

1920.
NEW ZEALAND.

FORESTRY DEPARTMENT

REPORT FOR THE YEAR ENDED 31st MARCH, 1920.

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

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ANNUAL REPORT.

The SECRETARY to the Hon. the COMMISSIONER OF STATE FORESTS.

SIR,—

Wellington, 10th September, 1920.

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

I have, &c.,

E. PHILLIPS TURNER, Secretary.

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

REPORT.

PART I.—INDIGENOUS FORESTS.

LEGISLATION.

DURING last session the State Forests Act, 1908, was amended so as to enable the Proclamation as provisional State forests of national-endowment lands. The amendment also provides for the net revenue which may be derived from any national-endowment land proclaimed provisional State forest being equally apportioned between the National Endowment and State Forests Accounts.

Provisional State Forests.

During the year, under the powers conferred by the State Forests Amendment Act, 1919, and section 34 of the War Legislation and Statute Law Amendment Act, 1918, 3,311,000 acres of Crown lands and 56,066 acres of national-endowment lands were proclaimed provisional State forests. These lands (particularly those in the South Island) contain a large area of barren mountain-top, a large area of mountain-slopes carrying only a subalpine scrubby vegetation, and a large area of forest at present of little value except for protection purposes; there is also a large area carrying forest now of value for milling. The reserved areas will be thoroughly examined by forest officers, and those found more suitable for farming than for forestry will, after the timber has been properly utilized, be made available for settlement. So far no proposals for the creation of provisional State forests have been received from the North Auckland, Wellington, and Canterbury Land Districts.

New Areas proclaimed State Forests under the State Forests Act, 1908, and Areas withdrawn from Reservation.

During the year a total area of 4,624 acres of broken forest country were proclaimed State forests under the State Forests Act, 1908, whilst four areas totalling 2,558 acres were withdrawn from reservation for the purposes of settlement.

An area of 2,229 acres was also acquired under the provisions of the Public Works Act, 1908, and section 34 of the War Legislation and Statute Law Amendment Act, 1918. This land is situated at the source of the Akatarawa Stream; and as a State forest it will ensure the preservation of the scenery on the Hutt to Waikanae Road, it will regulate stream-flow, and will also help to provide timber for Wellington.

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

Under the provisions of subsection (6) of section 34 of the War Legislation and Statute Law Amendment Act, 1918, 103 licenses were issued authorizing the sale or the cutting of timber on private lands. In most cases these licenses contained a condition prohibiting the export of the timber; in some cases where licenses were granted without this condition it was considered that export was sufficiently controlled by the Board of Trade Regulations, and in the others export was permitted, as it was satisfactorily shown that the timber produced could not be used in the locality, and that there were no coastwise vessels available to convey it to the large centres of population in the Dominion.

FINANCIAL.

Receipts and Expenditure.

The amount appropriated last year for expenditure upon State forestry was £136,998, and expenditure amounted to £66,819 2s. 6d., which is an increase on previous years, and is due mainly to increased wages, additions to buildings, the building of hutments, and the purchase of forest lands. That the expenditure was so much short of the estimate was due to certain proposed purchases of forests and sawmills not eventuating.

The building (deferred owing to the war) of cottages for employees has to be undertaken, and as large areas of indigenous forest have to be brought under systematic management an increased expenditure must be provided for; but, on the other hand, it is confidently expected that by this systematic management revenue will be very much augmented. Up till now the expenditure has been practically all on the plantations.

Under section 32 of the Finance Act, 1918, authority was provided for raising £200,000 for forestry purposes, and during the year £65,000 was raised and placed to the credit of the State Forests Account. The revenue from indigenous forests amounted to only £6,058 13s. 7d., and the revenue from plantations and nurseries to £2,455 2s. 3d.

STATE FORESTS ACCOUNT—RECEIPTS AND PAYMENTS, 1919–20.

<i>Dr.</i>				<i>Cr.</i>			
	£	s.	d.		£	s.	d.
To Cash in hand, 1st April, 1919 ..	2,399	5	6	By Interest on debentures ..	3,577	0	3
Loan Account—Debentures issued ..	65,000	0	0	Nurseries and plantations—			
Revenue from State forests, rents, royalties, &c. ..	6,058	13	7	Material, buildings, planting, pitting, &c. ..	43,794	18	3
Revenue from nurseries and plantations—	£	s.	d.	Extension of nurseries ..	145	6	2
Trees ..	572	14	9	Expenses of surveys ..	123	4	8
Firewood and poles ..	685	11	1	Dog Creek Bridge..	50	0	0
Seeds ..	114	17	11				
Grazing ..	163	4	9		44,113	9	1
Rentals ..	77	17	3	State forests—			
Sheep, wool, and skins ..	631	5	7	Additions to State forests..	7,293	19	8
Royalty on sulphur ..	16	14	11	Management expenses..	1,562	1	11
Sundries ..	192	16	0	Kauri-gum—Expenses of collection ..	120	11	9
				Collection of tree-seeds ..	27	13	5
	2,455	2	3				
					9,004	6	9
				Sundry expenditure—			
				Salaries ..	9,047	18	5
				War bonus ..	1,803	10	10
				Temporary clerical assistance ..	300	15	0
				Travelling-expenses ..	1,524	10	4
				Books, stationery, &c. ..	513	17	1
				Office furniture, technical instruments, &c. ..	222	13	6
				Specimens of New Zealand timber ..	15	11	6
				Cost of printing Sir D. Hutchins's report ..	172	10	0
				Grant to Sir D. Hutchins ..	100	0	0
				Cash in hand, 31st March, 1920 ..	5,516	18	7
					19,218	5	3
					£75,913	1	4
	£75,913	1	4				

STATE FORESTS ACCOUNT.—LOAN ACCOUNT AS AT 31ST MARCH, 1920.

<i>Dr.</i>				<i>Cr.</i>			
	£				£		
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		
Section 7, State Forests Act, 1908 ..	10,000			1918–19—			
				Section 50, Finance Act, 1916 ..	11,900		
				Section 32, Finance Act, 1918 ..	15,000		
					26,900		
				1919–20—			
				Section 50, Finance Act, 1916 ..	65,000		
				Section 32, Finance Act, 1918 ..	130,000		
				Balance of authority at 31st March, 1920 ..	£260,000		
	£260,000						

TRADE.

General.

During the year there was a strong revival of building and construction works, and it is to be regretted that a shortage of coastwise shipping prevented this demand being satisfied.

Increased cost of production has caused a corresponding rise in the selling-price of timber. The only party which has not participated in the increased prices is the State, as royalties have remained the same. Some advantages have, however, resulted from increased timber-values: for example, a less wasteful utilization of the forest is now fairly general, and beech (birch) is now being used far more than before; in fact, the many uses to which this timber is now being put makes valuable large areas of forest which heretofore have been considered almost worthless commercially.

