ironbark	1,812,289	128	26,370
Jarrah	455,174	..	5,904
Other timbers	1,362,990	53	16,992
(3.) Sawn, rough—			
Ironbark	238,529	220	3,695
Jarrah	213,188	228	1,569
Oregon pine (Canada)	..	..	..
Oregon pine (U.S.A.)	2,694,052	2,602	25,400
Other timbers	2,805,025	3,105	55,894
(4.) Sawn, dressed—			
Miscellaneous	7,132	16	267
	10,178,074	6,363	147,043
	Number.		
(5.) Laths	796,310	95	1,506
(6.) Palings, split	93,235	108	968
(7.) Rails, split	..	..	..
(8.) Posts, split	5,134	..	1,500
(9.) Shingles	678,065	83	1,483
	1,572,744	286	5,457
	Tons.		
(10.) Miscellaneous timbers	..	29	2,885
(11.) Tanning-bark	3,225	391	39,721
(12.) Wood-pulp	178	44	4,406
Total	..	7,113	£199,514

From the above it is found that the import of logs and dimension timber for the year under review was less than for the previous year by roughly 3,000,000 sup. ft., but the value was £14,000 more.

Export of Timber.

The following return, furnished by the Comptroller of Customs, shows the total quantity and value of the undermentioned kinds of timber exported from New Zealand, and the timber export duty collected, during the year ended 31st March, 1919 :—

Item.	Quantity.	Duty collected.	Value.
	Sup. ft.	£	£
Kauri	9,280,213	11	97,084
White-pine	28,385,105	4	233,680
Rimu	27,977,703	..	194,282
Beech	1,254,091	..	10,670
Miscellaneous (New Zealand)	1,797,425	..	16,224
,, (not New Zealand)	2,566	..	33
	68,697,103	15	551,973
	Tons.		
Tanning-bark (New Zealand)	8	..	122
Total	..	..	£552,095

From the above it is found that the export for the year under review was less than for the year ended 31st March, 1918, by roughly 2,000,000 sup. ft.; but in the former case, though the quantity was less, the value was £132,000 more. There was an increase of roughly 3,000,000 sup. ft. in the export of rimu for the year just ended over that of the previous year.

Output of Sawn Timber.

Information supplied by the Board of Trade shows that the total output of all timbers during the year was, in superficial feet, as follows: Rimu, 111,318,579; white-pine, 63,136,665; kauri, 21,835,023; totara, 13,387,038; matai, 11,930,040; beech, 4,466,116; taraire, 228,377; *Pinus radiata*, 1,501,274: or a total of 227,803,112 superficial feet for all kinds.

The output is 20,000,000 superficial feet below that for the year ended 31st March, 1918, as obtained from the reports which were sent in for that year by the Conservators of State Forests.

AREA OF FOREST LANDS OWNED BY THE STATE.

Returns received in October last showed that the approximate total area of all forests owned by the State was as follows :—

Forests controlled by the Commissioner of State Forests.

The Commissioner of State Forests has control over only State forests proclaimed under the State Forests Act and certain forest reserves made under the Land Act prior to 1885. The total area of both these classes is 1,654,214 acres, of which there are approximately 1,464,214 acres under forest, but *only about 364,000 acres* carry kauri, rimu, white-pine, matai, totara, and miro in sufficient quantity to be commercially valuable at the present time, though it may be possible by interplanting and other treatment to establish a crop of milling-timber trees on the balance of the land.

Forests not controlled by the Commissioner of State Forests.

(*a.*) The area of forest on Crown lands is approximately 3,899,832 acres, but of this only about *494,400 acres* are milling-forest.

(*b.*) The approximate area of forest on national-endowment lands is 2,205,575 acres, but only about *417,500 acres* of this area are milling-forest. In Westland the forests on national-endowment lands are far more valuable than those on Crown lands.

(*c.*) The area of forest on lands acquired under the Land for Settlements Act is 66,735 acres, and of this area there are approximately *58,000 acres* of milling-forest.

(*d.*) The area of forest on forest reserves, reserves for the growth and preservation of timber, timber reserves, and other reserves made under the Land Act, other Acts, or taken under the Public Works Act, is approximately 371,269 acres, but of this only about *37,200 acres* carry milling-timber. At present there is no authority to mill timber on these classes of reserves.

(*e.*) The total area of scenic reserves under both the Scenery Preservation Act and the Land Act is 389,065 acres. Most of this area is under forest, some of which is millable, but as the object of reservation is primarily to preserve the forest in its natural state none of the area can be considered in connection with the timber resources of the Dominion.

(*f.*) The total area of National Parks is 2,817,389 acres, of which about 2,081,000 are under forest, but the proportion of milling-timber is very small, and at present there is no authority to cut timber on National Parks.

Total Forest Area.

The total area of forest now owned by the State is about 10,478,247 acres, but of this area the total area of forest at present of milling value is approximately *only 1,371,000 acres*, and a portion of this is already subject to milling licenses. As the area of the whole Dominion is 65,864,550 acres, it will be seen that the total area of forest still owned by the State is only 15·9 per cent. on the total, whilst the area of milling-forest owned by the State is only *2·08 per cent.* It may be concluded that most of the forest on private and Native lands (of which there is no information as regards the forest area) will be cut down in a few years' time. When, therefore, it is borne in mind that such highly developed countries as France and Germany (and even these countries import together about 30 per cent. of their total consumption of timber) have respectively 17 per cent. and 26 per cent. of their total area under commercial forests, it will be seen how necessary it is that our remaining forests should be subjected to such management as will prevent their wasteful use and the exhaustion of our timber-supplies.

NEW AREAS PROCLAIMED STATE FORESTS AND AREAS FROM WHICH THE RESERVATION WAS WITHDRAWN.

During the year a total area of 630 acres was proclaimed State forest, whilst an area of 663 acres was withdrawn from reservation for the purposes of settlement.

FOREST FIRES.

During the year little damage was caused by fires in State forests. Two hundred acres were burned in Canterbury, but this forest contained no timber of milling value. On Crown land adjoining the Waipoua State Forest 200,000 ft. of kauri was destroyed by fire, but the fire was put out before it reached the reserve.

In common with most young countries, New Zealand has lost through the ravages of fire large areas of forest the value of which, if now existing, would amount to many hundreds of thousands of pounds. Persons are often heard to assert that New Zealand forests cannot be protected from fire, but such assertions are unreasonable when it is remembered that effective fire-protection is practised in Sweden, Norway, Germany, France, Austria, India, Japan, and South Africa, where the summers are on the whole hotter and drier than they are in New Zealand. Fire-protection is simply a matter of staff and the adoption of correct methods. Even in forests where fire-protection is practised, fires of course occasionally occur, as they do in cities where fire brigades are kept, but in the former case there is no more reason for accepting fires as unavoidable than there is in the latter case.

In the United States and Canada the protection of forests from fire is one of the chief functions of the Forest services. Fire wardens can arrest without a warrant any one detected in lighting a fire in a State forest; they are authorized to call upon settlers and others to help extinguish fires, and they are equipped with fire-fighting appliances and field telephones; settlers have to obtain permits from fire wardens to burn off their clearings, and are allowed to burn only during certain months of the year; engines on railway-lines (they are private lines, be it noted) and those used in logging operations must use approved spark-arresters in the summer months; and notices warning persons against destroying their own valuable property—the forests—are put up in all railway-stations and other suitable places. The Canadian Forest Association, which has official recognition and support, annually spends a large amount of money by advertising, lectures, and other means in informing the public of the immense value of the forests and the necessity, from considerations of timber-supply, water-conservation, climate, &c., for preventing their destruction.

At some of our most important kauri forests we already have caretakers, but more rangers are required; and it is desirable to have new legislation to control burning by settlers, to extend the powers of forest officers, and to make obligatory the use of spark-arresters during the summer months.

Serious fires have, indeed, even in recent years, occurred in American and Canadian forests, but their frequency has been very much reduced. In European forests protection is so efficient that fires are a rarity, and when they occur they are extinguished before any considerable damage is done.

EXPERIMENTS IN INDIGENOUS FORESTS.

There is a large area of forest in New Zealand which is at present of little or no value for milling, but which on account of its growing on poor hilly country it is desirable to retain under forest. The forests on these lands, however, can be made directly valuable; they already provide the shelter and the kind of soil young trees require, and all that has at present to be done is to find by proper experiment the most suitable trees to grow in them. Having ascertained this, certain areas will be taken in hand, properly protected, and suitable timber-trees planted in the forest on them. With this method of afforestation only about 200 trees are planted to the acre, as against 2,700 in plantations in open country. In the former case a certain amount of shrub-cutting and ring-barking of over-hanging trees will have to be done, and the young trees will require looking after for some years. Already plots have been selected in a milled forest in the Rotorua district, and during the coming planting season these will be planted with exotics. Mr. Goudie, Superintendent for the North Island, last winter planted some Monterey cypress in a small indigenous forest near Tikitapu Lake, and the result is so far most encouraging. In the South Island indigenous forests similar experiments will

be made. Experiments will also be made in the restoration of worked-out milling-forest by means of natural regeneration; but at present the officers with sufficient training to undertake these experiments are already fully occupied with other work.

General.

Research.

During the year there was considerable controversy as to the rate of growth of indigenous trees as compared with that of exotic trees. Excepting in the cases of *Pinus radiata* and the eucalypts, there is no reliable information as to the rate of growth to a millable size of exotics in this country when planted in large areas. Many persons have quoted the increments made by certain exotics grown as single trees or in rows as wind-breaks on good land as conclusive proof that such trees should be grown for timber in plantations on open lands in preference to any attempt to regenerate indigenous forests. Such a conclusion is, however, not warranted from such evidence, as the growth of single trees of a particular species is no criterion of the average growth of that species when it is growing in a dense stand on poor land—which, it may here be said, is the only land on which forestry should as a rule be practised on a commercial scale. As an instance of the truth of this may be given an eleven-year-old plantation of the quick-growing *Pinus radiata* at Hanmer, in which the trees were planted 4 ft. by 4 ft. apart; the average diameter (at breast-height and under bark) of the interior trees was only $3\frac{3}{4}$ in., with a height of approximately 40 ft., whilst the same trees grown in single rows might be as much as 11 in. in diameter at the same age.

As regards the rate of growth of indigenous trees in the natural forest, very few observations have been made by competent observers. Mr. T. F. Cheeseman, F.L.S., has done some valuable work in connection with the kauri, and has shown that the diameter-growth (including trees up to 705 years old) is 4·8 years to 1 in. From measurements I have made on three kauri-trees and a number of boards the average diameter-increment obtained was 1 in. in 4·6 years, whilst one board 8 in. wide showed an increment at the rate of 1 in. of diameter in 3·6 years. One of the quickest-growing trees observed by Mr. Cheeseman was 11 ft. in diameter, and it had reached this at an *average* rate of growth of 1 in. in 3·6 years, which is probably not surpassed, if equalled, by any of the first-class conifers in natural forests in any part of the world. In the case of the kauri, when compared with trees in planted forests, it must be borne in mind that it has to contend with the unchecked competition of other trees surrounding it, whereas trees in a cultivated forest are for the whole of their growing period under the management of skilled foresters. Little has yet been done to obtain the true diameter-increment of other native trees. Measurements made by myself, however, indicate that the beeches and tanekaha (celery-pine) are fairly fast; that rimu and totara, though in early life slow, quicken as their crowns get to the light; that white-pine is slow; and that matai, silver-pine, and mountain-cedar are all very slow. Some matai and silver-pine specimens I observed had taken over fifty years to produce 1 in. of diameter. It can, however, be reasonably assumed that the rate of growth of all indigenous trees in the forest can be accelerated by the application of sylvicultural treatment. It is of course absurd to condemn the regeneration of indigenous forests because some of the biggest kauri-trees are over 1,000 years old. It is of little consequence in forestry if a tree 12 ft. in diameter has taken five hundred or a thousand years to grow, but it is of great consequence how long a tree takes to reach the smallest diameter at which it can be profitably milled. The Californian redwood is a very quick-growing tree, and one that it is undoubtedly profitable to regenerate, yet it one is of the oldest trees in the world, some specimens having been found by American scientists to be over four thousand years old.

A research officer is shortly to be appointed to the staff, and one of his first duties will be to make a comprehensive investigation of the diameter, height, and volume increment of our chief trees throughout the whole of the Dominion. Mr. T. L. Lancaster, M.Sc., of Auckland University College, has already kindly started an investigation of this nature with regard to the kauri.

Instructions have been issued to district officers to obtain large samples of our indigenous beeches and other timbers in order that they may be sent to England to be tested for pulping purposes at the Imperial Institute. Samples of *Pinus radiata* are also being sent, and if the tests prove that this rapid-growing tree is suitable for the manufacture of wood-pulp there will be little doubt that it will be profitable to grow it on a large scale in this country for that purpose.

Mr. D. E. Hutchins's Report on the Waipoua Kauri Forest.

An exhaustive and valuable report by Mr. D. E. Hutchins (formerly of the Indian Forest Service) on the demarcation and future management of the Waipoua Kauri Forest was published during the summer. Mr. Hutchins strongly maintains that with proper management a continuous production of timber can be secured from a kauri forest, and that such production is cheaper than the production of timber from trees grown in plantations. He is satisfied that a very great mistake has been made in this country in allowing the clear-felling of kauri and the subsequent utilization for farming of the poor land on which it grew. Mr. Hutchins has a world-wide reputation as a forester, and his views and advice must receive most serious attention.

State Sawmilling.

But for the conditions resulting from the war, sawmilling by the Department would have been started in one of the forests of the North. The Railway Department has agreed to transfer to this Department its interest in the Puketi Forest, between the Bay of Islands and Hokianga Harbour.

This forest contains a large amount of kauri, and it is proposed to start milling in either this or the Warawara Kauri Forest during the coming year. As the Warawara Kauri Forest contains a large quantity of over-mature trees, and trees that have been much damaged by crude and clumsy "gum-bleeding," it should be the first forest to be milled.

Director of Forests.

During the war it would have been impossible to have obtained the services as Director of Forests of a person with the highest professional training, but since the termination of the war arrangements have been made for the High Commissioner to advertise in the United Kingdom, Canada, and the United States for a man who has graduated at a recognized school of forestry, and who has also had experience in the management of forests, to take the position of Director of Forests here. In order that selection may be made as in the case of professors at the University, the office of Director will be excepted from the Public Service Act.

In a preceding paragraph it has been shown that the area of forest of commercial value and still owned by the State is very small, and it is therefore of the highest importance that this forest should be managed with the greatest skill obtainable. A Director with the training referred to above and with the local knowledge of the officers available here will be able to carry out a system of treatment which all will feel confident is in the best interest of the State.

Increase in Staff.

To control and manage the forests owned by the State is of course the reason for the existence of a Forestry Department. Hitherto all forests excepting the plantations of exotics have been managed by the Lands Department staff; but the establishment of a separate Department entails the formation of a special staff for carrying out demarcation, special inspections, timber appraisements, fire-protection, forest research, milling and sale of timber, and these operations require a central administrative staff. Up to the present time only a Chief Officer has been appointed, but, as stated above, a Director of Forests is to be appointed; and a Research Officer, six Forest Inspectors, a Chief Clerk, with junior clerical assistants and draughtsman, are now about to be appointed. This staff, however, will be quite inadequate to do all the work that will be required in order to obtain an active and proper management of the forests, and it may be taken as certain that with the extension of operations additional officers will have to be employed in the near future.

PART II.—STATE NURSERIES AND PLANTATIONS.

Trees raised and Area planted.

During the year ended 31st March, 1919, 3,213,275 trees were raised in the four State nurseries, and during the same period 4,384,036 trees were sent out to the various State plantations and 453,749 to outside places.

In spite of the shortage of labour and a depleted staff, the new area planted was 2,799 acres, which brings the total area planted, since the starting of afforestation in 1896, up to 35,158 acres. The following table shows the area planted prior to the 1st April, 1909, and the area planted yearly since that date:—

—	Planted before 1st April, 1909.	1909–10.	1910–11.	1911–12.	1912–13.	1913–14.	1914–15.	1915–16.	1916–17.	1917–18.	1918–19.	Total Area.
	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.
North Island	7,802	1,807	1,575	1,664	776	1,288	1,416	1,913	1,918	1,633	1,835	23,627
South Island	3,291	891	1,025	902	828	537	749	764	846	1,020	964	11,817
Totals ..	11,093	2,698	2,600	2,566	1,604	1,825	2,165	2,677	2,764	2,653	2,799	35,444

Prison Labour.

At the Kaingaroa Plantation (near Rotorua) the average daily number of prisoners employed was 32·9. The total value of the work done by prisoners during the year was £2,793 2s. 1d.; and the total area was 1,085 acres. The total value of the work done in the North Island since 1900 is now £49,801 15s.

State Assistance to Farmers in Tree-planting.

The total number of trees disposed of to farmers and local bodies during the year was 420,412, which is an increase of 159,412 over the number disposed of during the previous year. Trees were disposed of gratis to soldier settlers. Inasmuch as tree-planting by farmers will supplement the timber-supplies of the Dominion, will add greatly to its beauty, and will also tend to improve the climatic conditions, there should be no question as to the advisability of the State's encouraging it by disposing of trees at a low price. In many countries, notably Canada, South Africa, and some of the Australian States, tree-planting by settlers has been considered so deserving of encouragement by the State that trees have been for many years disposed of either at a low price or gratis. The best results have, however, been obtained in those States where a small charge is made for the trees, as it has been found that where trees are distributed without charge settlers are liable to take no care of them.

Labour and the Employment of Discharged Soldiers.

During the first half of the year labour was scarce. To make plantation-work more attractive to discharged soldiers huts are being built for them, and stretchers and bedding have been supplied. Until recently most of the soldier workers have suffered from some physical disability, but since the New Year men in better health have accepted employment. The cost of the work done by soldier labour has exceeded the cost of similar work done by other labour in other localities.