The increased values of our indigenous timber have resulted in the felling and utilization of large quantities of *Pinus radiata* from farmers' plantations and shelter-belts. In many cases these plantation-trees had reached their natural maturity, and, provided new plantations are made, their use for timber was advisable, but it is to be feared that high prices have induced many farmers to fell plantations which should have been retained for shelter-purposes.

Import of Timber.

The following return, furnished by the Comptroller of Customs, shows the total quantity and value of the various timbers, tan, bark, &c., imported into New Zealand, and the net Customs duty collected thereon, during the year ended 31st March, 1920. The quantity of timber imported exceeded that of last year by 6,697,568 ft.

Item.					Quantity.	Net Duty collected.	Value.
(1.) Round logs—					Sup. ft.	£	£
Ironbark					849,019	58	16,590
Other timbers					59,108	7	962
(2.) Hewn logs—							
Ironbark					1,819,376	175	33,968
Jarrah					101,813	..	1,726
Other timbers					1,463,043	116	20,518
(3.) Sawn, rough—							
Ironbark					433,180	247	7,837
Jarrah					4,098,151	661	47,884
Oregon pine (Canada)					3,150	3	35
Oregon pine (U.S.A.)					2,886,651	2,849	26,947
Other timbers					5,123,089	5,823	120,823
(4.) Sawn, dressed—							
Miscellaneous					31,062	72	983
Total					16,867,642	10,011	278,273
(5.) Laths					Number.		
.. .. .					1,172,652	147	2,974
(6.) Palings, split					83,280	67	913
(7.) Rails, split					..	..	..
(8.) Posts, split					..	..	..
(9.) Shingles					1,076,250	132	2,486
Total					2,332,182	346	6,373
(10.) Miscellaneous timbers					Tons.		
.. .. .					..	15	2,179
(11.) Tanning-bark					3,184	400	39,990
(12.) Wood-pulp					942	230	23,018
Total					4,126	645	65,187

Export of Timber.

The following return, furnished by the Comptroller of Customs, shows the total quantity and value of timber and tanning-bark exported from New Zealand during the year ended 31st March, 1920. The amount exported is less by approximately 15,000,000 ft. than for the previous year. No timber-export duty was collected.

Item.					Quantity.	Duty collected.	Value.
Kauri					Sup. ft.	£	£
.. .. .					3,719,610	..	45,763
White-pine					34,827,162	..	317,150
Rimu					12,125,889	..	96,135
Beech					772,661	..	7,266
Miscellaneous (New Zealand)					2,264,588	..	18,362
,, (not New Zealand)					15,092	..	269
Total					53,725,002	..	484,945
Tanning-bark (New Zealand)					Tons.		
.. .. .					47	..	564

Output in Sawn Timber.

The Board of Trade has kindly furnished the following statement showing the actual output, in superficial feet, of the various kinds of timbers from New Zealand sawmills during the year ended 31st March, 1920: White-pine, 82,419,821; rimu, 145,584,203; kauri, 22,598,391; matai, 17,820,597; totara, 14,414,298; beech, 9,650,344; hinau, 4,247; taraire, 174,650; tanekaha, 54,328; pukatea, 200,000; *Pinus insignis*, 3,064,201; blue-gum, 80,000; kahikawaka, 50,000; silver-pine, 50,000: total output all classes, 296,165,080 sup. ft.

The output is 68,365,000 sup. ft. above that of the year ended 31st March, 1919, and shows greatly increased activity in the sawmilling business.

*GENERAL.**Forest Fires.*

It is pleasing to report that during the year there was only one case of destruction of forest by fire: this case was 100 acres of mixed forest in the Aorere district of Nelson.

Coal Shortage and Firewood.

In order to partially relieve the great inconvenience caused in Wellington by the coal shortage last winter a license was granted to the Munitions and Supplies Department to cut firewood in a State forest near Kaitoke. That Department fitted up a small mill at Thorndon, and since starting operations had, at the end of the year, supplied about 879 cords of firewood to consumers and dealers in Wellington. The wood was sold for about £2,339. The use of firewood for domestic purposes requires encouraging in every reasonable way, as, owing to the increasing value of coal, it may be advisable that the use of the latter should be largely confined to those purposes for which firewood would not be a satisfactory substitute.

Sir D. E. Hutchins's Report on New Zealand Forests.

During the year a valuable and exhaustive report by Sir D. E. Hutchins on the forests of the North was published. This is the second work written on our forests by this well-known authority, and the Dominion is much indebted to him for the invaluable work he has done for forestry whilst he has been among us. A further report by the same author is now being printed.

Forestry Department.

On the 1st September last what had previously been the Forestry Branch of the Lands and Survey Department was established as a separate Department, with the former Chief Officer as Secretary of the new Department; a small clerical staff was appointed, and, as there was no accommodation in the Government Buildings, offices were taken in a new building known as the Dominion Farmers' Institute Building.

Director of Forests and Chief Inspector of Forests.

During the year applications were invited through the High Commissioner for a Director and Chief Inspector of Forests, and on the advice of the British Interim Forest Authority Captain L. MacIntosh Ellis was selected as Director. Captain Ellis is a graduate in forestry of Toronto University, and has had extensive experience in North America, France, and Scotland. He reached New Zealand on the 17th March last, and immediately started an inspection of the plantations and indigenous forests. His report will appear in the annual report of next year.

Of the applicants for the post of Chief Inspector only one was considered to possess the necessary qualifications, but, as this one afterwards withdrew, this post has still to be filled.

General Staff.

During the spring a Research Officer and six Forest Inspectors, four of whom were ex-soldiers, were appointed. The Research Officer has been engaged upon a systematic investigation of the annual ring-growths of our chief commercial trees, and the Inspectors have been fully occupied in making inspections and reports on State forests, and also on private forests for which applications for licenses to fell had been made.

The reports of the Conservators of State Forests are appended hereto.

PART II.—STATE NURSERIES AND PLANTATIONS.*Trees raised and Area planted.*

During the year ended 31st March, 1920, trees to the approximate quantity of 11,724,000 were raised in the four State nurseries, and during the same period 3,710,900 trees were sent out to the various plantations and 277,235 to outside places.

The area planted in both Islands was 1,972 acres. This area is less than the average, and is accounted for by the fact that, owing to an adverse season at Tapanui, there was a much reduced number of trees for planting out on the plantations supplied by that nursery. The total area now planted in both Islands is 37,416 acres. The following table shows the area planted prior to the 1st April, 1909, and the area planted yearly since that date:—

Island.	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.	1919-20.	Total Area.
North	Acres. 7,802	Acres. 1,807	Acres. 1,575	Acres. 1,664	Acres. 776	Acres. 1,288	Acres. 1,416	Acres. 1,913	Acres. 1,918	Acres. 1,633	Acres. 1,835	Acres. 1,430	Acres. 25,057
South	Acres. 3,291	Acres. 891	Acres. 1,025	Acres. 902	Acres. 828	Acres. 537	Acres. 749	Acres. 764	Acres. 846	Acres. 1,020	Acres. 964	Acres. 542	Acres. 12,359
Total	Acres. 11,093	Acres. 2,698	Acres. 2,600	Acres. 2,566	Acres. 1,604	Acres. 1,825	Acres. 2,165	Acres. 2,677	Acres. 2,764	Acres. 2,653	Acres. 2,799	Acres. 1,972	Acres. 37,416

PRISON LABOUR.

At Kaingaroa Plantation (Rotorua district) the average number of prisoners employed was 23·62. The total value of the work done by prisoners during the year was £2,499 1s. 5d., and the total area planted was 658 acres. The total value of the work done by prisoners in the North Island since 1900 is now £52,300 16s. 5d.

Owing to the fact that the Prisons Department requires its prisoners for the farming, draining, and other operations which that Department is carrying on elsewhere, it has been arranged that the prisoners will be removed from Kaingaroa about the end of July. It has been found that Maoris have a special aptitude for plantation work, and they will in the future be employed at Kaingaroa Plantation.

DISCHARGED-SOLDIER LABOUR.

Discharged soldiers have been employed as labourers at both the North and South Island plantations during the year, and at present the total number is fifty-three; but before Christmas the number was more than double this. From the point of view of the Department the employment of this class of labour has not proved altogether satisfactory, as a large number of the men look upon tree-planting as merely a stop-gap occupation and remain only a short time at the work.

DAMAGE BY DEER.

In both the Rotorua and Tapanui districts deer have become a serious nuisance in the plantations, and though forest officers are permitted to shoot them on the plantations it is both difficult and expensive to keep these pests in check. Dr. Sommerville has shown that in the Scottish Highlands deer have in many localities, by eating the seedlings, completely prevented the regeneration of Scots pine. These animals are likely to become a serious trouble in our own native forests as soon as management operations are started in them, and it will be necessary to take strict measures to control them.

TREES TO FARMERS AND LOCAL BODIES.

The total number of trees disposed of to farmers and local bodies was 277,235, which is a large decrease in the number disposed of last year. The decrease was mainly due to the restrictions imposed by the Railway Department on the carriage of goods, and to a shortage of plants resulting from a bad season in the South.

The reports of the Superintending Nurserymen for the North and South Islands are appended hereto.

SUMMARIES.

SUMMARY OF OPERATIONS IN NURSERIES DURING YEAR ENDED 31ST MARCH, 1920.

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, 1920.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.		Trees sent to Plantations during Year.	Trees sent to Outside Places during Year.	
Rotorua ..	6,322 14 9	656 15 3	99 2 10	7,078 12 10	8,756,600	2,421,935	206,415	9,840,600
Tapanui ..	1,202 12 1	2,247 3 3	477 10 1	3,927 5 5	1,461,700	477,150	43,477	2,469,770
Ranfurly ..	516 9 7	676 13 8	479 11 9	1,672 15 0	402,000	126,830	6,472	920,450
Hammer Springs ..	1,423 15 6	857 1 0	394 4 2	2,675 0 8	1,104,077	685,050	20,875	2,658,877
Totals ..	9,465 11 11	4,437 13 2	1,450 8 10	15,353 13 11	11,724,377	3,710,965	277,239	15,889,697

SUMMARY OF OPERATIONS IN NURSERIES FROM 1896 TO 1920.

Name of Nursery.	Total Expenditure.				Output of Trees.		
	Tree-growing.	Maintenance.	Buildings, &c.	Total.	Estimated Number of Trees raised.	To Outside Places.	
	£ s. d.	£ s. d.	£ s. d.	£ s. d.		To Plantations.	To Outside Places.
Rotorua ..	62,393 11 3	7,622 8 3	12,189 13 2	82,205 12 8	71,790,194	59,946,509	2,003,085
Tapanui ..	31,511 13 1	4,151 4 3	5,804 4 1	41,467 1 5	19,824,968	16,016,093	1,339,105
Ranfurly ..	16,979 15 1	1,570 12 10	3,883 4 7	22,433 12 6	7,214,247	5,889,568	404,229
Hammer Springs ..	17,030 7 1	2,069 5 6	3,706 15 11	22,806 8 6	14,633,811	11,346,755	628,179
Starborough* ..	6,399 9 10	..	2,856 17 3	9,256 7 1	3,059,610	1,965,095	1,094,515
Kurov* ..	960 4 2	..	2,109 18 5	3,070 2 7	172,460	..	172,460
Totals ..	135,275 0 6	15,413 10 10	30,550 13 5	181,239 4 9	116,695,290	95,164,020	5,641,573

* Nursery now closed.

N.B.—Expenditure has not been allocated to “Maintenance” separately until year 1917-18.

SUMMARY OF OPERATIONS IN PLANTATIONS DURING YEAR ENDED 31ST MARCH, 1920.

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.	Acres.	£	s.	d.
Whakarewarewa	16,700			128	3	5	4,667	7	6	18	12	11		5,405	2	10
Waioapu	1,238,000			2,753	7	3	4,952	15	9	1,692	12	5		9,810	13	8
Kaingaroa Plains	917,235			2,574	9	6	622	0	3	2,074	5	6		5,270	15	3
Kaingaroa West				1,085	4	3				617	19	5		1,703	3	8
Puhipuhi	250,000			859	0	3	552	15	0					1,411	15	3
Conical Hills	16,025			75	9	2	1,140	19	8	30	14	1		1,247	2	11
Pukerau	9,000			26	5	0	605	18	1	5	18	6		638	1	7
Dusky Hill				9	7	6	284	1	1					293	8	7
Greenvale	452,125			1,434	5	8	1,549	17	10	1,055	14	4		4,039	17	10
Gimmerburn							190	4	1	14	18	4		204	12	5
Naseby	126,830			217	19	1	526	13	3	269	0	8		1,013	13	0
Hamner Springs	169,550			335	14	9	1,118	9	4	81	16	0		1,720	17	7
Balmoral	515,500			2,914	1	9	744	6	9	1,015	6	5		4,673	14	11
Dumgree							23	5	1					23	5	1
Raincliff							3	4	9					3	4	9
Totals..	3,710,965	1,085,540	2,625,425	12,413	7	7	16,981	18	5	6,876	8	7	1,187	14	9	37,459
																9
																4
																..
																..

SUMMARY OF UNDERPLANTING OPERATIONS IN INDIGENOUS FORESTS.