Balance-sheet for Plantations.

The balance-sheets (started last year) showing the financial position with regard to the nursery and the plantations in the North Island have been brought up to date and are published herein; up till the present it has not, for various reasons, been possible to prepare similar balance-sheets for the South Island nurseries and plantations, but this work is now about to be undertaken. When this work is completed the exact financial position of every compartment of trees in each plantation will be known, so that when the timber is felled the profit or loss on the undertaking will be evident.

Surveys of Plantations.

During the year surveys were made of parts of the Hanmer Springs, Greenvale, and Kaingaroa Plantations, but the completion of these was prevented owing to the surveyors being required for urgent soldier-settlement work. As it is, of course, important that compartment boundaries, fire-lines, and roads should be properly laid down before the planting is done, strenuous efforts will be made during the coming summer to complete the work that has been interrupted.

Dissemination of Forestry Information.

Great credit is due to the New Zealand Forestry League for the enterprise it has shown in disseminating leaflets giving information on various matters connected with forestry, and advocating that our forests (the necessity of which to a country has been emphasized by the war) should be subjected to scientific management. In Australia and Canada the Forestry Leagues receive official recognition and support, and they do most useful work in spreading information as to the great value of forests to a country and the necessity for their proper management, utilization, and conservation. There is much need of forestry propaganda in this Dominion, and it is to be hoped that the Forestry League will continue and extend the useful work it has started.

The Rev. J. H. Simmonds and other observers have at various times contributed to the *Journal of Agriculture* valuable articles on different exotic trees grown in New Zealand, and it is to be hoped that these enthusiasts will continue to publish the results of their observations, which are of much value to the Forestry Department and private tree-growers.

Nursery and Plantation Staff.

In August Mr. R. G. Robinson resigned his position as Superintending Nurseryman for the South Island, and was succeeded by Mr. D. J. Buchanan. Mr. Robinson first joined the service in 1899; he was a most capable and enthusiastic officer, and whilst in the Department had done very valuable work. It is much to be regretted that he could not see his way to stay in this service. Mr. Buchanan's place as plantation foreman at the Whakarewarewa Plantation was filled by the transfer of Mr. Mason from the Waiotapu Plantation.

It is with much regret that I record the death of Mr. W. A. Fraser, B.Sc., assistant forester at Tapanui. He joined the Expeditionary Forces shortly after the declaration of war, and after being twice wounded was killed in action in France last spring. Mr. Fraser was a graduate of the Edinburgh University Forestry School, and had he lived there is no doubt but that he would have risen to a high position in the service.

The increased operations of the Afforestation Branch and the absence of several members of the staff with our military Forces have caused a heavy pressure of work on those officers who remained, but the extra duties have always been most cheerfully and zealously performed.

SUMMARIES.

Summary of Operations in Nurseries during Year ended 31st March, 1919

Name of Nursery.	Total Expenditure.				Trees in Nurseries.			
	Tree-growing.	Maintenance.	Buildings, &c.	Total.	Estimated Trees raised during Year.	Output of Trees.		Estimated Number in Nurseries at 31st March, 1919.
						Trees sent to Plantations during Year.	Trees sent to Outside Places during Year.	
	£ s. d.	£ s. d.	£ s. d.	£ s. d.				
Rotorua	3,847 3 8	353 16 6	259 7 3	4,460 7 5	1,903,575	2,629,236	226,834	3,627,075
Tapanui	1,256 18 5	1,075 16 0	16 3 11	2,348 18 4	466,000	764,775	178,390	2,109,800
Ranfurly	726 12 4	498 8 0	21 1 6	1,246 1 10	220,700	462,200	7,375	1,025,375
Hanmer Springs	1,022 7 11	646 14 11	24 16 4	1,693 19 2	623,000	527,825	41,150	3,271,400
Totals	6,853 2 4	2,574 15 5	321 9 0	9,749 6 9	3,213,275	4,384,036	453,749	10,033,650

Summary of Operations in Nurseries from 1896 to 1919.

Name of Nursery.	Total Expenditure.				Estimated Number of Trees raised.	Output of Trees.	
	Tree-growing.	Maintenance.	Buildings, &c.	Total.		To Plantations.	To Outside Places.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.			
Rotorua	56,070 16 6	6,965 13 0	12,090 10 4	75,126 19 10	62,948,319	57,522,574	1,798,670
Tapanui	30,309 1 0	1,904 1 0	5,326 14 0	37,539 16 0	25,719,039	15,538,943	1,295,628
Ranfurly	16,463 5 6	893 19 2	3,403 12 10	20,760 17 6	8,536,737	5,762,738	397,757
Hanmer Springs	15,606 11 7	1,212 4 6	3,312 11 9	20,131 7 10	19,063,142	10,661,705	607,304
Starborough*	6,399 9 10	..	2,856 17 3	9,256 7 1	3,059,610	1,965,095	1,094,515
Kurow*	960 4 2	..	2,109 18 5	3,070 2 7	172,460	..	172,460
Totals	125,809 8 7	10,975 17 8	29,100 4 7	165,885 10 10	119,499,307	91,451,055	5,366,334

* Nursery now closed.

N.B.—With the exception of Rotorua, expenditure has not been allocated to "Maintenance" separately until year 1917–18.

Summary of Operations in Plantations during Year ended 31st March, 1919.

Name of Plantation.	Trees.			Expenditure.					New Area planted.	Cost per Acre planted.	General Maintenance per Acre.
	Number received from Nursery.	Number used to replace Losses.	Number planted on New Area.	Establishing.	Maintenance.	Buildings, &c.	Expenditure upon Disposal of Timber and Products.	Total.			
				£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	Acres.	£ s. d.	£ s. d.
Whakarewarewa ..	183,564	183,564	..	1,074 9 5	2,397 11 11	21 12 4	368 19 6	3,862 13 2	..	..	0 6 1
Waiotapu	982,097	39,825	942,272	2,557 1 9	1,792 18 7	827 9 1	83 8 8	5,260 18 1	750	3 8 3	0 4 3
Kaingaroa	1,423,575	229,625	1,193,950	2,590 7 1	652 3 11	738 15 6	..	3,981 6 6	1,085	2 7 9	0 2 3
Puhipuhi	40,000	40,000	..	..	735 2 5	..	..	735 2 5	..	..	0 12 3
Conical Hills	15,000	15,000	..	29 7 10	635 11 8	679 4 2	..	1,344 3 8	..	..	0 3 7
Pukerau	53,000	8,000	45,000	115 17 6	272 0 8	6 7 3	..	394 5 5	37	2 13 8	0 10 1
Dusky Hill	5,000	5,000	..	15 18 4	208 9 0	..	8 1 0	232 8 4	..	..	0 5 7
Greenvale	610,575	10,000	600,575	1,486 4 1	1,030 16 9	599 7 5	..	3,116 8 3	360	4 1 2	2 14 8
Waitahuna	..	..	..	..	1 17 7	..	..	1 17 7	..	..	0 3 5
Gimmerburn	..	..	..	..	371 1 7	26 10 2	..	397 11 9	..	..	0 11 10
Naseby	543,400	23,730	519,670	914 5 10	403 14 10	76 6 2	..	1,394 6 10	291	3 0 3	0 5 5
Hanmer Springs ..	132,725	132,725	..	299 17 10	580 19 9	27 3 9	158 2 10	1,066 4 2	..	..	0 4 0
Balmoral	395,100	147,100	248,000	2,161 0 5	351 5 8	742 11 8	..	3,254 17 9	276	5 2 3	0 15 4
Dumgree	..	..	..	..	13 6 9	..	..	13 6 9	..	..	0 1 3
Totals.. ..	4,384,036	834,519	3,549,467	11,244 10 1	9,447 1 1	3,745 7 5	618 12 0	25,055 10 8	2,799	..	..

Summary of Operations in Plantations from 1896–1919.

Name of Plantation.	Trees.				Expenditure.					Total Area planted.	Average Cost per Acre planted.	Average Cost of Maintenance per Acre per Annum.
	Number received from Nursery.	Number raised from Seed sown *in situ*.	Number used to replace Losses.	Total Number in Plantation.	Establishing.	Maintenance.	Buildings, &c.	Expenditure upon Disposal of Timber and Products.	Total.			
					£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	Acres.	£ s. d.	£ s. d.
Whakarewarewa ..	20,579,980	109,725	3,957,294	16,732,411	34,464 1 3	25,818 19 7	8,366 6 8	1,718 13 1	70,368 0 7	7,966	4 18 9	0 3 1
Waiotapu	25,062,369	83,121	4,905,959	20,239,531	32,062 9 11	17,101 11 3	9,148 13 2	1,569 10 4	59,882 4 8	8,454	4 9 0	0 2 1
Kaingaroa	11,106,503	..	1,630,000	9,476,503	13,040 11 0	3,087 10 7	6,552 17 4	..	22,680 18 11	6,007	2 11 8	0 1 4
Puhipuhi	3,060,764	..	2,060,764	1,000,000	4,210 11 11	8,108 17 2	1,376 5 9	..	13,695 14 10	1,200	4 7 9	0 9 0
Conical Hills	10,725,376	..	1,439,080	9,286,296	17,144 18 11	12,986 4 0	3,671 8 4	..	33,802 11 3	3,533½	4 17 0	0 4 7
Pukerau	833,860	..	20,300	813,560	1,728 19 8	1,304 15 10	670 18 3	..	3,704 13 9	573	3 0 3	0 11 4
Dusky Hill	3,043,897	..	863,060	2,180,837	8,842 15 8	4,909 4 8	1,522 14 6	8 1 0	15,282 15 10	745¾	11 17 4	0 6 3
Greenvale	1,191,795	..	10,000	1,181,795	3,129 18 9	1,453 11 6	2,465 6 1	..	7,048 16 4	737	4 4 10	0 19 8
Waitahuna	42,025	..	11,500	30,525	88 8 3	93 3 9	66 10 1	..	248 2 1	11	8 0 8	0 13 0
Gimmerburn	936,235	..	783,339	152,896	1,134 4 0	1,574 16 1	639 18 9	..	3,348 18 10	88	12 17 8	0 14 10
Naseby	4,776,528	..	566,355	4,210,173	7,673 0 3	4,182 19 3	1,764 17 8	..	13,620 17 2	1,776	4 6 4	0 2 5
Hanmer Springs ..	9,372,133	..	1,639,949	7,732,184	16,107 1 11	6,344 2 5	4,976 3 8	200 10 0	27,627 18 0	2,886½	5 11 7	0 2 5
Balmoral	1,267,547	..	147,100	1,120,447	5,105 8 0	854 5 11	4,766 15 0	..	10,726 8 11	732	6 19 5	0 7 9
Tekapo	48,000	..	..	48,000	148 8 11	23 9 4	5 10 0	..	177 8 3	29	5 2 0	0 5 3
Dumgree	1,679,765	..	1,110,125	569,640	6,462 17 2	1,786 0 1	4,229 14 3	..	12,478 11 6	209	*	*
Galloway†	6,930	..	3,050	3,880	18 13 0	3 10 0	46 16 10	..	68 19 10	2	..	..
Omarama†	4,390	..	..	4,390	25 0 8	..	44 12 1	..	69 12 9	2	..	..
Raincliff	..	..	..	50,000	..	..	..	..	1,104 12 5	206	..	..
Totals ..	93,838,097	192,846	19,147,875	74,833,068	151,387 9 3	89,632 1 5	50,315 8 5	3,496 14 5	295,937 5 11	35,157¾	..	..

* Data not available. † Experimental.

APPENDIX A.

(1.) REPORT UPON AFFORESTATION OPERATIONS IN THE NORTH ISLAND.

(By H. A. Goudie, Superintending Nurseryman for the North Island.)

During the year an area of 1,835 acres was planted, thus making the total area of plantations in the North Island 23,627 acres. The estimated number of trees raised from seeds during the year is 1,903,000, while the total raised at Rotorua Nursery since it was established is 62,946,000. The progress made, although not as good as desired, can be considered satisfactory when the difficulties due to the war and other adverse conditions are taken into account. The tree-seeds which were ordered in America for sowing in October reached New Zealand in the "Makura" during the influenza epidemic, and after being carried back to Australia were delivered late in January, when it was too late to sow them. This has caused a shortage of trees to show in the past year's operations, and will delay the return to the normal rate of progress for one year.

Labour.

During the early part of the year labour was scarce, and there was not sufficient available until the beginning of summer. A number of former employees are now being repatriated, and casual hands taken on during their absence with the Expeditionary Forces are being gradually paid off. The employment of returned soldiers, which is referred to at length in the report upon Waireka Camp, has enabled a certain amount of extension-work to be undertaken which would otherwise have been impossible. It is but right to state that this class of labour has not been cheap, and that the cost of work done at Waireka Camp has exceeded the cost of similar work done at the other stations. While this is regrettable, it is recognized as unavoidable, because a fair percentage of the men employed have been unfit to undertake heavy work. Light movable huts are now being built for the accommodation of the soldier workmen. These will be much more durable and certainly more comfortable than the tents they at present occupy.

Prison Labour.

Following is a summary giving particulars of prison labour since 1900, the year in which the policy of employing prisoners on afforestation-work was first adopted. Kaingaroa is now the only prison-labour station, and the work done there during the past year may be regarded as very satisfactory.

Summary of Prison Labour.

Station.	Year.	Period.	Total Value of Work performed.	Average Daily Number of Men employed during Period.	Average Value of Work per Man per Year.
		Years.	£ s. d.		£ s. d.
Whakarewarewa Plantation ..	1904–17	12·58	12,518 7 10	12·86	77 7 7
Waiotapu Plantation	1900–13	12·08	24,665 2 6	30·22	67 11 3
Kaingaroa Plains Plantation ..	1918–19	1·00	2,793 2 1	32·90	84 18 0
„ ..	1912–19	6·08	12,618 4 8	23·06	90 0 0

Since the prison camp at Kaingaroa was established 6,000-odd acres have been planted, and if the present rate of progress is maintained for another three or four years all the land within working distance of the camp will have been used. It is hardly necessary to state that the longer the present camp can be economically used as a centre the better. The establishing of a camp is a laborious and costly matter, and there are not many suitable sites on this reseerve where the water necessary for camp use and shelter for the buildings could be obtained. In order to prolong the present camp as a working centre it is suggested that a small mobile camp be established which would accommodate half of the number of prisoners now employed—this camp to be always kept within a radius of about three or four miles distant from the main camp and moved along as required. It is probable that if this suggestion were adopted the present camp could be used for from eight to ten years. There are details in connection with this proposal which concern the Prisons Department, and which need not be discussed here. Suffice it to say that the present camp is well equipped with necessary conveniences, and that the arrangements of the proposed auxiliary camp need not therefore be other than of a simple and inexpensive character.

Sale of Trees to Farmers.

The number of trees disposed of during the year to farmers was 193,522, and the seeds, which were supplied in various-sized packages, amounted in the aggregate to 132 lb. The decrease in the demand is probably due to the scarcity of farm labourers, this view being amply supported in correspondence with applicants. The introduction of the system of supplying *Eucalyptus* plants in trays was fairly successful; freight and packing charges were naturally much heavier, but the plants reached their destination, whether by rail or steamer, in much better condition. Trees supplied free of charge to soldier settlers numbered 22,500. In order to get the concession, applicants were required to supply means of identification, such as their regimental number, date of discharge, and name and number of their section of land.

Thinning and Underplanting.

Thinning, which had to be suspended during the war period, is now an urgent necessity on several compartments at Whakarewarewa and Waiotapu Plantations. The areas under European larch will need to be attended to first, and although this work is now in progress it will be necessary to expedite it to some extent. A small area of *Pinus radiata* also requires immediate attention, and this will probably be completed during the forthcoming winter. A great deal of the land now occupied by European larch originally carried a dense growth of bracken, and experience shows that this comes away strongly again as soon as thinning is done. It is therefore necessary either to thin very lightly or else open it up sufficiently to permit of underplanting being done. Unfortunately it has not been possible to obtain the usual supply of tree-seeds during the past four years, with the result that there are now very small stocks of Weymouth pine, Douglas fir, and Californian redwood plants available for underplanting. Until these are available the thinning will therefore need to be light. The Weymouth pine has proved an excellent tree for planting through a thinned larch plantation, and the same remarks apply to the Californian redwood. The results of the trials made with the Douglas fir are not so promising as the other trees mentioned, but it grows satisfactorily where the thinning has been fairly heavy. Up to the present time all thinnings have been disposed of either as firewood or mining-timbers, and as the demand for this material will in all probability increase there seems no reason to doubt that the expenditure on thinning will, in a great measure, be recovered from revenue.

Revenue.

The receipts for the year, of which details are given hereunder, amounted to £1,234 11s. 8d., which is short of last year's total by £300-odd. Fewer trees were sold, but the chief cause in the shrinkage of the revenue was the shortage of firewood and poles due to the partial cessation of thinning. A considerable amount of business in both these lines had to be refused, but with a return to normal conditions there is scarcely any doubt that the revenue from the disposal of forest products will increase.

Receipts for the year were as follows :—

	£	s.	d.
Sales of trees (204,155)	367	4	4
Sales of seeds (132 lb.)	84	19	5
Sales of poles (3,597)	67	19	0
Sales of firewood (163 cords)	283	5	0
Grazing	168	0	11
Sundry recoveries, &c.	263	3	0
	£1,234	11	8

Interplanting Exotic Trees in Native Forests.

For the purpose of experimenting with exotic trees in indigenous forests trial plots have been selected at Mamaku upon an area of forest from which the timber of millable size and quality has been removed. During the winter these plots will be fenced sufficiently to exclude horses and cattle, and plantings made with a number of exotic trees. The species of trees which are available are Weymouth pine, Douglas fir, Sitka spruce, Lawson's cypress, Monterey cypress, and silver-fir. The enclosures will be made sufficiently large to enable the following kinds being added when trees of same are available—viz., *Thuja gigantea*, Californian redwood, and *Cryptomeria japonica*. A small experimental planting of this nature made with the Monterey cypress in the native forest at Moerangi last winter promises to be successful.

Damage to Plantations by Deer.

A considerable amount of damage has taken place at Whakarewarewa Plantation as the result of the ingress of red deer from the forest country around Lake Okataina. In ordinary times not many of these animals are seen in the plantation, but when the shooting season commences the herds make for the plantations to find sanctuary. Several attempts made to destroy them have proved unsuccessful, as, owing to the amount of cover, they are most difficult to detect. At Kaingaroa, too, tracks have been seen in the small area of native forest, but so far no damage to the planted trees has resulted there. Considering the great damage these animals will assuredly cause if they become plentiful, it would appear to be but right that the Department should be consulted before any further lots are liberated. Such work as the natural regeneration of native forest-trees or the interplanting of exotic trees in forests would be much handicapped if deer were plentiful. Some means of control should be devised to ensure keeping them out of forest country as yet free of them.

Accommodation for Workmen.

A difficulty is frequently experienced in obtaining suitable labour owing to the want of accommodation for married men. This is frequently a trouble when it is necessary to transfer a married officer to a station hitherto under the charge of a single officer. The plantation at Waiotapu is the worst off in this respect, but even at Rotorua married men often have to refuse the offer of work because they cannot secure a house. A step has been made in rectifying this disability by the erection of married officers' quarters at Waiotapu and Kaingaroa. The erection of a number of cottages at Waiotapu for the workmen is also under consideration, and it is hoped that something in this direction will be accomplished during the next twelve months. A fairly large number of men can now be permanently employed upon maintenance and thinning work on the older plantations, and the providing of suitable accommodation for these will be necessary within the next few years.

General.

Preparations are well advanced for planting next winter about 1,500,000 trees. These will occupy an area of about 1,200 acres, and the majority of the planting will take place at Kaingaroa Plantation,

by prison labour, and at Waireka Camp, by returned soldiers. A small amount of planting will also be done at Puhipuhi Plantation.

The staff of officers is still very short, and it is hoped that this will be remedied to some extent by the return of an officer who has been absent with the Expeditionary Forces and by the appointment of another. The appointment of several experienced officers is a matter which should receive early consideration.

All officers are to be commended for their enthusiasm and industry displayed in carrying on the work during the last year of the war.

Herewith are balance-sheets showing the financial position of the several stations in the North Island, followed by reports upon each of these stations:—

BALANCE-SHEETS.

Rotorua Nursery, from 1898 to 31st March, 1919—Twenty-one Years.

Dr.	£ s. d.	£ s. d.	*Cr.*	£ s. d.	£ s. d.
Actual expenditure ..	75,126 19 10		Actual receipts ..	2,576 11 6	
Interest, compound, at 4 per cent.	34,675 19 10		Interest, compound, at 4 per cent.	259 7 6	
		109,802 19 8			2,835 19 0
Land rental—			Trees to plantations ..	74,505 6 6	
Accumulated rental compounded for twenty-one years at 4 per cent. of cost		107 8 4	Interest, compound, at 4 per cent.	22,169 1 3	
					96,674 7 9
			Present value of—		
			Buildings, fencing, &c.	3,723 15 5	
			Departmental property	2,205 0 7	
					5,928 16 0
			Trees in stock (at valuation) ..		4,471 5 3
		£109,910 8 0			£109,910 8 0

Whakarewarewa Plantation, from 1898 to 31st March, 1919—Twenty-one Years.

Dr.	£ s. d.	£ s. d.	*Cr.*	£ s. d.	£ s. d.
Actual expenditure ..	70,368 0 7		Actual receipts—		
Interest, compound, at 4 per cent.	27,447 3 9		Sale of forest material	£ s. d. 1,771 1 3	
		97,815 4 4	Sundries	235 18 1	
Trees from nursery ..	23,273 1 9			2,006 19 4	
Interest, compound, at 4 per cent.	9,093 2 0		Interest, compound, at 4 per cent.	131 2 8	
		32,366 3 9			2,138 2 0
Land rental—			Present value of—		
Accumulated rental compounded for twenty-one years at 4 per cent. of cost		3,163 9 3	Buildings, fencing, &c. ..	3,510 12 3	
			Departmental property ..	122 17 8	
					3,633 9 11
			Balance, being debt on 7,966 acres at average of £16 0s. 3d. per acre		.. 127,573 5 5
		£133,344 17 4			£133,344 17 4

Waiotapu Plantation, from 1899 to 31st March, 1919—Twenty Years.

Dr.	£ s. d.	£ s. d.	*Cr.*	£ s. d.	£ s. d.
Actual expenditure ..	59,882 4 8		Actual receipts—		
Interest, compound, at 4 per cent.	25,360 3 5		Sale of forest material	£ s. d. 455 17 0	
		85,242 8 1	Sundries	3 12 0	
Trees from nursery ..	30,336 16 3			459 9 0	
Interest, compound, at 4 per cent.	11,377 13 4		Interest, compound, at 4 per cent.	24 19 3	
		41,714 9 7			484 8 3
Land rental—			Present value of—		
Accumulated rental compounded for twenty years at 4 per cent. of cost ..		2,404 10 0	Buildings, fencing, &c. ..	3,610 17 2	
			Departmental property ..	443 7 0	
					4,054 4 2
			Balance, being debt on 8,454 acres at average of £14 15s. 4d. per acre		.. 124,822 15 3
		£129,361 7 8			£129,361 7 8

Kaingaroa Plains Plantation, from 1911 to 31st March, 1919—Eight Years.

Dr.	£ s. d.	£ s. d.	*Cr.*	£ s. d.	£ s. d.
Actual expenditure ..	22,680 18 11		Actual receipts—Sundries	131 14 0	
Interest, compound, at 4 per cent.	4,009 9 0		Interest, compound, at 4 per cent.	18 18 4	
		26,690 7 11			150 12 4
Trees from nursery ..	19,778 2 4		Present value of—		
Interest, compound, at 4 per cent.	1,584 5 6		Buildings, fencing, &c...	4,054 14 3	
		21,362 7 10	Departmental property	561 10 0	
					4,616 4 3
Land rental—			Balance, being debt on 6,007 acres at average of £7 14s. 4d. per acre		.. 46,359 5 9
Accumulated rental compounded for eight years at 4 per cent. of cost ..		3,073 6 7			
		£51,126 2 4			£51,126 2 4

Puhipuhi Plantation, from 1904 to 31st March, 1919—Fifteen Years.

Dr.	£ s. d.	£ s. d.	*Cr.*	£ s. d.	£ s. d.
Actual expenditure ..	13,695 14 10		Actual receipts—Sundries ..	18 0 0	
Interest, compound, at 4 per cent.	6,095 4 1		Interest, compound, at 4 per cent.	0 14 5	
		19,790 18 11			18 14 5
Trees from nursery ..	3,464 4 8		Present value of—		
Interest, compound, at 4 per cent.	1,303 13 3		Buildings, fencing, &c. ..	321 17 11	
		4,767 17 11	Departmental property ..	39 19 2	
					361 17 1
Land rental—					
Accumulated rental compounded for fifteen years at 4 per cent. of cost ..		261 10 0	Balance, being debt on 1,200 acres at average of £20 7s. 4d. per acre ..		24,439 15 4
		£24,820 6 10			£24,820 6 10

Rotorua Nursery.

The trees in stock at the 31st March numbered 3,627,075, and of this number 1,903,575 were raised from seed during the year. The output of trees last winter totalled 2,856,070, while the output to date is 59,321,244, of which 57,522,574 went to the State plantations and the balance, 1,798,670, to public bodies and farmers.

Tree-growth has been on the whole very satisfactory; the crop of *Pinus radiata* is particularly good, as are also the several kinds of *Eucalyptus* grown. The Corsican pine, whilst being good, is not especially so. Owing to the American tree-seeds arriving too late to be sown it is estimated that the shortage of trees caused thereby amounts to 3,000,000. These seeds are being carefully stored and will be sown next spring.

Sale of Trees and Tree-seeds to Farmers.—The system of sending out eucalypts in trays has proved satisfactory on the whole. The hardier species do splendidly, but the half-hardy, and in most cases more valuable, kinds make poor growth after being pricked off into the trays. As is the case with all trees raised in this nursery, the eucalypts are raised in seed-beds outside. The plants are lifted from the seed-beds in February and pricked off into trays, which are afterwards "plunged" out of doors and shaded and watered for a time. The usual dry and hot conditions common at this time of year causes a cessation of growth, from which the less hardy kinds have not recovered before the colder weather sets in. To grow these kinds satisfactorily it would be necessary to put them under glass after they are transplanted into trays. A good many farmers are showing an intelligent interest in tree-planting, and as a consequence there is a demand for an increasing number of species of *Eucalyptus*. The demand for tree-seeds has increased during the year, and to meet this considerable quantities have been collected under proper supervision.

Buildings.—A new wagon-shed was erected, and the old shed was altered and converted into a store-room for manures and other bulky materials.

Attached hereto are schedules of trees in the nursery, and trees transferred to plantations and sold during the year.

The average daily number of workmen employed during the year was 28·73.

Following is a record of rainfall and temperature for the year:—

Rainfall, Temperature, &c.

Month.	Rainfall.	Number of Days Rain fell.	Temperature.		Number of Days Frosts occurred.
			Minimum.	Maximum.	
1918.	In.		Deg. F.	Deg. F.	
April	6·880	16	38	73	..
May	1·675	11	30	67	6
June	5·890	22	27	61	12
July	3·705	19	25	53	20
August	2·580	14	25	62	11
September	4·410	13	27	67	9
October	9·890	20	32	70	2
November	4·960	14	33	78	2
December	3·775	10	32	80	1
1919					
January	3·160	11	36	82	..
February	2·025	8	49	84	..
March	3·640	8	32	81	1
Totals	52·590	166	..	..	64

Details of One-year-old Trees, sown 1918.

Name of Tree.	Number in Seed-beds.	Height, in Inches.	Amount of Seed sown.	Growth.
			lb. oz.	
Cupressus Lawsoniana	25,000	3½	4 0	Good.
,, *macrocarpa*	22,000	5	8 0	Very good.
Eucalyptus botryoides	2,500	4	0 2	,,
,, *eugenioides*	2,000	3	0 3	,,
,, *fastigata*	2,000	3	0 2	,,
,, *Macarthuri*	65,000	8	2 8	,,
,, *Muelleriana*	2,000	3½	0 4	,,
,, *obliqua*	1,500	3	0 3	,,
,, *ovata*	2,000	5	0 2	,,
,, *pilularis*	2,000	4	0 4	,,
,, *saligna*	2,500	2½	0 2	Good.
,, *viminalis*	50,000	11	1 0	Very good.
Pinus Laricio	225,000	1½	50 0	Good.
,, *radiata*	1,500,000	6	322 0	Very good.
Sequoia sempervirens	75	3	0 6	Good.
	1,903,575			

Details of Two-year-old Trees, sown 1917.

Name of Tree.	Number in Seed-beds.	Number in Nursery Rows.	Height, in Inches.	Growth.
Cupressus Lawsoniana	..	25,000	10	Medium.
,, *macrocarpa*	..	500	14	Good.
Pinus Laricio	450,000	..	5	Very good.
,, *ponderosa*, var. *scopulorum* ..	1,000,000	..	3½	Poor.
,, *strobus*	50,000	..	2½	,,
,, *radiata*	..	20,000	8	Fair.
Pseudo-tsuga Douglasii	..	130,000	5	,,
	1,500,000	175,500		
	1,675,500			

Details of Five-year-old Trees, sown 1914.

Name of Tree.	Number in Nursery Rows.	Height, in Inches.	Growth.
Pinus strobus	30,000	18	Very good.
,, *sylvestris*	18,000	7	Poor.
	48,000		

Details of Trees transferred to Plantations, &c., 1918–19.

Where sent.	Name of Tree.	Number.	
Whakarewarewa Plantation ..	*Cryptomeria japonica*	15	
	Cupressus arizonica	80	
	,, *Formosensis* ..	81	
	,, *glabra*	35	
	,, *macrocarpa*	2,425	
	,, *McNabiana*	47	
	,, *torulosa*	4	
	Thuja gigantea	170	
	Pinus radiata	180,000	
	Pseudo-tsuga Douglasii	32	
	Sequoia sempervirens	675	
			183,564
Waiotapu Plantation	*Acacia decurrens*	370	
	Pinus ponderosa scopulorum ..	52,275	
	,, *radiata*	929,452	
			982,097
Kaingaroa Plains Plantation ..	*Eucalyptus Macarthuri* ..	5,000	
	,, *viminalis*	1,500	
	Pinus Laricio	1,139,000	
	,, *ponderosa scopulorum* ..	23,400	
	,, *radiata*	254,675	
			1,423,575
Puhipuhi Plantation	*Pinus radiata*	..	40,000
Sales to farmers—Timber and shelter trees		..	195,022
Sales to public bodies—Shelter trees		..	9,133
Soldier settlers (free)—Timber and shelter trees		..	22,555
Native schools (free)—Timber and shelter trees		..	124
Total		..	2,856,070

Whakarewarewa Plantation.

The climatic conditions during the year were extremely variable. The winter was the severest experienced for a number of years, being unusually cold and wet. Copious rainfalls followed a late spring, and continued to the end of February, the benefits from which were largely counteracted by severe frosts in December, which retarded the growth of larch on the low-lying country, and on small areas of Douglas fir. There is nothing outstanding in the matter of tree-growth, this being if anything slightly below the average in the older compartments.

During the short spells of dry weather fires were fairly frequent on the country adjoining the plantation. These invariably occurred on unoccupied lands during Sunday afternoons, and were probably caused by picnic or hunting parties. There were no losses from fire in the plantations during the year.

Insect and other Pests.—A small caterpillar made its appearance late in the season on the pine plantations, and was noticed on a few isolated specimens throughout the ten-year-old *Pinus Laricio* and *Pinus Murrayana* compartments, and to a less extent on *Pinus radiata*. It is apparently a species of Tortrix, and the damage done is confined to the current season's needles, which are bitten through and wither off.

Rabbits and hares destroyed a few trees on the recently planted areas. Red deer also did some damage by barking a few of the established trees and trampling out some of the smaller ones. This damage does not extend over a very great area, but in view of underplanting being done throughout the native bush, and as deer make the bush their camping-grounds, they will have to be taken into consideration before this work is undertaken.

Tree-growth.—On the recently planted areas Monterey pine continues to make strong healthy growth, and is rapidly outgrowing the bracken. Douglas fir and Weymouth pine have also made good growth. A small lot of *Eucalyptus Macarthuri* planted two years ago on somewhat exposed country are a complete failure, despite special precautions being taken at the time of planting to ensure a crop. Sweet-chestnut are a very indifferent lot and have made very little height-growth.

Establishing.—All the land suitable for tree-planting within the plantation boundary is now in trees.

During the year 183,568 trees were received from the Rotorua Nursery, of which 180,000 *Pinus radiata* were planted on an area upon which trial planting of *Eucalyptus* had failed. The remaining trees, which comprised several species of *Cupressus*, were utilized for experimental work.

As the result of a shortage of labour, clearing for tree-planting extended over a period of four months, and, owing to the lateness of the season, the burning-off was difficult and expensive,

Planting was done under very favourable weather conditions, and splendid results were obtained, the death-rate being small. A small area of native bush, after being underscrubbed, was underplanted with 2,425 *Cupressus macrocarpa*. The young trees are making a vigorous growth; one measured showed an increase in height of 18 in. The losses in transplanting are slightly over 20 per cent. Experimental plantings with nine different kinds of trees made on a small drained swamp area were only fairly satisfactory. *Thuja gigantea* is the only tree which is doing really well; *Cupressus arizonica* is doing fairly well, and may ultimately be a success, although at present they are not as healthy as could be desired. Good results were obtained with *Cryptomeria japonica* and *Sequoia sempervirens* in underplanting larch, while the older plantings of these species continue to make strong vigorous growth.

Maintenance.—The bulk of the expenditure for the year has been in clearing around the young trees on the recently planted areas, which are mostly rough steep faces covered with heavy bracken and tutu. This class of country has been largely planted with the fast-growing *Pinus radiata*, and by this means the cost of cleaning round trees, although still very considerable, has been reduced to a minimum, as this pine rarely requires going over after the second year from planting.

Fire-breaks have been kept in an efficient state, all the boundary and subdividing breaks being gone over. A mowing-machine was used where possible in clearing, but owing to the generally rough nature of the country this was practicable on small areas only. There is abundant rich pasture on some of the grassed fire-breaks which requires heavy stocking to become thoroughly effective in the event of fire. With the grazing so scattered sheep-worrying dogs are troublesome, and probably young cattle would be found the more suitable. The grazing was leased to a local farmer for the year ending 31st December, 1918, but he had so many sheep killed by dogs that it is not likely he or any other farmer will be anxious to get the grazing again.

The demand for mine-props regulated the extent of the season's thinning, this being done only as material was required. Fifteen acres of larch, growing in mixture with Douglas fir, were thinned, the object being to provide greater growing-space for the Douglas fir.

Utilization.—The sales for the year amounted to 4,197 mine-props and 163 cords of firewood, of a total value of £442 10s.

Labour.—A shortage of labour early in the season, and the influenza epidemic later, interfered considerably with the work. The average daily number of men employed during the year was 18·50.

Summary showing the Area of Whakarewarewa Plantation (7,966 Acres in Trees).

How occupied.	Acres.
Pines	3,137·49
Larch	2,557·80
Eucalypti	1,468·70
Spruce and Douglas fir	643·31
Miscellaneous	159·04
Roads, tracks, and fire-breaks	514·43
Land unsuitable for planting, including swamps and creeks, also residence reserves, paddocks, and water-main reserve	1,490·23
Unplanted land	152·80
Total	10,123·80

Waiotapu Plantation.