Mamaku State Forest.—Number of trees planted, 2,000 ; cost of establishing, £231 19s. 7d. ; total area planted, 20 acres ; average cost per acre planted, £11 12s.

SUMMARY OF OPERATIONS IN PLANTATIONS FROM 1896-1920.

Name of Plantation.	Trees.			Expenditure.										Total Area planted.	Average Cost per Acre planted.	Average Cost of Maintenance per Acre per Annum.	
	Number raised from Seed sown <i>in situ</i> .	Number received from Nursery.	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.
Whakarewarewa	109,725	20,596,680	3,973,994	16,732,411	34,592	4 8	30,486	7 1	8,384	19 7	2,309	12 1	75,773	3 5	7,966	4 19 10	0 3 6
Waioatapu	83,121	26,300,369	5,208,309	21,175,181	34,815	17 2	22,054	7 0	10,841	5 7	1,981	8 7	69,692	18 4	9,206	4 8 8	0 2 4
Kaingaroa Plains	..	12,023,738	1,746,375	10,277,363	15,615	0 6	3,709	10 10	8,627	2 10	..	..	27,951	14 2	6,665	2 15 6	0 1 3
Kaingaroa West	..	..	..	..	1,085	4 3	..	..	617	19 5	..	..	1,703	3 8	..	..	..
Puhipuhi	..	3,310,764	2,310,764	1,000,000	5,069	12 2	8,661	12 2	1,376	5 9	..	..	15,107	10 1	1,200	5 2 10	0 9 0
Conical Hills	..	10,741,401	1,455,105	9,286,296	17,220	8 1	14,127	3 8	3,702	2 5	..	..	35,049	14 2	3,533½	4 17 5	0 4 8
Pukerau	..	842,860	29,300	813,560	1,755	4 8	1,910	13 11	676	16 9	..	..	4,342	15 4	573	3 1 3	0 13 4
Dusky Hill	..	3,043,897	863,060	2,180,837	8,852	3 2	5,193	5 9	1,522	14 6	8	1 0	15,576	4 5	745½	11 17 4	0 6 3
Greenvale	..	1,643,920	71,300	1,572,620	4,564	4 5	3,003	9 4	3,521	0 5	..	..	11,088	14 2	953	4 15 9	1 1 0
Waitahuna	..	42,025	11,500	30,525	88	8 3	93	3 9	66	10 1	..	..	248	2 1	11	8 0 9	0 12 1
Gimberburn	..	936,235	783,339	152,896	1,134	4 0	1,765	0 2	654	7 1	..	..	3,553	11 3	88	12 17 8	0 14 6
Naseby	..	4,903,358	616,755	4,286,603	7,890	19 4	4,709	12 6	2,033	18 4	..	..	14,634	10 2	1,822½	4 6 7	0 2 7
Hamner Springs	..	9,541,683	1,785,499	7,756,184	16,442	16 8	7,462	11 9	5,057	19 8	385	7 6	29,348	15 7	2,906½	5 13 1	0 2 8
Balmoral	..	1,783,047	264,940	1,518,107	8,019	9 9	1,598	12 8	5,782	1 5	..	..	15,400	3 10	992	7 11 7	0 8 0
Tekapo	..	48,000	..	48,000	148	8 11	23	9 4	5	10 0	..	..	177	8 3	29	5 2 0	0 5 1
Dungree	..	1,679,765	1,110,125	569,640	6,462	17 2	1,809	5 2	4,229	14 3	..	..	12,501	16 7	209	..	..
Galloway	..	6,930	3,050	3,880	18	13 0	3	10 0	46	16 10	..	..	68	19 10	2	..	..
Omarara	..	4,390	..	4,390	25	0 8	..	..	44	12 1	..	..	69	12 9	2	..	..
Raincliff	..	..	..	50,000	..	..	..	..	..	..	..	..	1,107	17 2	206	..	..
Totals	192,846	97,449,062	20,233,415	77,458,493	163,800	16 10	106,611	15 15	157,191	17 0	4,684	9	2,333,396	15 3	37,110½	..	..

APPENDIX A.

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

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

THE area planted during the year amounted to 1,430 acres, thus making a total of 25,057 acres planted in the North Island to date. Trees raised in the nurseries during the year are estimated at 8,756,000, while the total raised to date is 71,790,000. On the plantations the results generally are not as good as usual owing to the prevalence of frosts throughout the spring and early summer, which made the death-rate amongst newly planted trees greater than usual.

LABOUR.

A plentiful supply of unskilled labour has been available throughout the year, and at one time it was impossible to employ all the applicants for this class of work whom the Repatriation Department had available. The Waireka returned soldiers' employment camp has fulfilled a useful role in employing a class of demobilized soldier which it was difficult to reinstate into civil life. From a departmental point of view the employment of this labour is not altogether satisfactory, because a great number of the men regard the acceptance of the tree-planting work only as a temporary occupation, and in very many cases they remain for a short period only. The Department is thus debarred from working up a valuable asset in the shape of a staff of experienced workmen. The Maori workmen employed evince a greater desire to look upon the forestry work as a permanent occupation, and it appears as if the future operations of the Department in this district will in a great measure depend upon them. As a class they are splendid workers, fond of the outdoor life, quick to learn, and intelligently interested in the forestry work. The younger generation of Maoris have had the advantage of educational facilities not enjoyed by their fathers, and many of these young men could probably be trained to undertake the more responsible classes of work.

SALE OF TREES TO FARMERS.

Trees to the number of 185,890, and packets of tree-seeds aggregating 130 lb. in weight, were supplied to applicants during the year. The shortage of farm labour and the restricted railway service deterred many persons from planting. Experience has shown that the Department cannot hope to satisfactorily meet the whole of the demands from farmers in the North Island with trees from Rotorua Nursery because of the delay which often takes place in the transmission of packages on the railway. Packages consigned to towns in Hawke's Bay are never less than five days in transit, unless consigned in small lots by parcels rate, and consequently the trees are often in an unsatisfactory state when unpacked. In most cases the amateur tree-planter does not know how to treat such trees, and his losses are consequently a source of disappointment to him. When transport difficulties exist applicants are usually advised to procure seed and raise the trees they require. In this way much disappointment has been avoided, and the applications for tree-seeds have increased.

PRISON LABOUR.

The following schedule shows particulars of the work done by prison labour since the year 1900. During the year prison labour performed work to the value of £2,499 1s. 5d., this being dealt with in detail on the report on Kaingaroa Plains Plantation, at which station the prisoners were employed.

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 ..	1919-20	1-00	2,499	1 5	23-62	105	16 1
„	1912-20	7-08	15,117	6 1	23-14	92	5 5

DAMAGE TO PLANTATIONS.