The beneficial effect of the mild weather experienced during the spring was marred by an exceptionally heavy frost during midsummer, when eleven degrees were registered. Although it did apparently a lot of damage, it is not so bad when closely examined, for most of the injury is confined to the needles or leaves. The terminal buds were not harmed to the extent they would have been had it happened a month sooner. In Block 18 the small Corsican pine in the tussock hollows suffered the most.

The area in trees was increased by 749 acres, making a total of 8,454 acres under timber. The number of trees planted out was 908,772.

The growth of trees in the different blocks is up to the average of previous years. The growth put up by *Sequoia sempervirens* (redwood) in Block 4 since the larch was thinned is very good and looks very promising. The underplanting done with *Pinus strobus* is also worthy of special mention, as it is doing so well, and, in fact, wherever it has been planted here it is a success. This is very gratifying, as it is such a valuable tree. The only drawback is the number of double leaders caused by frost in its earlier stages of growth, but most of this can be rectified when thinning is done. *Pinus strobus* and *Pinus ponderosa* where planted with other species as nurses have become predominant by 6 ft. to 8 ft., and will very soon kill the nurse-trees out.

The older pine plantation, especially the *Pinus radiata* in Block 7, was badly affected by caterpillars. These in their attacks are very much like the caterpillars of the *Tortrix pinicolana*. They, however, differ in habit, as the eggs are deposited in two rows of about thirty or forty along the needles, and can be easily seen. They are of a bluish colour, and oval in shape, with the sharp point outwards. The caterpillar moves about by means of a thread it spins from branch to branch. They feed all over the trees affected, so much so that some appeared as if the needles had been burned.

Since the autumn the trees have recovered a little, but judging by the number of eggs seen there is very little hope that the end of them is in sight.

The ploughing, disking, and upkeep of fire-breaks was attended to as usual. The area that was laid down in grass last autumn is not very promising, but one could not expect it to be considering that it was on the highest ground in the plantation. Better results may be expected from this season's sowing, as it is on the lower ground.

The maintenance of the different blocks will be one of the greatest sources of expenditure here for the future, owing to the necessary underscrubbing and thinning. Another item which will be rather costly is the widening of the narrow fire-breaks on the older blocks, as there will be a chain to be underscrubbed, carried out, and burnt on each side, and the sooner this is done the better, in order to minimize the danger of fires spreading from one block to another.

The thinnings-out of the different blocks, it is hoped, will be a source of revenue with firewood and mine-props. So far there is only a market for the latter here, but eventually, when the soldiers' settlement is established in the Waiotapu Valley, there should be a sale for the former, or at least for rails.

Labour and Accommodation for Workmen.—It is hoped that a start will be made during the coming year to provide small comfortable cottages for the workmen. Better accommodation is urgently needed in order that the services of good workmen may be retained.

Average daily number of men employed during the year, 20·32.

Summary showing the Area of Waiotapu Plantation (8,454·03 Acres in Trees).

How occupied.	Acres.
Larch	3,310·85
Pines	4,950·73
Eucalypti	180·50
Birch	11·95
Roads, tracks, and fire-breaks	551·08
Unplanted land	1,324·20
Land unsuitable for planting, including swamps, creeks, also reserve for horse-paddocks and residences	288·65
Total	10,617·96

Following is a record of the rainfall and temperature for the year :—

Rainfall, Temperature, &c.

Month.	Rainfall.	Number of Days Rain fell.	Temperature.		Number of Days Frosts occurred.
			Minimum.	Maximum.	
1918.	In.		Deg. F.	Deg. F.	
April	5·48	15	26	70	7
May	2·88	11	22	66	16
June	5·85	22	27	61	12
July	3·98	18	14	56	23
August	2·93	14	15	62	16
September	4·24	12	21	69	14
October	9·57	20	24	68	9
November	5·23	16	24	79	5
December	4·53	13	21	79	8
1919.					
January	3·88	11	26	89	3
February	1·82	6	38	87	..
March	2·76	9	25	80	11
Totals	53·15	167	..	..	124

Waireka Camp (Waiotapu Plantation).

Situated on the edge of the Kaingaroa Plains, at an altitude of 1,800 ft. above sea-level, an afforestation camp has been formed for returned soldiers seeking employment. The camp is twenty-six miles from Rotorua, on the Galatea Road, and, being favoured with an abundant supply of pure spring water, has been named "Waireka." No expense has been spared to make Waireka a model camp; the situation is ideal, and it is doubtful if there is a healthier spot in the Dominion, or one more suitable for men with lung trouble or suffering from the effects of shell-shock. In the laying-out and building of the camp the comfort and wants of the men have received every consideration. A combined cookhouse and mess-room with seating-accommodation for forty men has been

erected and stocked with all the necessary culinary articles and mess requisites. This building contains a large cooking-range, and has an abundant supply of hot and cold water laid on, which is not only a great convenience, but an aid to cleanliness, which is a feature of the camp.

The camp proper consists of twenty-one tents, neatly erected in three parallel lines, with the doors facing to the north in order to take advantage of the sun. The tents are 10 ft. by 12 ft., and have tongued-and-grooved wooden floors well raised above the ground, and are erected on frames, which makes them as comfortable and as hygienic as it is possible to make a tent. Each tent accommodates two men, and stretchers, blankets, &c., have been provided.

The camp stores are carted from Rotorua once a week by the Department free of charge, so the only necessity which the men have to pay freight on from Rotorua is meat once a week, and during the winter this may be avoided.

By the foregoing it will be seen that every consideration has been shown to the men in the organizing of the camp, and it can safely be said that there is nothing approaching it provided for casual labour anywhere in the Dominion. Notwithstanding the efforts made to make the conditions of employment attractive, a considerable proportion of the men who have been sent to the camp by the Repatriation Department have remained only a short time. Many of these were of the class that can be most easily described as "wasters"; others were suffering from wounds and ill health as the result of their active service abroad, and were physically unfit to undertake the work. Many who were willing to work and eager to get back into civil life have benefited by the generous treatment accorded them by the Government in establishing this camp. But in justice to such men it is advisable that the utmost discrimination be shown in selecting men who are deserving of assistance. The camp should not be considered a dumping-ground for men who have made a nuisance of themselves in the cities and forfeited their right to be assisted; neither is it the place to send men who through age or injuries received are incapable of performing a fair day's work. It may rightly be considered as a place for the industrious type of man whose health will not permit of him accepting any but outdoor work.

The portion of the Waiotapu Plantation on which Waireka Camp is situated was taken over as a separate working unit on the 1st November last, since which date an area of 615 acres has been cleared. This includes 150 acres which has been reserved as a forest township site, and 465 acres for tree-planting. It is anticipated that at least another 200 acres will be cleared for planting this season. A road connecting the camp with the Galatea Road, about half a mile, has been formed and roughly graded, and a telephone-line erected, linking up the camp with the Rotorua telephone system. A horse-paddock, approximately 10 acres, has been ploughed and laid down in grass, and if all goes well will supply an urgent want next season.

Pitting operations were commenced about the middle of February, and 74,025 pits were dug during the month, at an average cost of 11s. 9d. per 1,000. On Block 24, 44,644 pits which were not planted last season will be available, bringing the total up to 118,669; but it is confidently anticipated that over half a million pits will be available for planting this season.

The average daily number of men employed during the period 1st November to 28th February is 15·26.

Kaingaroa Plains Plantation.

(Area, 33,355 acres; altitude, 1,800 ft., approximately.)

During the year an area of 1,085 acres was planted, thus making a total area in trees of 6,007 acres. The number of trees planted on new ground was 1,193,950, and those used to replace failures in last year's planting numbered 229,625. With the exception of 6,500 eucalypts, which were planted for trial purposes, all the trees used were Corsican and Monterey pines. The results are remarkably good, and the failures which did occur were chiefly amongst the Monterey pine. Experience has proved the wisdom of acclimatizing all the trees used on this plantation by lining them out in the temporary nursery for at least a year before they are planted permanently.

The growth throughout the older blocks has been good. A late frost in December affected the Douglas fir to a slight extent, but very little permanent damage was done.

Formation Work.—The surveyor and party who were engaged in subdividing the reserve and laying off roads and fire-breaks broke up their camp in July last. Since then detail and stock maps have been made of all the area surveyed, but there is still about another six months' field-work required to complete the whole of the reserve. It is hoped that this will be gone on with at an early date.

Roads.—The principal north-and-south road which passes through the centre of the reserve crosses two large gullies, but apart from these the road is on level country and easily formed. The prisoners have been engaged at intervals through the summer in road-formation in the gullies referred to, and have formed about a mile, 12 ft. in width, in the solid. About 5 chains of this formation passes through more or less solid rock, where the work was slow and a large quantity of explosives had to be used. The gradient is 1 in 20 and 1 in 19 on the south and north sides of the gully respectively. Once this cutting is completed, access to a very large area of country will have been provided, because the level land can be safely traversed with vehicles, if necessary, without forming the road. Should circumstances permit, it is proposed to continue the formation of this and other principal roads, and endeavour to have road access to the various blocks before they are planted.

Temporary Nursery.—In pursuance of the policy to improve the land reserved near the prison camp and make it available for nursery purposes, a further area of virgin ground amounting to 30 acres was cultivated and sown with a mixture of grasses and clovers. The total area now dealt with in this manner is about 120 acres. This is a larger area than is required for actual nursery purposes, but by working the several enclosures in rotation the soil-fertility is being increased, and the areas not in tree crops are providing grazing and winter feed for the horses and other animals kept. Sixteen tons of oaten sheaf and 30 tons of hay were harvested this autumn, and this will provide ample feed until next harvest. The shelter-belts of Monterey pine planted through this cultivated land have grown splendidly, and should in a few years make an appreciable difference in the crops.

Prison Labour.—This class of labour, with which all the work on this plantation is done, continues to be satisfactory. Work was performed to the value of £2,793 2s. 1d. during the year, and the average daily number employed was 32·90.

Summary showing the Area of Kaingaroa Plains Plantation (6,007·3 Acres in Trees).

How occupied.	Acres.
Pines	5,641·55
Douglas fir	340·17
Larch and chestnut mixture	25·58
Roads, tracks, and fire-breaks	446·18
Unplanted land	26,901·52
Total	33,355·00

Attached is a record of rainfall and temperature for the year :—

Rainfall, Temperature, &c.

Month.	Rainfall.	Number of Days Rain fell.	Temperature.		Number of Days Frosts occurred.
			Minimum.	Maximum.	
1918.	In.		Deg. F.	Deg. F.	
April	5·84	16	33	70	..
May	2·41	12	28	64	6
June	6·14	20	27	58	11
July	2·95	17	23	58	19
August	2·39	9	23	61	11
September	3·55	13	24	67	13
October	10·23	21	31	69	2
November	3·80	19	30	80	2
December	3·65	10	28	81	2
1919.					
January	2·81	10	33	83	..
February	2·10	8	45	85	..
March	2·71	11	30	78	1
Totals	48·58	166	..	..	67

Puhipuhi Plantation.

(Area, 1,200 acres, approximately ; altitude, 1,000 ft., approximately.)

The past year, although not constituting a record for the amount of rain, was a wet one. The total rainfall was 64·16 in., which is 27·64 in. less than last year's fall. April, June, July, September, and October were the wettest months. Rain was recorded on 123 days and frost on 11 days.

The planting of 40,000 *Pinus radiata* on an area destroyed by fire and on an area of poorly grown eucalypts was very successful. The trees have made an average growth of about 9 in., and the deaths, which occurred chiefly in the summer, are estimated to be about 8 per cent. There is very little humus in this soil, and the subsoil, being of a volcanic nature, cracks badly and dries out after even a short period of dry weather.

A factor which has militated against the growing of eucalypts is the strong prevailing winds off the east coast. The young trees did splendidly until they became tall enough to catch the wind, when the growth became slower and the tops assumed a round bushy appearance. In sheltered gullies and on sloping ground facing south or north good results have been obtained. It is now proposed to plant all exposed slopes and ridges with *Pinus radiata*, and conserve only the areas of eucalypts which are

sufficiently sheltered to enable them to develop properly. As soon as an officer can be spared several roads and access tracks will be surveyed and plans of the reserve prepared.

The average daily number of men employed during the year was 4·31.

Following is a record of rainfall and temperature for the year:—

Rainfall, Temperature, &c.

Month.	Rainfall.	Number of Days Rain fell.	Temperature.		Number of Days Frosts occurred.
			Minimum.	Maximum.	
1918.	In.		Deg. F.	Deg. F.	
April	13·01	15	34	76	..
May	3·58	13	32	60	1
June	8·10	13	34	60	..
July	6·97	15	32	56	8
August	1·68	9	32	60	2
September	10·40	10	34	66	..
October	10·41	18	34	68	..
November	1·81	6	36	76	..
December	2·80	8	33	78	..
1919.					
January	2·09	6	36	86	..
February	1·54	3	40	88	..
March	1·77	7	38	86	..
Totals	64·16	123	..	..	11

(2.) REPORT ON AFFORESTATION OPERATIONS IN THE SOUTH ISLAND.

(By D. J. Buchanan, Superintending Nurseryman for South Island.)

For afforestation operations generally the climatic conditions experienced during the past year have been particularly unfavourable, and it is doubtful if in any season during the past twenty years the raising and transplanting of trees has ever been conducted under such adverse circumstances. A winter of almost unprecedented severity was followed by a long period during which excessive moisture and low temperatures prevailed, the warmth so necessary to successful germination and the healthy growth of young plants being entirely wanting. Frosts were exceptionally severe in the early spring months, and occurred with considerable frequency until midsummer. In North Canterbury heavy gales were a feature of the summer months, which were characterized in Otago by extreme wetness. In the month of July a fall of snow occurred in the Hanmer Springs district to a depth of 4 ft. 10 in. on the plains, resulting in the complete suspension of operations for a period of two months.

Excepting for a slight retarding of growth no appreciable effects of the abnormal season are apparent amongst well-established trees, but a perusal of the reports from the different stations discloses the fact that the growing-percentages and development of the younger stock are slightly below the average standard.

During the year an additional area of 964 acres was planted, thus increasing the total area planted in the South Island to 11,530 acres.

Tree-raising.

Trees to the number of 1,309,700 were raised from seeds, and the total raised to date is 56,550,900.

Only a very limited supply of imported seeds was procurable, and as the only way in which the deficiency could be made up was by substituting Dominion-grown seeds, *Pinus radiata* in considerably increased quantity was operated with. At each of the nurseries very disappointing results have attended the sowing of this species, and, although this may be to a certain extent attributable to unfavourable germinating conditions, it is quite evident that the seed was of inferior quality. Fair results generally have been attained with the imported seeds, and the failure of *Pinus radiata* accounts for the comparatively small number of trees raised. As the nurseries all carry fairly heavy stocks it is not anticipated that the past season's partial failure will affect expansion work to any appreciable extent. The development of the transplanted trees in the nurseries is poor on the whole, and the removal of a considerable proportion to the plantations will in consequence have to be deferred for a further season. Had the usual vigorous growth been made it is practically certain that the available labour would have been quite inadequate to deal with the season's output.

The total number of trees in the nurseries at the 31st March was 6,406,000, about one-third of which will be sufficiently advanced for permanent planting during the coming winter.

Labour.

The position regarding labour reached an acute stage during the past year, and although planting schemes were planned in accordance with the anticipated shortage of workmen considerable difficulty was experienced in carrying out the proposals in their entirety. Various works of a more or less urgent nature have been necessarily neglected, and it will take some time after labour becomes more plentiful to overtake the arrears and put all the stations in thoroughly good working-order. Although a fair number of discharged soldiers have at various times been employed, the majority have soon become dissatisfied, and, except in very few instances, their period of employment has been comparatively brief. Latterly, however, the tendency to stay for only a short time has not been so pronounced, and is evidence that the improved living-conditions, and part-payment for time lost through wet weather, is having the desired effect in eliminating the causes of dissatisfaction. A kitchen and dining-room have recently been provided at Greenvale Plantation and will be in occupation during the coming winter; a similar building will also be erected at Balmoral Plantation, but probably not until the present camp has been removed to a new site. Preparations are now in hand for the erection of several huts at the above-named stations, the accommodation so provided being reserved entirely for returned soldiers.

While the labour-market will probably not return to normal conditions for some little time yet, it appears safe to assume that the position will have altered materially within the next twelve months, and will allow the prosecution of afforestation operations on a more comprehensive scale.

Trees for Farmers.

It is evident that the privilege of purchasing trees at a reasonable cost from the State nurseries continues to be appreciated by farmers and local bodies, the number sold during the year being 226,890, practically the same number as that disposed of during the previous year. While the demands of farmers have been principally for shelter-trees, the local bodies are more inclined to the purchase of species suitable for timber-production, and as the orders for the latter are generally large it is reasonable to infer that plantations of some considerable commercial importance are being established. Sufficient numbers of the species most in demand were reserved for distribution during the coming winter; but owing to the unfavourable season many are not sufficiently advanced for planting, and a curtailment of sales will probably be necessary.

Revenue.

The revenue received during the year amounted to £1,263 18s. 4d., and resulted chiefly from the sales of trees, grain, sheep, wool, and firewood.

The largest receipt was for wheat and oats grown at Gimmerburn Reserve, where an excellent crop, which realized satisfactory prices, was taken from land not required for tree-planting purposes.

The amount received for firewood, £125 10s., shows a considerable increase on that received from the same source during the previous year, and has resulted chiefly from the sales of thinnings taken out of the shelter belts at Hanmer Springs Plantation.

Receipts for the year were as follows:—

	£	s.	d.
Trees (226,890)	241	8	6
Grain (1,927 bushels)	536	12	10
Sheep	88	14	6
Wool	194	7	4
Firewood (129½ cords)	125	10	0
Grazing	63	18	3
Rent of cottage, &c.	13	6	11
Total	£1,263	18	4

Grazing of Sheep on Plantations.