In the autumn of 1919 a noticeable amount of damage was observed in the pine plantations at Waiotapu and Whakarewarewa, which when investigated proved to be due to insects. Specimens of larvæ were secured, and these were identified by Mr. G. V. Hudson, F.E.S., as belonging to two genera of moths—viz., *Utenopseustis obliquana* and *Tortrix excessana*. The damage, although not widespread or sufficient to cause any deaths amongst the trees, appeared to be worst where the soil was poor and dry. All species of pines were attacked, and without further investigation it cannot be definitely stated that the insects showed a preference for any particular one. The caterpillars feed on the young leaves, the midrib of which generally gets gnawed through about the centre, thus causing the top end to hang over and wither. Trees affected present the appearance of having had their young shoots badly damaged by frost. During the autumn just passed a recurrence was observed, but the damage done is not as great as on the former occasion.

At Whakarewarewa Plantation red deer have been responsible for a very considerable amount of destruction to the young trees, and it was necessary to take steps to thin out these animals. Since they were liberated some years ago the herd has increased very considerably, and it is feared that it will be impossible to entirely rid the plantation of them, because fresh animals keep coming in from the adjacent country around Lake Okareka. One has only to see the damage that these animals are capable of to realize that their liberation should be more strictly controlled than it apparently is at present.

SURVEY WORK.

A surveyor and party commenced work in October upon the Kaingaroa end of the Reparoa Block, where 2,320 acres were subdivided and the necessary fire-breaks laid off to connect with the Waireka and Kaingaroa systems. The work was then continued on the eastern end of the Kaingaroa Block, where 6,291 acres were subdivided. The roading system was also extended, levels being run for a distance of three miles and a quarter, the heaviest gradient being 1 in 22. This end of the Kaingaroa Block will probably be completed in three months' time, when the party will continue the work on the southern end of the reserve.

REVENUE.

The amount passed through the Receiver's Account during the year is detailed hereunder. The total shows an increase over last year's receipts of about £116, which is accounted for to a great extent by increases in the quantity of tree-seeds and thinnings sold.

Receipts for the year were as follows:—

	£	s.	d.
Sales of trees (185,890)	339	9	3
Sales of tree-seeds (130 lb.)	114	17	11
Sales of poles (4,200)	210	15	0
Sales of firewood (238 cords)	331	11	0
Grazing	144	8	9
Royalty on sulphur	16	14	11
Sundry recoveries	192	16	0
	<u>£1,350</u>	<u>12</u>	<u>10</u>

INTERPLANTING EXOTIC TREES IN NATIVE FORESTS.

Two areas in the native forest on the Mamaku Plateau, one of 10 acres in the mixed forest and one of 15 acres in the beech forest, were selected for experimental purposes and ring-fenced. A selection of shade-enduring exotic trees were planted in each, which, on the whole, have done very well. It is yet too soon to comment upon the suitability of the various species tried, because the trees are barely established, and the subsequent behaviour of the various kinds is yet conjectural. The work cost close on £12 per acre, but this expenditure included many items which would be non-recurrent if a much larger area had been dealt with. A reliable estimate, based upon the above expenditure, shows that such work, if done on an extensive scale, would not exceed £8 per acre. The most expensive item is the disposal of the undergrowth and debris, which is very heavy in parts of the forest. Exotic trees could, however, be planted in the open parts of a forest at a comparatively small cost, and, although a full crop would not be obtained in the first rotation, they would eventually spread and fully stock the land. The damp conditions of the mixed forest in this locality show that the danger of fire spreading is practically non-existent, and that fire-protection measures would not involve a great expenditure. In the beech forest, however, where the conditions are more open, fire-protection work would entail a more elaborate organization. The regeneration of miro is good in the mixed forest, while in the beech forest tanekaha is very plentiful. In both forests rimu is very sparse.

GENERAL.

Preparations for planting about two million trees during the coming winter are well forward. The bulk of this work will be done at the two stations at Kaingaroa Plains, while a smaller area will be undertaken at Puhipuhi Plantation.

I wish to here place on record my appreciation of the loyal and efficient assistance received by me from all officers during the year.

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

BALANCE-SHEETS.

Rotorua Nursery, from 1898 to 31st March, 1920—Twenty-two Years.

Dr.	£	s.	d.	£	s.	d.	Cr.	£	s.	d.	£	s.	d.
Actual expenditure ..	82,205	12	8				Actual receipts ..	3,242	14	7			
Interest, compound, at 4 per cent. ..	39,351	5	2				Interest, compound, at 4 per cent. ..	372	16	3			
				121,556	17	10					3,615	10	10
Land rental: Accumulated rental compounded for twenty-two years at 4 per cent. of cost ..					115	3	6	Trees to plantations ..	77,169	9	1		
							Interest, compound, at 4 per cent. ..	26,036	0	9			
											103,205	9	10
							Present value of—						
							Buildings, fencing, &c... ..	3,340	12	0			
							Departmental property ..	2,737	5	3			
											6,077	17	3
							Trees in stock (at valuation) ..				8,773	3	5
											<u>£121,672</u>	<u>1</u>	<u>4</u>

Tree-growth.—The very dry weather experienced during November and December retarded the germination of the later-sown seeds, but on the whole the results obtained are very satisfactory. The crop of Douglas fir is a particularly fine one; germination was good, and a large proportion of the seedlings have made unusually strong growth. *Pinus radiata* is also a very good crop. *Pinus ponderosa*, while being good, is not as vigorous as it usually is. The slower-growing species of *Eucalyptus* were sown a little earlier this year in order to obtain a somewhat larger class of tree. This early sowing proved very successful, but the usually vigorous *E. Macarthuri* and *E. viminalis*, which were sown later, were held back by the dry weather, and the crops of these species are not so satisfactory as usual. Unfortunately the applications from farmers for the two species mentioned are usually numerous, and it is doubtful if the crop will be sufficient for requirements.

Fodder Crops.—A spring sowing of oats resulted in a crop estimated at 50 tons of oaten sheaf, which was harvested in good condition. A grass and clover mixture was sown with the oats, and this came away well after the oats were cut, and is providing good grazing for the teams. It is expected that the stock of fodder grown will be sufficient for requirements throughout the coming year.

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

The average daily number of workmen employed during the year was 32.46.

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.	
1919.	In.		Deg. F.	Deg. F.	
April	0.500	5	28	70	6
May	3.085	6	27	68	11
June	3.385	16	26	63	12
July	4.930	18	26	64	12
August	5.690	17	27	62	9
September	3.930	15	30	70	13
October	5.120	11	31	71	2
November	1.710	16	31	72	4
December	1.130	11	28	76	4
1920.					
January	6.500	13	36	78	1
February	7.330	13	40	83	..
March	3.805	11	38	78	..
Totals	47.115	152	..	..	74

Details of One-year-old Trees, sown 1919.