Satisfactory results have attended the grazing of departmental sheep on Dusky and Conical Hills plantations during the past year, all firebreaks having been kept in such a state of efficiency that cultivation work has been unnecessary. Mustering, which has to be done at least three times in the year, is a particularly difficult undertaking, and can seldom be carried out satisfactorily under the present system of management. Having no one in charge of the flock the services of neighbouring settlers have chiefly to be depended upon for mustering, and, although assistance is given willingly enough, it frequently happens that the farmer cannot spare the time necessary to do the work thoroughly. Efforts to secure a shepherd have so far been unavailing, but it is hoped that from amongst the returned soldiers seeking employment a man able and willing to fill the position will be found. Owing to the slump in the sheep-market it would not be possible to sell the ewes without incurring a somewhat serious loss, but as the feed necessary to carry the whole of the stock through the winter is not available a considerable proportion of the lambs must be disposed of. The total number of sheep and lambs on the plantation at the 31st March was 965, and their value as shown in the statement given hereunder was based on current market prices at that date.

STATEMENT OF STOCK TRANSACTIONS.

Dr.	£	s.	d.	*Cr.*	£	s.	d.
Balance forward at 1st April, 1918 ..	750	17	10	Sales of wool	163	3	0
Management expenses, mustering, dipping, shearing, &c...	56	18	7	Stock in hand 31st March, 1918 (at valuation)	792	8	6
Commission on sales	0	1	5				
Balance, being profit on year's transactions	152	13	8				
Total..	£960	11	6	Total	£960	11	6

GENERAL.

An effort will be made to have all surveys and plans of plantations, necessary for the keeping of accurate and systematic records, completed during the coming year. With the small clerical staff employed the preparation of balance-sheets for each station has not been possible, but it is anticipated that the assistance required will shortly be provided, and that statements showing the true financial position of each nursery and plantation will be available for publication in the next annual report.

During the approaching winter and spring months planting will be carried out at Balmoral, Naseby, and Greenvale plantations, and it is estimated that the areas planted will aggregate 1,000 acres.

It is also proposed, as circumstances permit, to carry out much-needed improvements in connection with the quarters of officers and workmen, and in the working plant generally, these matters having been deferred during the war period owing to the high prices of material and the scarcity of labour.

The permanent staff has been still further depleted during the past year, and it has been necessary in several instances to fill responsible positions by temporarily promoting junior officers.

The thanks of the Department are due to all officers, who have during a particularly arduous year cheerfully and willingly borne added responsibilities, and have done their utmost to carry all operations to a successful issue.

Attached hereto are reports of the several stations under my charge.

TAPANUI NURSERY, OTAGO.

(Area, 173 acres; altitude, 500 ft.; established, 1897.)

The climatic conditions experienced practically throughout the year have been particularly unfavourable for nursery work, and probably never since the inception of this station have operations generally been conducted under more adverse circumstances. Following on a winter of exceptional severity, cold stormy weather was almost continuous during the spring and summer months, snowfalls and frosts occurring frequently; and it was not until the end of January—during which month a record rainfall was experienced—that anything approaching normal conditions prevailed. For considerable periods tillage of the soil was almost impossible, and extreme difficulty was experienced in completing the transplanting of seedlings and seed-sowing, the most important phases of nursery operations. The shortness of the growing season was not conducive to good results, and growth generally is much below that of an average year.

Raising of Seedlings.—The crop of seedlings raised during the year is estimated at 466,000, details of which are appended. Owing to the short supply of European seeds and the non-arrival of the American order, the quantity of seed operated with was comparatively small, the greater proportion of the seed used being *Pinus radiata*, purchased somewhat late in the season. Unfavourable weather was responsible to some extent for poor germination; but the failure of *Pinus radiata* resulted chiefly from the inferior quality of the seed, the resulting seedlings from 140 lb. of seed sown being estimated at 152,000. *Cupressus macrocarpa* was also a partial failure, but fair germination resulted with *Pinus Laricio* and *Pinus muricata*, and also with small sowings of eucalypts. Sufficient eucalypts to meet the probable requirements of farmers were pricked off into trays, and, although small plants, may be sufficiently advanced before the advent of the planting season. During the past winter eucalypts in trays were severely affected by frost, several of the less hardy species being killed outright.

Transplanted Trees.—Seedlings to the number of 1,256,000 were transplanted into nursery-lines from the seed-beds, the operation, owing to unavoidable delays, being extended considerably beyond the usual period. On the whole, disappointing results have eventuated, poor development being general, and it is estimated that fully 50 per cent. of the lined-out trees will not be sufficiently advanced for permanent planting during the coming season. Although *Pinus radiata* has not made its usual vigorous growth, the plants are strong and sturdy, and will be practically all fit for transference to plantations. *Pinus ponderosa* will have to remain in the nursery for another season, and the same applies to a considerable proportion of the *Pinus Laricio*, amongst which a high percentage of failures occurred in handling. It is anticipated that the number of trees transferred to plantations during the coming season will be approximately the same as that dealt with in the past season.

The output of trees during the year totalled 943,165, of which number 128,390 were disposed of to farmers and local bodies.

The estimated number of seedlings in the nursery at the 31st March was 2,109,800, and the total number raised since its inception was 25,719,039.

Horse-feed.—An area of 25 acres was utilized for the production of horse-feed, and it is anticipated that the crops raised will be almost sufficient to carry through the coming season.

The average daily number of employees was 15.

Rainfall, Temperature, &c.

Month.	Rainfall.	Number of Days Rain fell.	Temperature.		Number of Days Frosts occurred.
			Maximum.	Minimum.	
1918.	In.		Deg. F.	Deg. F.	
April	3·66	16	72	25	5
May	2·58	16	67	28	9
June	5·40	18	55	19	14
July	4·12	17	53	20	29
August	2·98	17	60	20	16
September	2·66	13	69	25	12
October	2·91	14	73	26	6
November	4·58	16	78	29	5
December	4·62	15	75	30	4
1919.					
January	9·85	23	80	33	..
February	0·47	6	86	33	..
March	3·13	15	84	29	3
Totals	46·95	186	..	..	103

Details of One-year-old Trees, sown 1918–19.

Name of Tree.	Number in Seed-beds.	Amount of Seed sown.	Remarks.
		lb.	
Pinus Laricio	240,000	80	Small plants.
,, *ponderosa*	18,000	8	Fair plants.
,, *radiata*	152,000	140	Good plants.
,, *muricata*	34,000	7	Fair plants.
,, *pinaster*	8,000	3	,,
Cupressus macrocarpa	4,000	7	Poor crop.
Eucalyptus viminalis	4,200	..	Pricked off into trays; generally poor growth.
,, *Macarthuri*	1,400	..	
,, *acervula*	600	..	
,, *fastigata*	1,300	..	
,, *Gunnii*	2,500	..	
Total	466,000		

Details of Two-year-old Trees, sown 1917–18.

Name of Tree.	Number in Seed-beds.	Number in Nursery-lines.	Remarks.
Pinus Laricio	200,000	9,000	Fair growth.
,, *ponderosa*	200,000	..	Strong plants.
,, *radiata*	..	120,000	Majority fit for plantations.
,, *muricata*	..	16,000	Uneven growth.
,, *Banksiana*	40,000	..	Fair plants.
,, *pinaster*	..	5,000	Poor growth.
Pseudo-tsuga Douglasii	5,000	..	Poor plants.
Larix leptolepis	..	9,000	Fair growth.
Cupressus macrocarpa	..	5,000	,,
Totals	445,000	164,000	
	609,000		

Details of Three-year-old Trees, sown 1916–17.

Name of Tree.	Number in Nursery Rows.		Remarks.
	Lined in.	Lined out.	
Pinus Laricio	350,000	555,000	Generally poor growth.
,, *ponderosa*	..	101,700	Poor growth.
,, *Banksiana*	..	6,000	Good trees.
,, *muricata*	..	2,000	,,
,, *Taeda*	..	150	,,
Pseudo-tsuga Douglasii	..	10,000	,,
Larix europæa	..	250	,,
Betula alba	..	3,000	Fair plants.
Populus monolifera	..	4,000	Good growth.
,, *fastigiata*	..	2,700	,,
Totals	350,000	684,800	
	1,034,800		

Trees transferred from Nursery to Plantations, &c., 1918–19.

Where sent.	Name of Tree.	Number.
Greenvale Plantation	*Pinus Laricio*	495,475
	,, *radiata*	103,950
	Cupressus macrocarpa	11,150
		610,575
Conical Hills Plantation	*Pinus radiata*	15,000
Dusky Hill Plantation	,, ...	5,000
Pukerau Plantation	,, ...	53,000
Naseby Plantation	*Pinus Laricio*	81,200
Ranfurly Nursery	,, ...	50,000
Selwyn Plantation Board	Assorted forest-trees	61,000
Rangiora Domain Board	,, ...	4,000
Waikuku Beach Board	,, ...	3,000
North Canterbury Hospital and Charitable Aid Board	,, ...	2,500
Otago Hospital and Charitable Aid Board ..	,, ...	1,880
Taieri Lake Domain Board	,, ...	3,000
Justice Department, Papanui	,, ...	6,550
Justice Department, Prison Camp, Invercargill	,, ...	6,250
Farmers	,, ...	40,210
Total	..	943,165

Conical Hills Plantation, Otago.

(Area, 3,672 acres; altitude, 400 ft. to 1,050 ft.; commenced operations, 1903.)

This plantation is now well established, and amongst the trees generally there is little evidence that the development has been adversely affected by the severe climatic conditions experienced here in common with other stations in the district. The rate of growth on the whole has been quite satisfactory, and on certain species, notably the spruce, the abundance of moisture during the summer months has had a beneficial effect, the trees having everywhere, except on the very exposed situations, made improved growth. The shelter provided by well-established blocks of pines is also having a pronounced effect upon the spruce, the vertical development in such situations being exceptionally good, and is surpassed by few species throughout the plantation. Where sufficiently protected from heavy gales the Douglas fir is also making better headway, and promises to develop into useful timber-trees. The growth of *Pinus Laricio*, particularly on the sheltered slopes, leaves nothing to be desired, and *Pinus strobus* and the true type of *Pinus ponderosa*, although somewhat affected on exposed positions by the cold south-westerly gales which prevailed in the late spring months, are also making good progress.

The replacing of unsuitable species with *Pinus radiata* has been attended with good results, and it is hoped, as labour becomes more plentiful, to continue this work on a more comprehensive scale,

and so have all unsatisfactory areas fully stocked at as early a date as possible. By the grazing of sheep the firebreaks have been kept in a very efficient state, and it has not been necessary to resort to horse-work during the past summer.

It is most desirable that an increased staff should, if possible, be maintained at this station during the current year in order that the various works—necessarily neglected as the result of the scarcity of labour during the war period—may be given the attention that is now urgently required.

The average number of men employed throughout the year was 8·6.

Summary showing Area of Conical Hills Plantation (3,533½ Acres in Trees).

How occupied.	Acres.
Pines	1,850
Larch	913
Spruce and Douglas fir	138½
Ash, poplars, &c.	126
Miscellaneous mixtures	506
Paddocks, firebreaks, tracks, &c.	138½
Total	3,672

Pukerau Plantation, Otago.

(Area, 628 acres; altitude, 700 ft. to 1,400 ft.; commenced operations, 1915.)

Steady uniform progress is noticeable amongst the trees in this reserve, the different compartments of pines having a particularly healthy and thriving appearance. Vigorous growth has been made during the autumn months by *Pinus radiata*, *Pinus Laricio*, and *Pinus ponderosa*, the latter in particular showing to great advantage.

Spruce, poplars, and eucalypts are not making satisfactory headway, and are evidently not suitable for the locality. Amongst the species planted in experimental plots, *Pinus Murrayana*, *Pinus patula*, *Pinus Montezumæ*, and *Pinus Thunbergii* are very promising and satisfactory, but slower development is general on the plot of *Pinus strobus*. The area selected for experimental work here is particularly well sheltered; and the results obtained give no reliable indication as to the suitability or otherwise for planting on average country, but merely serve to demonstrate that certain species may be grown satisfactorily when planted in specially favoured situations.

Somewhat indifferent results attended the planting of an additional area of 37 acres during the spring months, the *Pinus radiata* seedlings used for the purpose not being sufficiently hardened off to withstand the cold winds experienced shortly after planting, and in addition the plants were too small to compete successfully with the rank growth of coarse herbage, which, owing to the inadequate amount of available labour, speedily got beyond control. If labour is sufficiently plentiful an effort will be made to complete the planting of this reserve during the coming season.

The average of men employed throughout the year was 2·5.

Summary showing the Area of Pukerau Plantation (573 Acres in Trees).

How occupied.	Acres.
Pines	555
Douglas fir, poplars, &c.	18
Paddocks, firebreaks, &c.	55
Total	628

Dusky Hill Plantation, Otago.

(Area, 845 acres; altitude, 400 ft. to 800 ft.; commenced operations, 1898.)

While the past season has not been favourable to the rapid development of trees, a fair rate of growth is noticeable, and satisfactory progress has been maintained. The most uniform development has perhaps been made in the blocks of pines and larch, and it is evident that the climatic conditions have favoured the latter species, which has not been affected by the premature needle-cast so prevalent in recent years. On exposed hillsides the spruce remain practically at a standstill, and it is only where well sheltered that an improved rate of growth can be shown.

The deciduous trees also are not developing evenly, growth being good only on the lower ground, where soil of fair quality and a good depth is found. During the spring it was necessary to straighten up and firm a considerable number of the *Pinus radiata*, which had been over-balanced by heavy falls of snow.

A judicious thinning of the older larch in the near future would appear to be advisable, both height and diameter increment having fallen away rather rapidly during recent years.

The firebreaks and roads have been satisfactorily grazed by departmental sheep; but as mustering is a difficult undertaking, and past experience has proved that only a very limited flock can be carried through the whole of the year, it would perhaps be a better proposition to lease the grazing-rights at a reasonable rental.

The expenditure for the year amounted to £232 8s. 4d., and the total to date £15,282 15s. 10d.

The average of men employed throughout the year was 1·4.

Summary showing the Area of Dusky Hill Plantation (745¾ Acres in Trees).

How occupied.	Acres.
Pines	270¾
Larch	234¼
Spruce and Douglas fir	93¼
Ash, birch, &c.	46¾
Miscellaneous mixture	100¾
Roads, tracks, firebreaks, &c.	99¼
Total	845

GREENVALE PLANTATION, OTAGO.

(Area, 5,169 acres; altitude, 700 ft. to 1,200 ft.; commenced operations, 1917.)

Operations at this station have been conducted under particularly trying conditions, the exceptional severity of the season, especially the winter and spring months, together with the scarcity of labour, causing vexatious delays, considerable difficulty being experienced in completing the season's planting-work. Planting during the winter was impossible, and it was not until the latter end of August that a start was made, the work being finally completed just at the end of October—at least a month later than is desirable.

The afforested area was increased by 360 acres during the year, trees to the number of 600,575 being used for this purpose, while 10,000 were utilized in replacing failures on the previous season's area. Comparatively little growth has been made by the trees planted, but the percentage of failures is exceptionally low, and on the whole the result of the season's operations may be said to be fairly satisfactory.

A small number of *Cupressus macrocarpa* planted at the end of the season were practically a total failure, the few other deaths noticeable being amongst *Pinus radiata*. Neither of these species is adapted for very late planting, which was no doubt responsible for the failures which occurred.

The pines planted during the previous season bear a distinctly healthy appearance, and although little growth was apparent until the latter end of the summer it is evident that they are all suitable for extensive planting in this locality. The greater part of this reserve will probably give the best results if planted only with the hardier pines. Douglas fir may with advantage be grown in the more sheltered situations; but experiments with the eucalypts have demonstrated the uncertainty attending the planting of even the hardiest species, few trees having survived the cold winds and severe frosts of the past winter.

Little preparation for the approaching season's planting has so far been made, all available labour having been fully occupied during the summer months in cleaning trees and in necessary attention to the firebreaks. It is anticipated that approximately 600,000 trees will be dealt with during the winter and spring months, and that the planting of this number together with fencing and roadmaking will provide employment for at least 30 men during the period.

To improve living-conditions of workmen in the camp a kitchen and dining-room have recently been provided, and preparations are now in hand for the erection of several huts required for the accommodation of an increased staff.

The expenditure during the year was £3,116 8s. 3d.

The average of men employed throughout the year was 19·9.

Summary showing Area of Greenvale Plantation (737 Acres in Trees).

How occupied.	Acres.
Pines	703
Douglas fir	3
Miscellaneous trees	31
Paddocks, firebreaks, tracks, &c.	55
Unplanted area	4,377
Total	5,169

RANFURLY NURSERY, CENTRAL OTAGO.

(Area, 49 acres; altitude, 1,400 ft.; established, 1896.)

An average season's rainfall for this district was recorded during the year, 19·87 in. falling on 123 days. It was, however, very unevenly distributed, the winter and spring months being unusually dry, while in the three months of summer two-thirds of the total precipitation was registered. Frosts occurred on 130 days, and were exceptionally severe, as much as 30° being recorded in the month of August.

The season has not been favourable for nursery work, insufficient moisture and strong drying winds during the period when transplanting operations were in progress being responsible for a heavy death-rate. Cold weather during the summer months retarded growth, and the trees generally throughout the nursery, and particularly those in the nursery-lines, show poor development. Of the transplanted seedlings *Pinus ponderosa* has given the best results, and has demonstrated its ability to thrive under most unfavourable climatic conditions. Amongst *Pinus Laricio* and *Pinus radiata* the percentage of failures is particularly high, and comparatively few of either species will be available for permanent

planting. The total number of trees transplanted into nursery-lines was 463,800, but subsequent failures have reduced the number by nearly 50 per cent.

The estimated number of seedlings raised during the year was 220,700, details of which will be found in the attached schedule. Seed-sowing was completed a month later than usual, and has been attended with indifferent results, germination not being altogether successful, and subsequent attacks of "damping off" due to continuous wet weather considerably reducing the number in the seed-beds. A fair rate of growth has been maintained by two-year-old plants in seed-beds, and a considerable proportion will be sufficiently advanced for transfer to the plantations during the coming winter, the permanent planting-out of this class having been attended with good results in recent years.

The total output of trees during the year was 469,575, and it is estimated that the number available for afforestation during the coming season will be slightly over 300,000.

Vacant areas in the nursery were utilized for the production of horse-feed, thus serving the double purpose of keeping the land clean and supplying a considerable amount of winter fodder.

The average daily number of men employed was 4·63.

The expenditure for the year was £1,246 1s. 10d., the total to date being £20,760 17s. 6d.

Rainfall, Temperature, &c.

Month.	Rainfall.	Number of Days Rain fell.	Temperature.		Number of Days Frosts occurred.
			Maximum.	Minimum.	
1918.	In.		Deg. F	Deg. F.	
April	1·04	10	70	20	5
May	0·54	10	61	19	20
June	0·76	13	59	12	21
July	0·49	9	50	5	31
August	1·59	13	59	1	19
September	0·78	7	67	22	13
October	0·63	8	69	22	6
November	3·01	14	74	28	5
December	1·89	8	77	25	3
1919.					
January	8·13	17	82	29	4
February	0·30	5	83	35	..
March	0·71	9	84	24	3
Totals	19·87	123	..	..	130

Details of One-year-old Trees, sown 1918–19.

Name of Tree.	Number in Seed-beds.	Amount of Seed sown.	Remarks.
		lb.	
Pinus ponderosa	53,200	20	Fair germination.
,, *Laricio*	156,100	45	Very uneven.
,, *radiata*	6,000	15	Poor results.
,, *muricata*	2,200	½	Fair crop.
Cupressus macrocarpa	200	½	Poor germination.
Larix leptolepis	..	1	Failure.
Populus fastigiata	3,000	(Cuttings)	Strong plants.
Total	220,700		

Details of Two-year-old Trees, sown 1917–18.

Name of Tree.	Number in Seed-beds.	Number in Nursery-lines.	Remarks.
Pinus ponderosa	350,000	..	Strong plants.
,, *Laricio*	89,000	..	Very small.
,, *Banksiana*	150,000	..	Healthy plants.
,, *muricata*	300	..	Small plants.
,, *radiata*	2,300	31,500	Good trees.
Cupressus macrocarpa	2,000	..	Well grown.
,, *Lawsoniana*	1,000	..	Medium plants.
Totals	594,600	31,500	
	626,100		

Details of Three-year-old Trees, sown 1916–17.

Name of Tree.	Number in Nursery-lines.	Remarks.
Pinus ponderosa	87,700	Strong plants.
„ *Laricio*	85,750	Only fair.
„ *muricata*	300	Well-grown trees.
Pseudo-tsuga Douglasii	500	Majority good plants.
Picea excelsa	4,200	Fair plants.
Betula alba	100	Good trees.
Total	178,550	

Trees transferred from Nursery to Plantations, &c., 1918.

Where sent.	Name of Tree.	Number.	
Naseby Plantation	*Pinus ponderosa*	141,925	
	„ *Laricio*	299,050	
	„ *radiata*	12,700	
	„ *muricata*	470	
	„ *pinaster*	925	
	Cupressus macrocarpa	1,630	
	Betula alba	175	
	Larix europœa	2,375	
	„ *leptolepis*	2,950	
			462,200
Supplied to settlers	*Pinus ponderosa*	275	
	„ *Laricio*	4,500	
	„ *muricata*	100	
	„ *radiata*	100	
	Cupressus macrocarpa	300	
	Larix leptolepis	600	
	Betula alba	100	
	Populus monolifera	300	
	„ *fastigiata*	1,100	
			7,375
Total	..		469,575

NASEBY PLANTATION, CENTRAL OTAGO.

(Area, 2,850 acres; altitude, 2,450 ft.; commenced operations, 1900.)

Notwithstanding the unfavourable weather conditions experienced at this plantation a fair measure of success has attended the season's operations. The winter and early spring months were unusually dry, and owing to north-westerly gales being very prevalent during the planting season little benefit was derived from the occasional showers which fell at that period; had it not been for the frequent and heavy precipitations of the summer months there is no doubt that a high percentage of failures would have been recorded. Frosts occurred with considerable frequency during the growing-period, and resulted in a somewhat serious check to the growth of the younger larch; amongst other species no ill effects of late frosts are apparent.

The number of trees handled during the season was 543,400: 519,670 of which were planted on new area amounting to 291 acres, while the remaining 23,730 were used in replacing the previous season's failures. *Pinus ponderosa* and *Pinus Laricio* occupied practically the whole of the new area, the small number of other species being required for replanting on the older blocks. Satisfactory results have been attained with the mentioned species, *Pinus ponderosa* showing an excellent growing-percentage, whilst the death-rate amongst *Pinus Laricio* does not exceed the average, and will probably not amount to 5 per cent.

With the exception of the larch already mentioned the established trees continue to make good progress, the rate of growth comparing favourably with that of any previous year, and a general healthy appearance is noticeable throughout the various blocks. *Pinus radiata* has shown its characteristic rapid development, and, were it not so difficult to successfully transplant in this district, could be operated with more extensively. While the most uniform growth is displayed on areas of *Pinus Laricio*, this species is surpassed in rapidity of height-increment by *Pinus ponderosa*; but, unfortunately, in the older blocks of the latter there is a considerable proportion of the slow-growing variety *P. scopulorum*, giving an impression of uneven development on the areas concerned

Experiments conducted on a small scale with *Eucalyptus Macarthuri* have proved that it is not sufficiently hardy to withstand the severe frosts experienced here.

Preparations for the coming season's planting have been completed, a further area of approximately 122 acres having been enclosed and pitted during the summer months. This area, together with that left available from the previous season, will be sufficient to accommodate the whole of the output of Ranfurly nursery. The afforestation of the whole of this reserve will probably be completed within the next two years. The grazing by a neighbouring settler of a small number of sheep on the older part of the plantation has been attended with good results, much rank growth having been kept down satisfactorily, thus to some extent eliminating the danger of fires.

Maintenance work at this station has been comparatively light, being confined chiefly to the cultivation of firebreaks and the suppression of rabbits. The latter work is a matter of some difficulty, particularly amongst the established trees, to which rabbits in considerable numbers gained admittance during the winter, when the snowdrifts covered the fences.

The average daily number of men employed was 6·02.

Summary showing the Area of Naseby Plantation (1,776 Acres in Trees).

How occupied.	Acres.
Pines	1,475
Larch	271
Pines and larch mixture	23
Miscellaneous trees	7
Firebreaks, roads, and tracks	150
Unplanted land	550
Unsuitable for planting, including water-race, creeks, residence reserve, &c.	374
Total	2,850

(Survey incomplete; areas approximate.)

Rainfall, Temperature, &c.

Month.	Rainfall.	Number of Days Rain fell.	Temperature.		Number of Days Frosts occurred.
			Maximum.	Minimum.	
1918.	In.		Deg. F.	Deg. F.	
April	1·26	8	68	20	11
May	0·26	4	60	20	23
June	1·42	13	54	15	26
July	0·69	9	48	9	31
August	2·02	7	60	6	25
September	1·29	7	66	16	22
October	0.71	7	68	18	16
November	3·97	11	74	24	11
December	2.26	7	72	20	11
1919.					
January	10.25	14	68	28	6
February	0·38	3	79	35	..
March	0·72	7	82	26	4
Totals	25.23	97	..	..	186

Gimmerburn Plantation Reserve.

(Area, 425 acres; altitude, 1,200 ft.; commenced operations, 1903.)

No afforestation operations were carried out at this station, practically the whole of the labour applied being in connection with the growing of grain crops, 100 acres cropped during the previous year being again sown in wheat and oats. The crop was sown in the autumn, and until the beginning of summer had every appearance of giving an exceptionally good return; the anticipated success, however, was not realized, the unfavourable weather experienced in midsummer having an adverse effect on the ultimate yield, which was somewhat disappointing and not comparable with the previous year's return. It is estimated that the results of the past season's cropping operations will be in the vicinity of 500 bushels of wheat and 25 tons of oaten sheaf. The previous year's return was 355 sacks of wheat, 210 sacks of oats, and 18 tons of chaff. After reserving sufficient grain for seed and horse-feed 1,085 bushels of wheat and 772 bushels of oats were disposed of at satisfactory prices. Grain-growing in this district is a very uncertain proposition, and it is considered advisable to restrict cropping in future to an area sufficient to produce the amount of horse-feed required for local stations.

Regarding the area under trees little comment can be made, the average annual growth having been made by the plantation as a whole.

Of the three species planted *Larix europœa* and *Pinus ponderosa* are showing to the best advantage, individual specimens of each having made good growth; on the other hand many trees are not making satisfactory progress, and this applies more particularly to *Pinus austriaca*, the majority of which will probably never develop sufficiently to produce anything more valuable than firewood.

For afforestation purposes the land as yet unplanted is perhaps the better part of the reserve, and an effort to complete the planting of the whole area will be made in the season 1920. Rabbits are numerous within the enclosure, and, owing to the cover afforded by the trees and to the infested state of adjoining lands, are difficult to control. It will be necessary to thoroughly eradicate the pests before further planting can be progressed with.

Summary showing the Area of Gimmerburn Plantation (88 Acres in Trees).

How occupied.	Acres.
Pines	74
Larch and pine mixture	14
Firebreaks, roads, &c.	12
Unplanted land	325
Total	425

HANMER SPRINGS NURSERY, CANTERBURY.

(Area, 40 acres; altitude, 1,225 ft.; established, 1902.)

Rain fell on 117 days during the year, the total rainfall being 48·94 in., as against 59·17 in. for the previous year. The highest shade temperature (97°) was registered on the 21st February, and the lowest (8°) on the 5th July; frost was recorded on 159 days, showing an advance of thirty-nine days on the records of the previous year.

Reviewing the weather conditions generally, a perusal of the meteorological records for the year will disclose the fact that the average rainfall was high for the spring, winter, and early summer months, with a marked falling-off for February and March, during which the conditions almost approached a drought, which had an extremely detrimental effect on all nursery stock. Low temperatures prevailed until very late in the season; in fact, frost was recorded during every month of the period under review, which is quite unprecedented for this station.

The thermometer-readings disclose a record: the minimum temperature (8°) being 10° below that of the previous year, and the highest reading (97°) being 8° in excess of the highest reached during the previous year. The warm weather conditions, which under other circumstances would have so greatly benefited tree-growth, were made very unfavourable by the lack of moisture, and the rapid growth usually so noticeable during these months was entirely wanting. The snowfall (4 ft. 10 in.) experienced during the month of July constituted a record for this station, no previous fall approaching anything like it. From the foregoing facts it will be easily seen what extremely adverse conditions prevailed throughout the past year, which greatly militated against successful operations.

Tree-growing.—It is to be regretted that the successful operations usually in evidence at this station cannot be recorded over the past twelve months, mainly owing to the extremely adverse weather conditions experienced, and partly to the shortage of experienced workmen. Lining-out could not be undertaken until very late in the season, and throughout was carried out under conditions of soil and weather very unfavourable to success. Trees to the number of 1,380,600 were transferred to the nursery-lines, but the results obtained were not in any way encouraging, the loss throughout being excessively heavy, and in some instances reaching 50 per cent. The growth made was poor, owing to wet and cold conditions during the early part of the season and the lack of moisture during our main growing-months. Two- and three-year-old trees made fair headway, but are not to be compared to the stock produced in former years. Seed-sowing also suffered under the generally adverse conditions, and was spread over an unduly lengthened period.

From 212½ lb. of seed only the small total of 623,000 mainly medium plants resulted, a very poor crop compared with those of previous years. *Pinus radiata* proved almost a complete failure sown in open lines, and even under frames the result was little better, which would seem to indicate seed of poor germinating-quality. Of the other varieties sown little better reports can be made. It is anticipated that 947,000 trees will be available for transfer to plantations and farmers, &c., during the coming season. During the past year 568,975 trees were sent out from the nursery, of which 29,150 were disposed of to farmers and others. The total number of trees in stock on the 31st March was 3,271,400.

Horse-feed.—The growing of oats, &c., for the purpose of providing feed for our teams proved fairly successful, about 24 tons of oatsheaf being harvested. During the winter months teams are dependent on dry feed exclusively, owing to the total lack of any green feed in the paddocks. It is therefore necessary to purchase a certain amount of chaff, &c., as the area available for cropping is not large enough to grow sufficient feed to last throughout the year. Hay to the amount of about 20 tons was saved about the plantations, but the feeding-quality is not high, as Yorkshire fog is present to about 40 per cent.

General.—All vacant areas on the nursery were put down in red clover for the purpose of ploughing in for green manure; but this work was unavoidably delayed until late in the season, and very poor results were obtained. Before sowing the areas received a dressing of carbonate of lime at the rate of 1 ton per acre. The nursery area is now too limited to allow the working of the ground to the best advantage. An extension is urgently needed to allow the thorough spelling of the present overcropped area, so that the soil may be again brought into good heart. To the unavoidable

successive cropping-over of the same area may be attributed the gradual falling-off in the standard of tree-growth during the past two or three years. A good deal of work was necessary in maintaining the good condition of roads and attending to the general upkeep and cleanliness of stables, workshops, implement-sheds, outbuildings, &c. The repair and upkeep of fences, vehicles, implements, tools, &c., also require the usual attention.

Meteorological records and tree schedules are appended.

The daily average of men employed throughout the year was 10·8.

The expenditure for the year amounted to £1,693 9s. 2d., the total expenditure to date being £20,131 7s. 10d.

Rainfall, Temperature, &c.

Month.	Rainfall.	Number of Days Rain fell.	Temperature.		Number of Days Frosts occurred.
			Maximum.	Minimum.	
1918.	In.		Deg. F.	Deg. F.	
April	3·91	13	68	26	6
May	4·01	10	61	20	19
June	4·62	12	64	15	25
July	8·05	10	52	8	29
August	3·85	8	60	9	18
September	2·95	6	75	19	19
October	4·75	14	70	24	14
November	5·45	14	74	21	9
December	2·48	11	92	26	6
1919.					
January	6·16	9	82	29	3
February	1·32	4	97	32	2
March	1·39	6	83	25	9
Totals	48·94	117	..	..	159

Details of One-year-old Trees, sown 1918–19.

Name of Tree.	Number in Seed-beds.	Amount of Seed sown.	Remarks.
		lb.	
Pinus Laricio	300,000	80	Medium trees.
,, *radiata*	200,000	145	Germination a failure, poor plants.
,, *muricata*	60,000	6	Good plants.
Cupressus macrocarpa	20,000	10	Good plants; germination poor.
Eucalyptus Macarthuri	13,000	½	Good plants.
,, *viminalis*	30,000	½	,,
Total	623,000		

Details of Two-year-old Trees, sown 1917–18.

Name of Tree.	Number in Seed-beds.	Number in Nursery-lines.	Remarks.
Pinus Laricio	700,000	..	Strong plants.
,, ,, ...	..	400,000	Poor plants.
,, *ponderosa*	250,000	..	Strong plants.
,, ,, ...	..	250,000	Poor plants.
,, *radiata*	..	100,000	Good plants.
,, *Banksiana*	..	100,000	Medium plants.
,, *muricata*	..	2,000	Good plants.
,, *Taeda*	..	400	Medium plants.
,, *pinaster*	..	4,000	,,
Picea excelsa	..	6,000	Poor plants.
Cupressus macrocarpa	..	12,000	,,
Populus fastigiata	..	20,000	,,
,, *monolifera*	..	14,000	Fair plants.
Cupressus Lawsoniana	..	2,000	Poor plants.
Totals	950,000	910,400	
	1,860,400		

Details of Three-year-old Trees, sown 1916-17.

Name of Tree.	Number in Nursery-lines.	Remarks.
Pinus Laricio	600,000	Good plants.
,, *ponderosa*	100,000	Medium plants.
,, *muricata*	13,000	Good plants.
,, ,, ...	40,000	Very large plants.
Pseudo-tsuga Douglasii	20,000	Poor plants.
Picea excelsa	7,000	,,
Cupressus macrocarpa	8,000	Good plants.
Total	788,000	

Trees transferred from Nursery to Plantations, &c., 1918–19.

Where sent.	Name of Tree.	Number.	
Hanmer Plantation	*Pinus radiata*	87,000	
	,, *Laricio*	15,000	
	,, *ponderosa*	800	
	,, *pinaster*	1,850	
	,, *Taeda*	575	
	Populus monolifera	5,000	
	,, *fastigiata*	22,500	
			132,725
Balmoral Plantation	*Pinus radiata*	186,800	
	,, *ponderosa*	44,000	
	,, *Laricio*	153,300	
	,, *muricata*	11,000	
			395,100
Tapanui Nursery	*Pinus muricata*	2,000	
	Larix leptolepis	10,000	
			12,000
Public bodies and farmers ..	*Pinus radiata*	19,450	
	,, *Laricio*	1,150	
	,, *muricata*	3,700	
	Populus monolifera	100	
	,, *fastigiata*	150	
	Cupressus macrocarpa	3,200	
	Larix leptolepis	700	
	Eucalyptus viminalis	400	
	,, *Macarthuri*	300	
			29,150
Total	..		568,975

HANMER SPRINGS PLANTATION, CANTERBURY.

(Area, 3,668 acres; altitude, 1,225 ft.; commenced operations, 1901.)