Name of Tree.	Number in Seed-beds.	Height, in Inches.	Amount of Seed sown.	Growth.
			lb. oz.	
<i>Cryptomeria japonica</i>	6,000	1	2 0	Fair; poor germination.
<i>Cupressus Lawsoniana</i>	120,000	1½	6 0	Good.
<i>macrocarpa</i>	30,000	2-3	12 0	”
<i>Eucalyptus botryoides</i>	2,000	5-9	0 2	Very good.
<i>eugenioides</i>	1,200	3-7	0 3	”
<i>fastigata</i>	2,000	4-10	0 2	”
<i>gigantea</i>	200	1-3	0 3	Fair; poor germination.
<i>Macarthuri</i>	50,000	3-5	2 8	Good.
<i>Muelleriana</i>	1,000	2-6	0 4	”
<i>obliqua</i>	500	2-9	0 5	Very good.
<i>ovata</i>	5,000	4-10	0 2	”
<i>pilularis</i>	1,200	2-5	0 4	Good.
<i>regnans</i>	5,000	2-5	0 3	Very good.
<i>saligna</i>	2,000	5-9	0 2	”
<i>viminalis</i>	30,000	5	1 8	Good.
<i>Liriodendron tulipiferum</i>	100	6	10 0	Good; poor germination.
<i>Pinus ponderosa</i>	1,250,000	2-4	300 0	Good.
<i>Laricio</i>	200,000	1	40 0	Fair.
<i>radiata</i>	1,500,000	4-7	220 0	Very good.
<i>strobis</i>	250,000	1½	90 0	Fair.
<i>Pseudo-tsuga Douglasii</i>	4,500,000	2-6	300 0	Very good.
<i>Sequoia sempervirens</i>	400	3	10 0	Fair; very poor germination.
Total	7,956,600			

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

Name of Tree.	Number in Seed-beds.	Number in Nursery Rows.	Height, in Inches.	Growth.
<i>Cupressus Lawsoniana</i>	..	30,000	5-10	Very good.
<i>macrocarpa</i>	..	13,000	6-12	..
<i>Pinus Laricio</i>	160,000	30,000	3-6	Fair; very good.
	160,000	73,000		
Total	233,000			

Details of Three-year and Older Trees.

Name of Tree.	Number in Nursery Rows.	Age, in Years.	Height, in Inches.	Growth.
<i>Pinus strobus</i>	40,000	3	4	Fair.
"	20,000	6	16-27	Good.
Total	60,000			

Details of Trees grown at Temporary Nursery, Kaingaroa Plains.

Name of Tree.	Number in Seed-beds.	Number in Nursery Rows.	Age, in Years.	Height, in Inches.	Growth.
<i>Pinus radiata</i>	800,000	..	1	2	Slow; sturdy plants.
"	..	240,000	2	7	Very good.
<i>Laricio</i>	..	40,000	3	4	Good.
"	..	5,000	4	5	"
<i>ponderosa</i>	..	6,000	3	4	"
" var. <i>scopulorum</i>	..	400,000	3	3	Fair.
<i>Pseudo-tsuga Douglasii</i>	..	100,000	3	9	Good.
	800,000	791,000			
Total	1,591,000				

Details of Trees transferred to Plantations, &c., 1919-20.

Where sent.	Name of Tree.	Number.
Whakarewarewa Plantation ..	<i>Cupressus macrocarpa</i>	700
	<i>Pinus radiata</i>	16,000
		16,700
Waiotapu Plantation	<i>Pinus strobus</i>	12,000
	" <i>ponderosa</i> , var. <i>scopulorum</i>	504,000
	" <i>radiata</i>	722,000
		1,238,000
Kaingaroa Plains Plantation ..	<i>Pinus Laricio</i>	502,375
	" <i>ponderosa</i> , var. <i>scopulorum</i>	373,100
	" <i>radiata</i>	41,525
	<i>Populus Eugenei</i>	72
	" <i>monolifera</i>	1
	" <i>nigra</i>	15
	" <i>regenerata</i>	95
	" <i>robusta</i>	40
	" <i>serotina</i>	12
		917,235
Puhipuhi Plantation	<i>Pinus radiata</i>	250,000
Mamaku experimental plots	Assorted trees	2,000
Sales to farmers	Timber and shelter trees	180,615
Sales to public bodies	Shelter trees	5,275
Donations to public schools	"	200
Donations to soldier settlers	"	18,325
Total		2,628,350

WHAKAREWAREWA PLANTATION.

The climatic conditions for the year were extremely variable, and for the most part unseasonable; a late spring followed a fairly severe winter, and tree-growth generally was at a standstill, excepting on the more favoured situations, until about the middle of January. An improvement then became apparent; frequent heavy rains, accompanied by a high temperature, brought on a new growth at a remarkable rate, particularly on the lower bracken country, where the growth now equals that of any previous year. Trees growing on the higher exposed country did not benefit to the same extent, as the growth, although healthy enough, is somewhat below the average. Very little new growth was made on the Waipa flats, all the pine compartments being much below the average, while sections of larch made no perceptible growth, and a large number of struggling trees round the cold swamp land were killed outright. During the spring severe frosts cut out the tops on some of the smaller Douglas fir and Sitka spruce. Fortunately, the affected areas are small, as a number of the trees have little chance of recovery.

Fires on adjoining properties were not of frequent occurrence, this being due principally to the moist weather conditions experienced during the summer months. Unfortunately, two small fires occurred while the burning-off of fire-breaks was in progress. The first was caused through a sudden gust of wind carrying the fire into a block of five-year-old Douglas fir, eighty-eight trees being destroyed before the fire could be got under control. The second fire resulted in an area of $1\frac{3}{4}$ acres of four-year-old *Pinus strobus* being burnt. In this instance the ground had become very dry, and, although every precaution was taken to ensure a safe burn, apparently some live sparks were not detected, and these, fanned by a strong breeze, burnt under the ground a distance of 5 or 6 yards, until the standing growth was reached some twenty-four hours later.

Insect and other Pests.—The small caterpillar which made its appearance in February of last year on isolated specimens throughout the pine compartments, and which has been identified as the larvæ of *Ctenopscus obliquana*, did very little damage. The affected trees quickly recovered, and could not be identified the following spring. The caterpillar has again made an appearance, at least three weeks later than last year, and apparently less numerically, as the affected trees are not so badly damaged.

Judging by the amount of damage done, red deer have apparently increased during the year, especially in the Moerangi section. Large numbers of chestnut have had the terminal buds nibbled off, very few trees escaping damage on the higher country. Some slight damage was also done on the larch and pine compartments at Kakapiko. The deer have shown no marked preference for any particular tree species; the amount of protection afforded by the side branches seems to be the deciding factor, and for this reason larch has suffered less than the pines. Several attempts have been made to thin out the herds, and as a result nine deer were shot during the year.