Operations at this station were again confined almost exclusively to work in connection with the general upkeep of the plantations, a small portion only of the work for the year coming under the headings of "Utilization" and "Miscellaneous Expenses." The replacing of failures constituted the main work for the winter months, a total of 132,725 trees being used for this purpose, consisting of the following varieties: *Pinus radiata*, 87,000; *Pinus Laricio*, 15,000; *Pinus ponderosa*, 800; *Pinus maritima*, 1,850; *Pinus Taeda*, 575; *Populus deltoides*, 5,000; *Populus fastigiata*, 22,500. Of the foregoing, *Pinus radiata* did very poorly owing to the heavy snowfall experienced in July remaining on the ground until very late in the season, and thus preventing the continuation of planting operations until the season was too far advanced to transplant trees with any degree of safety. With the exception of *Pinus Taeda* all other varieties met with a fair measure of success. The season throughout was a very trying one. A snowfall without precedent occurred during the first week in July, completely holding up planting operations for over two months, and causing considerable damage to fences. Little harm, however, resulted to the plantation generally, considering that the snow reached a depth of 5 ft. 2 in. at the survey camp and over 8 ft. on the higher parts of the plantation. A few larch were laid flat in patches on the sidelings, aggregating an area of about an acre. Alder on flats adjoining Dog Creek suffered to some extent, and branches were stripped from pines

in comparatively few cases. A small percentage of silver-birch along the margins of blocks were broken off from two-thirds of their height: but beyond this little damage was done to the plantation as a whole, which is surprising, considering the severity of the storm and the depth of snow. Nevertheless, the snow greatly hampered operations generally, and caused much additional labour in the matter of pruning and repairs to fences, roads, &c. The telephone-lines also required a good deal of repair to put them into working-order again. The opening of tracks to enable the carting of stores, firewood, hay, &c., entailed much additional labour.

Due attention was given to the safeguarding of the plantations against fire by the ploughing of boundary firebreaks, but owing to the shortage of teams internal breaks were not touched. On these breaks, where grassed, the growth was allowed to mature, and was cut before being properly ripe in order to minimize the danger from fire; the result being the maintenance of a satisfactory degree of firebreak efficiency at a minimum cost, and the production of some 20 tons of fair-quality feed for winter use. Cropping operations produced about 50 tons of good oatsheaf. The grazing of sheep on firebreaks would be a payable proposition when trees on the more recently planted areas attain sufficient size; but against this must be placed the difficulty of mustering, the animals being apt to disappear among the trees immediately work commences. The usual attention was directed towards the elimination of the rabbit pest by trapping and poisoning, the efforts in this direction meeting with a fair measure of success. The destruction of noxious weeds such as gorse, broom, briars, &c.—occupied the attention of the staff for some time. Damage by red deer was not noticed to any extent, but four of these animals were destroyed during the snow period.

Though adverse weather conditions prevailed throughout the year, the standard of tree-growth was well maintained, and evidence of disease was not noticeable. The thinning of shelter-belts of *Pinus muricata* produced a considerable amount of saleable timber for firewood, and the greater part was disposed of locally after departmental requirements were met. The cutting-out of larch felled by snow resulted in about five hundred excellent poles, a number of which were profitably disposed of during the year.

The surveying of blocks was taken in hand by Mr. A. J. Mountfort, and, though extremely severe weather conditions had to be contended with, the work was put through expeditiously. Attached hereto are details of trees planted and areas covered since the initiation of tree-planting at this station, area approximate only.

The daily average of men employed throughout the year was 6·8.

The expenditure for the year amounted to £1,066 4s. 2d., and the total expenditure to date is £27,627 18s.

Summary showing Area of Hanmer Springs Plantation (2,886½ Acres in Trees).

How occupied.	Acres.
Pines	1,409
Pines and Douglas fir mixture	140½
Larch	1,177
Spruce	60
Alder	71½
English birch, poplars, willows, &c.	28½
Paddocks and cropping-areas	250
Roads and firebreaks	150
Land unsuitable for planting (including swamps, river-beds, &c.)	381½
Total	3,668

(Survey incomplete; areas approximate only.)

Balmoral Plantation, Canterbury.

(Area, 7,636 acres; altitude, 550 ft.; commenced operations, 1916.)

A general review of the third year's operations at this station does not disclose such favourable results as those of the two preceding seasons; but, taking into consideration the shortage of suitable labour and the phenomenally severe winter, the results are satisfactory.

Work was totally suspended during the whole of July and part of August by an extremely heavy snowfall, unprecedented in this district. Tree-planting was commenced on the 19th June and was completed on the 21st September, the total number planted being 395,100, of which 248,000 were used to cover new area and 147,100 to replace failures in former plantings. The varieties dealt with were as follows: *Pinus radiata*, 186,800; *Pinus ponderosa*, 44,000; *Pinus Laricio*, 153,300; *Pinus muricata*, 11,000, the latter being used for marginal planting at 6 ft. apart. The death-rate, which was higher than usual, was mostly confined to *Pinus radiata*, an experimental planting of seedlings of this tree proving a total failure; the two-year-olds, however, showed to better advantage, and results were fair. The heavy death-rate may be partly attributed to the fact that a large percentage of these trees were bundled ready for transfer before the snowfall, and were buried for some weeks, which would have a detrimental effect on their vitality. Severe early spring nor-westers immediately following the planting of the trees would, however, contribute 90 per cent. of the cause of failure.

All established trees are doing markedly well, especially *Pinus ponderosa*, which in many cases has made a vertical growth of 18 in. for the season. At the present time we are experiencing a prolonged spell of hot dry weather, and although all grass and herbage is parched up the trees have not suffered in the slightest.

During the year 580 acres of scrub were cleared in preparation for pitting and tree-planting, and pits to the number of 375,685 are now in readiness for the reception of trees. It is anticipated that about 700,000 trees will be dealt with during the coming planting season. During the year three additional huts were built for the use of employees, and the camp will now accommodate twenty men. A small cottage for the plantation foreman is now nearing completion, and should be finished by the end of April; this long-looked-for requirement will be much appreciated. The usual poisoning of the rabbit-infested areas met with a fair measure of success. All manuka scrub of sufficient size for fuel was set aside whilst clearing was in progress, and was subsequently carted to depots for departmental use. A small quantity was disposed of locally, but the sale was discontinued latterly owing to camp requirements.

The daily average of men employed during the year was 20·8.

The expenditure for the year was £3,254 17s. 9d.; and total expenditure to date, £10,726 8s. 11d.

Summary showing Area of Balmoral Plantation (732 Acres in Trees).

How occupied.	Acres.
Pines	718½
Poplars and English birch	3½
Douglas fir	10
Firebreaks, tracks, paddocks, &c.	680
Unplanted land	6,224
Total	7,636

APPENDIX B.

EXTRACTS FROM REPORTS BY THE CONSERVATORS OF STATE FORESTS.

AUCKLAND.

H. M. SKEET, Conservator of State Forests (Commissioner of Crown Lands).

The general condition of the timber industry throughout the Auckland District during the past year has been well maintained, and, notwithstanding the further increased retail and wholesale prices fixed by the Sawmillers' Associations for the various sawn products, the number of orders received by the principal sawmillers has far exceeded the available stock supplies, resulting in an accumulation of unfulfilled orders. The shortage of sawn timber is mainly attributed to the depleted log stocks, through the continuance of the scarcity of skilled bush labour causing delay in resuming operations in several of the larger bushes; but this difficulty is gradually being overcome, and many of the smaller sawmillers have recently reported more favourably in this direction.

Local Trade.—Both the building and furniture trades have shown a marked improvement, more particularly the former, owing presumably to the present demand for houses.

Export Trade.—From the official statistics the total quantity of timber exported for the year ended 31st December, 1918, from Auckland and Kaipara combined was 37,519,176 sup. ft., valued at £303,356, which, whilst showing a slight decrease in quantity as compared with the return for the year 1917, shows the substantial increase in value of about 32 per cent. per 100 sup. ft.

Sawmills.—There are at present about sixty sawmills working in the Auckland District, employing about two thousand hands, the approximate output of sawn product being 150,000,000 sup. ft.

Prices for Sawn Timber.—As contemplated in my previous year's report, the prices of sawn timber were subjected to a further substantial double increase during this year—firstly by a reduction in discounts allowed to builders—viz., 10 per cent. being reduced to 2½ per cent., and, secondly, by an average increase on all kinds and classes of sawn timber of about 2s. per 100 sup. ft. Taking, as an example, one line alone in each kind of timber, it may prove of interest to note the increases in prices per 100 sup. ft. during the war period, exclusive of the reduced discounts allowed as above stated:—

	Kauri, First-class, 3 in. to 12 in. wide.	Rimu, Heart.	Matai, Heart.	Totara, Heart.
	s. d.	s. d.	s. d.	s. d.
1914	28 0	25 0	23 0	25 0
1916	28 0	28 0	25 0	29 0
1917	32 0	34 0	28 0	30 0
1918	36 0	38 0	33 0	40 0
1918 (October)	38 0	39 6	34 6	42 0
	(Increase, 35½%)	(Increase, 58%)	(Increase, 50%)	(Increase, 68%)

Increased Utilization of Inferior Timbers.—Owing to the exceptionally high prices commanding for those grades of the better kinds of milling-timbers which were previously used for the manufacturing of cases and fruit-boxes, the substitution of the lower grades of timber has considerably increased the demand for such timber as tawa and *Pinus radiata*. The utilization of the latter timber to such an extent has resulted in the erection of a number of small sawmills throughout the district wherever fair supplies of the log timber were available. The royalty paid by sawmillers for the standing timber

ranges from 1s. to 1s. 6d. per 100 sup. ft., and the retail price realized for the sawn product is about 17s. 6d. per 100 sup. ft. It may be of importance to note that the principal sawmills are also engaged in cutting *Pinus radiata*, and large stocks of the better class of this timber are now being seasoned for prospective export to Australia for building, the off-cuts being converted into box-timber.

Forest Fires.—Notwithstanding the exceptionally long spell of dry weather experienced during the past summer, the kauri forests have been immune from fires, with the exception of one fire penetrating on to Crown lands on the lower end of the Waipoua State Forest and scorching about 240,000 ft. of kauri timber. This fire was the result of settlers burning off on their leasehold sections adjoining the forest reserve, and was started by them notwithstanding the repeated warnings given both by this office and the caretakers of the danger of the fire spreading into the kauri forest.

Timber-measuring.—Two timber-measuring parties were engaged during the whole of the year, and two additional parties during part of the year. The total quantity of milling-timber measured was 26,882,818 sup. ft., at a cost, including line-cutting, of 1·05d. per 100 sup. ft.

Timber-sales.—The following table shows in superficial feet the various kinds of timber disposed of during the year ended 31st March, 1919 :—

——	Kauri.	Rimu.	Kahikatea.	Totara.	Matai.	Miscellaneous.	Total.
Crown lands and lands for settlement	283,522	327,713	103,741	129,115	63,685	486,929	1,394,705
Education reserves ..	90,174	10,000	22,000	..	..	..	122,174
State forests	..	127,832	59,921	2,000	..	8,165	197,918

Timber-floating Licenses.—New licenses granted and licenses renewed, 92 ; lapsed, 13.

Taranaki.

G. H. Bullard, Conservator of State Forests (Commissioner of Crown Lands).

In the southern part of the Taranaki Land District milling at present is almost at a standstill, the requirements of the district being met mostly from mills near the Main Trunk line. Two small mills are at work, but neither of them constantly so, owing to the difficulty of obtaining experienced labour, and for that reason and the rough nature of the country worked in their output is only small at present. In the northern end of the district six mills are now operating, and two more are in the course of construction. There is plenty of demand for all timber.

The present output would amount to approximately 11,000,000 ft. annually, made up of about 5,000,000 ft. of kahikatea and 6,000,000 ft. of rimu, matai, and totara—the two last in small quantity only.

Royalties and rents received are—(*a*) from State forests, £64 15s. 11d. ; (*b*) sales of timber from national-endowment lands, £1,273 0s. 7d. ; (*c*) licenses and sales, £276 4s. 3d.

In the southern end of the district milling in a small way may last for another twelve years. In the northern end the present mills will cut out much sooner, but as soon as the Stratford–Okahukura Railway reaches Ohura the milling of about 90,000,000 ft. of timber on the Waitaanga Plateau, between Ohura and the coast, will come under consideration. Access to this will be costly, but the amount of timber will justify the expenditure. On Crown and private land near Tahora, the present railhead of the line from Stratford, there are perhaps 30,000,000 ft. available for milling. A mill is at work on some of this now, but a tram-line for about six miles will be needed to tap the larger part.

So far there is little or no increased utilization of timbers formerly little used.

No forest has been destroyed by fire during the year.

With reference to timber matters generally, I gather from Crown Lands Rangers Meredith and Sheehy's reports that rimu forms the bulk of the milling-timber in this district, and has to be worked out of rougher country than previously. The protection of forests is becoming more difficult as the land adjacent is settled. Trespassers should be severely dealt with, but to obtain convictions and keep them out of forests an army of Rangers would be needed. Many of the public seem to take it for granted that forests are preserved for the purpose of providing winter grazing for their stock, and hunting and shooting grounds for them and their families. The danger from fire is not so great where the State forest is surrounded by green bush, but where fern land adjoins, each successive fern fire eats a little farther into the green bush. The dry timber left after road-formation is another source of danger, and planting fringes of quick-growing evergreens would seem to be one way of preserving our State forests.

The wholesale prices of timber per 100 sup. ft. in the yard at New Plymouth are as follows : Rimu—O.B. scantling, 23s. ; boards and planks, to 9 in. wide, 24s. ; clean O.B. planks and boards, to 9 in. wide, 26s. ; building heart, scantling size, 28s. ; heart boards and planks, up to 9 in. wide, 31s. ; dressing heart, up to 9 in. wide, 37s. ; clean heart for joinery, up to 9 in. wide, 45s. Totara—building heart, 50s.

Hawke's Bay.

W. F. Marsh, Conservator of State Forests (Commissioner of Crown Lands).

General Condition of the Timber Industry.—With regard to that portion of the Hawke's Bay District extending from Mohaka in the north to Woodville in the south, the milling-timber is practically

cut out, but north of Mohaka the conditions of the industry are sound, and the demand for timber keeps steady, with the result that all the mills have ready sale for their output.

Number of Mills working, &c.—Ten mills in all have worked during the year, the sawn output from the log of each kind of timber during the year being as follows: Rimu, 3,118,775 sup. ft.; matai, 163,694 sup. ft.; white-pine, 2,217,612 sup. ft.; totara, 13,016 sup. ft.; birch, 19,706 sup. ft.

Royalties and Rents received from licenses and sales of timber from Crown lands, £107 10s.

Net Wholesale Prices.—Per 100 sup. ft.: Rimu—O.B., 15s. and 16s. to 20s. 3d.; clean O.B., 18s. to 19s. Matai—O.B., 15s. and 16s. to 20s. 3d.; heart, 19s. 6d. to 28s. Totara—Clean heart, 44s. and 45s. White-pine—Ordinary, 20s.; clean, 22s. 6d. Kauri—First class, 42s.; rough heart, 37s. 6d.

Approximate Duration of Supplies.—Under present conditions the trade supplies in lower part of the Hawke's Bay District will probably not last more than three or four years, and so far as the northern part of the district is concerned it may last from twelve to fifteen years at present rate of cutting.

Utilization of Timber formerly little used.—There is an increase in the production and use of *Pinus insignis* and poplar. Silver-beech is not utilized so far in the southern end of Hawke's Bay District.

There was practically no destruction by fires.

There is a clamant need for a vigorous afforestation policy to make provision for future requirements in view of the fast disappearing bush here, as elsewhere.

Wellington.

G. H. M. McClure, Conservator of State Forests (Commissioner of Crown Lands).

The general condition of the sawmilling industry is sound, and orders are numerous. Forty-nine mills are in operation, cutting from 80,000 to 300,000 sup. ft. per month, a mean average being 150,000 sup. ft., or a total of 75,600,000 sup. ft. per annum, the principal timbers being rimu, 45 per cent.; totara, 15 per cent.; matai, 30 per cent.; and kahikatea, 10 per cent.

The net wholesale cash prices per 100 sup. ft. on trucks are as follows:—Rimu: O.B. scantlings, 19s.; O.B. boards and planks, to 9 in. wide, 20s. (clean, 24s.); O.B. boards and planks, to 12 in. wide, 21s. (clean, 25s.); ½ in. full-cut rough lining, 8 in. or 9 in. by ½ in., 12s. 6d.; ¾ in. rough lining, T. and G., 6 in., 8 in., or 9 in. by ¾ in., 19s. 6d (dry, 22s.); O.B. rimu, 4 in. or 6 in. by ¾ in., T.G. and B. or V., 22s. 6d. (dry, 25s.); rough heart, to 9 in., 22s.; rough heart, 10 in. and 12 in., 28s.; building heart, to 9 in., 36s.; heart, 10 in. and 12 in., 38s.; clean heart, to 9 in., 36s.; clean heart, 10 in. and 12 in., 38s. Matai: Clean heart rustic or T. and G., 34s. 6d. (dry, 37s.); rough heart rustic or T. and G., 27s. 6d. (dry, 29s. 6d.); O.B. rustic or T. and G., 24s. (dry, 26s. 6d.). Totara: O.B. scantlings, 21s.; clean O.B. boards, 25s. (dressed 27s. 6d., dry 2s. 6d. extra); rough heart, 25s.; building heart, 39s.; clean heart, 41s. 6d. Specified lengths in scantlings 1s., other sizes 2s., per 100 ft. extra.

No milling-timber has been destroyed by fire during the year, and the above-mentioned are the only classes of timber at present being milled.

The time-sheet of an average mill will total £500 per month; running-expenses, royalty, oil, belting-repairs, and renewing plant, £250 per month. During the war the output fell about 33 per cent., but is now practically normal.

Royalties received: From State forests, £39; rents, £267; from timber cut on Crown land, £2,364; national endowments, £547: total, £3,178.

Marlborough.

H. J. Lowe, Conservator of State Forests (Commissioner of Crown Lands).

The timber industry in this district is gradually dying out on account of the milling-timber in the native forest being almost exhausted, and unless beech (birch) timber becomes more popular commercially the end of the industry so far as this district is concerned is within sight.