Tree-growth.—Notwithstanding the short growing season the plantation as a whole presents a healthy appearance, and some excellent growth was made on situations well above the cold low-lying tussock country. On the Moerangi foothills Monterey pine have made their usual vigorous effort, and vertical growth of from 8 ft. to 10 ft. is not uncommon. On the more exposed faces in the higher altitudes the trees have made a much smaller but by no means stunted growth. Later plantings of Douglas fir have also made good growth; those round about Lake Rotokakahi have now outgrown the bracken, and are remarkable for their strong, even growth, the average height being about 7 ft. 6 in. in the five-year-old trees. To the south of the lake increased height-growth up to 3 ft. 6 in. has been measured in the four-year-old compartment. Douglas fir growing in mixture with larch has resulted in very uneven growth wherever planted; a few splendid trees are in evidence, but these are in the minority. *Eucalyptus acervula*, twelve years old, growing on Block 15, are a particularly fine lot, and are the most promising of the gum compartments.

Establishing.—The 16,000 *Pinus radiata* and 700 *Cupressus macrocarpa* received from the Rotorua Nursery were used in replacing failures in last season's planting. The take, while not as good as usual, was sufficient for the requirements of the compartments.

Maintenance.—A considerable amount of the expenditure under this heading was for the upkeep of fire-breaks, clearing being necessary over large areas of the internal breaks where the heavy bracken growth alongside the trees had a tendency to smother out the grass. On the boundary fire-breaks ploughing was done wherever possible, and further protection was got by extensive burnings alongside the public roads. To improve the fire-break system and also provide better means of communication the swamps along the Waitapu Road boundary are being drained. A considerable amount of clearing had to be done round the recently planted trees, but as these are now rapidly outgrowing the bracken little further clearing will be necessary.

The average daily number of men employed during the year was 22·78.

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 weather conditions at this station compared with those of last year have been considerably drier. The difference in rainfall amounted to 12·54 in., and in the number of days on which rain fell fifty-three. An unseasonable frost, registering 11 degrees, which was experienced about the middle of December, cut back this season's growth of Douglas fir, and also affected the larch growing on the low-lying country. The *Pinus ponderosa* var. *scopulorum* on Block 20 also were affected, but to a less degree, and these have now practically recovered.

Maintenance.—As the whole of the reserve is planted up, the majority of the work performed during the year has consequently come under the heading of maintenance, this consisting mainly of underscrubbing 330 acres of larch and about 30 acres of pines preparatory to thinning.

The upkeep of fire-breaks has also been a considerable expense. Owing to the dry weather and parching winds which prevailed during the summer months extra precautions had to be taken to guard against fire spreading into the plantation. On adjacent lands several fires occurred during the year, but in each case the fire-breaks proved to be most effective in preventing them from spreading into the plantation. In order to further reduce this expenditure the remaining interior fire-breaks suitable for grassing purposes were sown down in the early spring, and the result of this work, although not up to expectations, will at least answer the purpose for which it was intended, as it greatly benefited by the heavy rains which fell during the months of January and February. It can now in its present state be considered as a fair crop.

The areas thinned in Blocks 1 and 2 were underplanted with 12,000 Weymouth pine, these being planted as an undercrop to the larch. Good results were obtained with these.

A few deaths are noticeable among the *Pinus radiata* on Block 7. Although this compartment was badly affected last year by caterpillars, it soon made a speedy recovery, and the deaths cannot be attributed to this cause. It is probable that the trees are suffering from the effects of the dry weather. The caterpillar *Ctenopseustis obliquana* made its appearance this year, but confined itself to the *Pinus strobus* on Block 3 and caused no permanent damage.

The trees throughout the plantation, although they have not made the average height-growth, have done well considering the weather conditions.

Buildings.—A five-roomed cottage with the necessary conveniences was erected for the use of the plantation foreman. It is proposed to erect seven workmen's cottages during the coming year.

The average daily number of men employed during the year was 22·08.

Summary showing the Area of Waiotapu Plantation (9,206½ Acres in Trees).

How occupied.						Acres.
Larch	...	...	...	...	...	3,310·85
Pines	...	...	...	...	...	5,703·12
Eucalypti	...	...	...	...	...	180·50
Birch	...	...	...	...	...	11·95
Roads, tracks, and fire-breaks...	...	...	...	...	...	620·47
Unplanted land	...	...	...	...	...	278·66
Land unsuitable for planting, including swamps, creeks, reserves for horse-paddocks and residences	...	...	...	...	...	512·41
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.	
1919.			In.		Deg. F.	Deg. F.	
April	..	..	0·75	5	20	71	21
May	..	..	3·21	6	18	69	23
June	..	..	3·08	12	12	59	14
July	..	..	2·83	9	18	62	10
August	..	..	5·43	7	20	61	9
September	..	..	2·61	8	21	69	15
October	..	..	4·88	11	25	71	6
November	..	..	2·70	12	28	72	7
December	..	..	1·32	10	21	84	4
1920.							
January	..	..	5·78	14	31	83	2
February	..	..	5·53	11	31	84	1
March	..	..	3·98	8	31	74	4
Totals	..	..	42·10	113	..	..	116

WAIREKA CAMP PLANTATION.

During the year an area of 752 acres was planted with 923,650 trees, and 302,350 trees were planted to replace failures in the area planted during the previous year. Owing to adverse weather conditions, and more particularly to the dry weather and frosts during the spring and early summer months, the failures amongst newly planted trees are more numerous than usual. A considerable area of the land planted consists of gullies where the cold becomes very intense at night, and consequently spring frosts have a deadly effect upon newly planted trees.

Maintenance-work.—All the boundary fire-breaks were ploughed and disked, and the internal ones cleared and burned off. There is very little bracken or other rank-weed growth on any part of this block, and the maintenance is therefore not a heavy item.

Roads.—The central road was continued and connected up with the camp reserve, thus giving access to the greater part of the reserve. Most of the formation was on level country, and the work was done with a plough and road-grader.

Buildings.—Nine huts, each capable of accommodating four men, were built to replace the tents. Besides being more comfortable the huts will prove much more economical than tents in the long-run.

Preparations for 1920.—Since November last an area of 900 acres on portion of the Reparoa Estate recently acquired by the Crown has been cleared and burned. Pitting will be commenced shortly, and it is anticipated that before the planting is started in the spring the preparations will be sufficient for planting 500,000 trees.

All the work done prior to November has been charged to Waiotapu Plantation, and the trees planted have been included in the summaries attached to the report upon that station. Subsequent work has been debited to Kaingaroa West, this being a subsection of the Kaingaroa Reserve.