During the year ten mills have been in operation, seven in the northern portion of the district and three small plants in the Kaikoura district. Two old-established mills have closed down, leaving eight working at the close of the year. Of these five (including those in the Kaikoura district) are cutting on private property, the balance being one on Crown lands and two on State forest. About half the output of the northern mills is absorbed between Blenheim and Nelson, but the southern plants do not cut sufficient for the local requirements.

The amount of royalties received during the year was as follows: Crown lands, £305 16s. 1d.; State forests, £1,228 9s. 7d.; land for settlements, £80 19s. 4d.: total, £1,615 5s.

The net wholesale prices per 100 sup. ft. charged for the different timbers are as follows: O.B. rimu, 23s. 6d.; clean heart rimu, 29s. 6d.; white-pine, 1s. 6d. less than rimu; matai, 35s.; beech (birch), 37s.

The prices at Kaikoura for imported timber are generally dearer, being—for local production of all sorts of timber, 20s.; for imported timber, O.B., on wharf, 30s.; heart rimu, on wharf, 45s.; heart matai, on wharf, 44s.; heart totara, on wharf, 49s.; white-pine, on wharf, 37s. 6d.

The approximate duration of the industry is five years, although, with isolated and at one time unpayable patches of timber, the diminishing supply, through exhaustion, and the attention now being directed to *Pinus insignis*, the industry may be prolonged for a few more years. There are some very fine plantations of exotic timbers, but not sufficient to supply the annual consumption.

The increased utilization of timber formerly little used is scarcely noticeable, although some of the mills which have permanent orders for box-timber are cutting anything which will make a log.

In spite of the extremely dry summer and autumn, the district has been practically free from fires. This is partly accounted for through the persistent warning of sawmillers, bushmen, settlers, and the general public as to the danger of lighting fires. Although late in the day, it is felt that the Forestry Department might do much in the way of educating the public generally to appreciate the value of the forest and why it should be protected.

Apart from native forests, there are some magnificent plantations of *Pinus insignis* and gums (*Eucalyptus*), many of which are now of commercial value, and have reached the stage (owing to age, deterioration in value, and liability to be blown down) at which they should be milled; but no plantation should be allowed to be cut without an equal area being planted.

The question of afforestation and tree-planting is one that should be pushed on energetically not only in this district, which is to a great extent treeless, but throughout the whole Dominion. Native forest should be conserved and scientifically worked for the timber, particular attention being given to the protection of the young growth, and suitable lands should be acquired and planted.

As far as this district is concerned, there are parts of it which have great advantages over other districts as far as the replanting is concerned. For instance, there are large areas of land of low value in the Sounds County which might be resumed and planted. The cheapness of water carriage, the working of the forests, and protection from fires, makes the Sounds district somewhat unique for the purpose of forest-planting, to say nothing of the enhanced beauty it would give to these fine waterways, the hills surrounding which are to-day practically bare and an unsightly lot of poor farms. There is also a large area along the sea-front of the Wairau Plain which should be placed in the hands of the foresters. It is low-grade land which could be acquired for very little.

Nelson.

H. D. McKellar, Conservator of State Forests (Commissioner of Crown Lands).

The timber industry during the year under review has been quiet, and returns show a decrease in output of about half a million feet over last year's figures. Mills, however, which closed down on account of shortage of labour due to war conditions are now in some cases starting again, and this, with several new mills in course of erection, will bring the industry back to normal, and will no doubt be responsible for a considerable increase in output. More labour is becoming available as men are released from the camps and Expeditionary Forces, and the outlook in timber circles is much brighter. The chief timbers milled are rimu and beech, very little white-pine being available.

The number of mills working is approximately eleven, and the ascertained output is—Beech, 468,921 sup. ft.; rimu, 2,661,402 sup. ft.; silver-pine, 14,647 sup. ft.; white-pine, 60,700 sup. ft.; and cedar, 400 sup. ft.

The royalties and rents received from the various classes of land are—State forests, £106 4s.; national-endowment areas, £799; and Crown lands, £377.

The prices ruling in the city for ordinary building and clean heart are as follows: Rimu: O.B., 22s. 6d. to 27s.; all heart—unseasoned, 31s. 6d.; seasoned, 34s. Matai: Rough heart, 25s. 6d.; clean heart—unseasoned, 32s.; seasoned, 34s. 6d. White-pine and red-beech: O.B., 22s. 6d. to 27s.; all heart—unseasoned, 31s. 6d.; seasoned, 34s. Brown-beech, 31s. 6d. Totara piles, 10d. per foot.

Taking as a basis the amount of timber cut during the year, it is estimated that the supply of timber of commercial value will last from twenty-five to thirty years. This is a matter upon which it is difficult to make any definite pronouncement, as forest is always liable to destruction by accidental fires in seasons of drought, and the area of timber of value may thereby be diminished. The estimate is, too, contingent upon the energy with which the industry is carried on. The duration stated is based on present output, but if the industry received a fresh impetus whereby cutting was prosecuted more energetically, then the duration of supply will be consequently more restricted.

No timbers formerly wasted are now being utilized, but millers have a demand for smaller sizes, the supplying of which considerably reduces the wastage which was formerly unavoidable.

I am pleased to be able to report that little if any milling-bush has been burnt by accidental fires in this district. The only fire of any consequence was about three years ago, which was caused by a settler burning his felled bush in the midst of timber country.

In the case of timber on lands within a mining district it might be advantageous if millers were compelled to give timely warning to the Warden of their intention to surrender their holdings. The Ranger would then have an opportunity of making an inspection before tram-lines and machinery were removed, and this might be the means of ensuring a more thorough cleaning-up and removal of any timber found on the land and which should have been milled.

The above remarks apply mostly to the Reefton and Buller districts. In the northern part of the land district the timber industry on Crown lands is rapidly approaching exhaustion, and is not calculated to last more than three or four years for the more valuable timbers such as rimu, totara, matai, and kahikatea. There is, however, a large supply of beech, both black and brown, but this timber is not much in demand. The better classes of timber are brought from the Pelorus Valley, in Marlborough.

The timber still standing is becoming more difficult of access, and this fact renders operations in this portion of the district more unsatisfactory. It is not possible to obtain a complete statement of output, as most of the mills are working on private lands.

The industry, as has been stated, has been fairly quiet during the year, and there is not much of special note to record. Two points might, however, be noted. The first is a wood-wool plant which has been installed by Messrs. Robertson Bros., sawmillers, Nelson. Most of the timber for this industry comes from outside the district, but the wood-wool is made in the city. The wool is used for packing apples and other articles, and the supply seems hardly equal to the demand.

The second point of interest lies in the fact that orchardists are beginning to realize the value of a small timber-supply of their own, and they are planting belts of *Pinus insignis* round their properties. These trees will not only give shelter to the fruit-trees, but will also in the years to come afford the owner a supply of timber for his apple-cases, &c.

Canterbury.

H. D. M. Haszard, Conservator of State Forests (Commissioner of Crown Lands).

Native Forest and Timber Matters.—The milling of native timbers in this district is practically confined to one small mill near Oxford, the total capacity of which, when in full work, would not exceed an output of 1,000,000 sup. ft. per annum.

There is very little native bush remaining in this district, and it is very difficult of access. This accounts for the smallness of the industry. What little timber there is is nearly all beech (birch). Imported hardwoods, such as ironbark, now take the place of native timbers in the construction of bridges, &c., and redwood, Oregon pine, and Baltic pine are the timbers mostly used for houses.

The rent and royalty received for timber cut on State forests during the year amounted to £536 3s. 3d. Those from national-endowment and Crown lands were nil.

The present market prices for timber per 100 sup. ft. are as follows:—Red-pine (rimu): Undressed —up to 12 in. wide, 31s. 9d.; over that size, 34s. 9d. to 38s. 9d.; dressed flooring, 35s. to 40s.; lining, 23s. 6d. to 30s.; weatherboards, 28s. 6d. to 35s. White-pine (kahikatea): First class, dressed, no quotations available; second class, up to 12 in. wide, 28s. Black-pine (matai), 41s. to 43s.; veranda-flooring, 4 in. by 1 in., 16s. 6d. Totara, 53s. 6d.; dressed veranda-flooring, 4 in. by 1 in., 20s. 6d. Kauri (flitch), 12 in. to 24 in. wide, 59s. to 71s.; dressed, 3s. extra; rough, 12 in. to 18 in., 39s. to 45s.; T. and G. flooring, 60s. to 63s.; veranda-flooring, 21s. 6d.; shingles, 4 in., 93s.; 6 in., 160s. Local-grown timbers from exotic trees: Bluegum, 3 in. by 1 in., 4 in. by 1 in., 4 in. by 2 in., for studs, gates, &c., 24s. *Pinus radiata*—Weatherboards and scantlings, 9 in. by 1 in., 3 in. by 2 in., 4 in. by 2 in., 25s. These timbers are coming more into common use, probably on account of the increasing cost of others. Imported hardwoods: Jarrah, unobtainable; ironbark piles and posts, 3s. 6d. to 4s. per running foot. Softwoods: Redwood, 55s.; yellow-pine, 67s. 6d.; Baltic pine, unobtainable.

Forest Fires.—During the year a fire occurred on the View Hill Forest Reserve, by which about 200 acres of native bush was very considerably damaged. There was also a small fire in the bush on the forest reserve on Annan Settlement, but the extent of the damage has not yet been ascertained.

The supply of native timber being exhausted, *Pinus radiata* is coming into more frequent use for dwellings and sheds. This is mostly obtained from plantations under the control of the Selwyn Plantation Board, and from some private plantations.

Westland.

R. S. Galbraith, Conservator of State Forests (Commissioner of Crown Lands).

The timber industry for the year ending 31st March, 1919, again shows a considerable further falling-off in output, the total being 40,140,200 sup. ft., as against 46,760,100 for last year, being a shortage of 6,619,900 ft. This is to a large extent due to the difficulty of obtaining machinery and material, especially iron rails for extension of tramways, the scarcity of suitable labour, and the influenza epidemic.

Now that the war is over and the men are returning to the Dominion, conditions will no doubt gradually improve, and I anticipate a considerable increase in the output for next year. The shipping facilities during the year have been satisfactory, and no mills had to cease work through lack of storage-space.

There is a keen demand for timber, higher prices are being realized, and the industry generally is on a sound footing. Out of a total number of forty-three mills, seven are at present idle, chiefly owing to scarcity of labour and iron rails; eight are working on freehold and twenty-eight on Crown lands. Two large mills and three smaller ones are in course of erection. The larger ones when completed will be each capable of cutting 25,000 sup. ft., and the smaller ones 8,000 sup. ft., per diem.

Of the total cut of 40,140,200 sup. ft., 26,750,500 sup. ft. were taken off Crown lands and 13,389,700 sup. ft. off freehold lands: this comprised 33,820,200 sup. ft. of rimu, 6,000,000 sup. ft. of white-pine, and 320,000 sup. ft. of brown-birch (*Fagus fusca*).

The only State forest in Westland is an area of some 600 acres in Kanieri Survey District, near Rimu, which has recently been proclaimed; it contains about 400 acres of valuable timber, which has been appraised, and which it is intended shortly to offer for sale by public auction, but no revenue has been received from it during the past year.

The rents and royalties received by this Department are as follows: £7,369 12s. 8d. from national-endowment lands, £177 1s. 2d. from Crown lands, and £53 1s. from other endowments, making a total

of £7,599 14s. 10d. This does not include rents and royalties deemed goldfields revenue under section 148 (*a*) of the Mining Act, 1908.

Prices realized for timber vary considerably, the following being about the average f.o.b. at Greymouth per 100 sup. ft.: Rimu—Clean heart, 19s.; clean, 15s.; ordinary building, 12s. White-pine—12 in. and over, 21s.; smaller size, 14s. 6d.; white-pine (seconds), 16s.

No very definite estimate can be arrived at in respect of the total quantity of accessible timber of commercial value in the district, but from reports furnished I should say that the output for the past year could be maintained for about forty years. The requirements of other districts, combined with facilities for export by rail, and removal of war difficulties will no doubt tend to greatly increase the output, and probably reduce the period to thirty years or even less.

Of the timbers formerly little used, brown-birch (*Fagus fusca*) is principally required for mining and bridge work; silver-pine is in good demand, chiefly for sleepers, but is getting more difficult to obtain.

Millers have been able to dispose of a class of timber to Australia known in the trade as "shorts" and "rough," for which there is little demand in New Zealand, and as a good deal of this timber is obtained from the top of the tree where the branches have been cut off the bush is now being worked out in a very clean and satisfactory manner.

No forest areas have been destroyed by fires during the past year, and, indeed bush fires give practically no trouble in this district, which for this reason, combined with its mild moist climate and comparative freedom from high winds, appears to possess special advantages for the growth of timber, and should prove an attractive field for experiments in afforestation.

Otago.

Robert Sadd, Conservator of State Forests (Commissioner of Crown Lands).

In reply to yours of the 11th ultimo, I forward herewith copy of a report from Ranger O'Neill embodying most of the information desired.

There is no practical difference in the position of the timber trade since last year. The mills are working as busily as the supply of labour will permit. They are, generally speaking, still short-handed, though the position is not so acute in this respect as it was last year. There seems to be plenty of demand for the output.

There are altogether nine mills of varying sizes working in Otago, and the output for the past year would be about 6,000,000 sup. ft. The possible output is much more than this, and no doubt as labour becomes plentiful this total will be increased by at least 25 per cent. The following are the approximate totals of each class milled: Red-pine (rimu), 3,000,000 ft.; black-pine (matai), 250,000 ft.; white-pine (kahikatea), 150,000 ft.; miro, 500,000 ft.; totara, 100,000 ft.; beech, 2,000,000 ft. In the mixed forests of Otago red-pine is perhaps the chief timber, and, being much in demand, always occupies the most prominent place in the output. Beech and miro come next in order of quantity and, consequently, next in output. White-pine and totara are getting very scarce, and hence their totals are comparatively small.

The supply of timber in Otago should last for many years yet, though an increase in the export trade to Australia would reduce the time to some extent. As the most accessible forest is naturally attacked first, these easy reached areas are at present supplying the demand. The beech forests in Otago are getting considerably more attention than they got for years past, and beech timber is gradually being more and more drawn upon than it used to be.

There has not been any milling-forest destroyed by fire during the year.

No doubt a fairly large trade is being done with Australia in the timber line, and the output of much of our forest land is going overseas. In view of the absolute necessity of being able to produce sufficient timber for local requirements, it would seem to be a bad policy to permit of much export.

The royalties and rents received were as follows: From State forests, £130; from national-endowment lands, nil; from Crown lands, £259.

The net wholesale prices of timber are as follows: Red-pine and beech, ½ in. and under, 12s. to 15s. per 100, according to width; over ½ in. and up to 12 in. wide, 16s. to 24s. per 100; sizes under 3 in. by 1 in., 17s. per 100; weatherboards, 8 in. by ¾ in., 17s. 6d. per 100.; extra widths and lengths, over 20 ft. and up to 30 ft., 1s. extra per 100 per foot.; 12 in. wide and up to 20 in., 1s. per 100 per inch. Black-pine, up to 8 in., 20s. to 27s. per 100 ft.; over 8 in. and up to 12 in. wide, 1s. per 100 per inch extra; T. and G. flooring, 31s. per 100 ft. Totara, up to 8 in., 24s. 6d. to 31s. per 100 ft.; over 16 ft. long and up to 20 ft., 1s. per 100 per foot extra; over 8 in. wide and up to 12 in., 1s. per 100 per inch extra.

Southland.

Thomas Brook, Conservator of State Forests (Commissioner of Crown Lands).

The general conditions with regard to the above industry in Southland for the year ended 31st March, 1919, were practically the same as last year. The output of rimu was less, while kahikatea, beech, totara, and matai were slightly more; but, taking the total, the production for this year was just 250,000 ft. over last.

There were thirty-seven out of fifty-one mills worked more or less quarter-time during the year, chiefly owing to shortage of labour.

The quantities of each kind of timber produced during the year were—Rimu, 10,900,000 sup. ft. · kahikatea, 5,000,000 sup. ft.; beech, 3,550,000 sup. ft.; matai, 428,000 sup. ft.; totara, 420,000 sup. ft.

Royalties and rents received from—State forests, £1,820 6s. 3d.; licenses and sales of timber from national-endowment lands, £11 7s. 4d.; licenses and sales of timber from Crown lands, £1,492 6s. 3d.

Silver-beech (*Fagus Menziesii*) has now been established as a good timber for sawmilling purposes. It is classed as suitable for butter-boxes, and a small factory at Otautau is manufacturing it into handles for spades, shovels, picks, hoes, brooms, axes, &c.

Timber prices (per 100 sup. ft., less 10 per cent. to builders).—Red-pine (rimu) and beech (*Fagus Menziesii*): O.B.—$\frac{1}{2}$ in. thick and under, up to 8 in. wide, 15s.; up to 10 in. wide, 16s. 3d.; up to 12 in. wide, 17s. 3d.; scantlings, up to 5 in. wide, 19s.; scantlings, three-quarter heart, 4s. extra. Heart—Up to 8 in. wide, 25s. 6d.; up to 10 in. wide, 27s. 6d.; up to 12 in. wide, 28s. 6d.; clean heart 3s. extra on above prices. Matai (black-pine)—Up to 8 in. wide, 25s. 9d. ordinary, but 31s. 3d. if all heart.

There has been no destruction by fires this year.

The Southland forests are carefully managed. There is a very strong demand for timber at the present time, but owing to a scarcity of labour it is difficult to keep pace with requirements. Looking at the timber-milling industry in Southland purely from this Department's point of view, it would appear that the high prices charged for sawn timber are such that it would almost justify the Department revising its scale of royalties, but before doing so it would be necessary to consider to what extent the restrictions being placed upon millers by the Board of Trade affect the position.

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