All the work done at this station has been performed by discharged soldiers. That a more worthy and deserving class of man is now being employed is evidenced by the fact that the average period of employment per man is much longer than formerly.

The average daily number of men employed throughout the year was 25·96.

KAINGAROA PLAINS PLANTATION.

A new area of 658 acres was planted during the year, thus bringing the total area planted to date to 6,665 acres. The weather conditions throughout the planting season proved far from favourable; the early part of the season was unusually dry, whilst throughout the winter and well into the spring frosts were frequent. Trees to the number of 800,860 were planted on new area, and 116,375 were used to replace failures in the previous season's planting. The death-rate—estimated at present—amongst the trees planted last winter is higher than it has been since the year 1914. Amongst the Corsican pine it is estimated that the failures amount to 20 per cent., whilst the *Pinus ponderosa* var. *scopulorum* show about 8 per cent. of failures. A small lot of 18,000 *Pinus radiata* were almost an entire failure owing to the severity of the weather in the late spring. The average death-rate since 1912, the year in which the work commenced at this station, is 15 per cent.

Road-formation.—Owing to the shortage of prison labour very little progress has been made with the new roads. A small gang was occupied for about two months on the cuttings referred to in last year's report, and, although a considerable amount of good work was done, the road is still unfinished.

Maintenance.—In addition to the labour required to keep the fire-breaks in an efficient state, a considerable amount of work was needed to keep the fern and tutu in check amongst the small trees. The eastern end of the reserve, towards which the operations are now approaching, is clad with bracken and manuka much more heavily than the land already planted, and consequently the maintenance charges are likely to be higher than heretofore. A tractor which was purchased for cultivating the fire-breaks has so far given excellent results, and it is evident that the ever-increasing area of fire-breaks can with this machine be dealt with much more expeditiously and probably more cheaply than was possible with horses.

Temporary Nursery.—Although the growth is much slower than at Rotorua, the nursery stock produced is very robust. During the year 800,000 *Pinus radiata* were raised from seed, and about the same number of lined-out trees were grown. One of the paddocks has been ploughed, and will be worked up in readiness for lining-out about two million seedlings next spring.

Cropping.—About 30 tons of hay and the same quantity of oaten sheaf were harvested and securely stacked. This will provide ample feed for the horses during the year.

Buildings.—A cottage for the foreman and a hut for the horseman were erected during the year.

Preparations for 1920 Planting.—An area of approximately 1,000 acres has been cleared and pitted in readiness for next season's planting. The trees available for planting are chiefly Corsican pine, Douglas fir, and *Pinus radiata*.

Summary showing the Area of Kaingaroa Plains Plantation (6,665·26 Acres in Trees).

	How occupied.	Acres.
Pines	...	6,299·51
Douglas fir	...	340·17
Larch and chestnut mixture	...	25·58
Roads, tracks, and fire-breaks...	...	446·18
Unplanted land	...	26,243·56
Total	...	33,355·00

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.	
1919.				In.		Deg. F.	Deg. F.	
April	..	..	..	0.76	9	27	66	5
May	..	..	..	2.46	8	25	64	19
June	..	..	..	3.45	15	22	55	12
July	..	..	..	3.34	18	23	59	12
August	..	..	..	6.44	18	25	59	13
September	..	..	..	1.96	11	24	64	10
October	..	..	..	4.12	10	30	71	3
November	..	..	..	0.97	9	29	69	5
December	..	..	..	1.53	8	25	76	3
1920.								
January	..	..	..	4.42	16	34	77	..
February	..	..	..	6.05	12	39	81	..
March	..	..	..	2.65	7	36	74	..
Totals	..	..	..	38.15	141	..	..	82

PUHIPUHI PLANTATION.

The weather conditions throughout the year have been, on the whole, favourable for tree-growth, except during November and December, when the conditions were somewhat dry; the rainfall was fairly evenly distributed throughout the year.

Pinus radiata to the number of 168,000 were planted on areas where the eucalypts had failed. The results are good, the failures being estimated at from 10 per cent. to 12 per cent. Although the growth made is not great, the trees have a very healthy appearance, and it is expected that they will come away vigorously in the spring.

The pines planted during the previous year have done exceedingly well, and now average 1 ft. in height, although many of them are fully 2 ft. tall. By another year these trees should be well above the bracken, when the maintenance charges should be practically nil.

Temporary Nursery.—About 70,000 seedlings *Pinus radiata* were lined out in a nursery plot last spring. These have made good, strong growth, and will be used during the coming winter for blanking. Sufficient land is now in course of preparation for lining out 200,000 seedlings next spring. Once a nursery stock of two-year-old *Pinus radiata* can be worked up it is expected that much better results will be obtained in the plantation.

Preparations for 1920.—An area of 120 acres has been cleared, and of this 80 acres has been burned and is ready for pitting. This area, which will require about 150,000 trees, will be planted during the coming season.

The average daily number of men employed was 7.56.

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.	
1919.				In.		Deg. F.	Deg. F.	
April	..	..	..	0.18	2	34	70	..
May	..	..	..	9.34	14	30	66	..
June	..	..	..	2.81	8	30	64	9
July	..	..	..	8.31	13	30	60	9
August	..	..	..	4.37	10	32	60	6
September	..	..	..	5.57	9	34	68	..
October	..	..	..	5.44	6	30	76	1
November	..	..	..	1.39	8	38	76	..
December	..	..	..	2.59	8	32	80	2
1920.								
January	..	..	..	5.42	12	40	80	..
February	..	..	..	8.29	17	42	82	..
March	..	..	..	12.94	6	40	80	..
Totals	..	..	..	66.65	113	..	..	27

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

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

During the year an area of 542½ acres was planted, thus increasing the total area of the South Island plantations to 12,395½ acres.

That the progress made does not compare favourably with that of recent years is directly attributable to the abnormal climatic conditions of the previous year, as the result of which nursery stock made exceptionally poor growth, and a great proportion of the trees were not sufficiently advanced for transfer to the plantations. Unfortunately the position disclosed at the end of the past season was very similar, adverse conditions having retarded the development of trees in the more advanced stage of growth to such an extent that the aggregate output of trees from the three nurseries will again be considerably below normal. A three-months drought commencing toward the latter end of summer was experienced in South Otago, and resulted in very heavy losses amongst transplanted trees in the Tapanui Nursery.

The estimated number of trees raised from seed during the year is 2,967,000, while the total raised since the establishment of the South Island nurseries is 44,906,000.

No European seeds were available for sowing, a small quantity of *Pinus Laricio*, which did not arrive until the end of January, having to be stored until next spring. The only imported seeds sown were comparatively small quantities each of Douglas fir and *Pinus ponderosa*, and on the whole the results are disappointing, the latter species having germinated very poorly. Nearly two millions of good *Pinus radiata* seedlings were raised, and this crop will in a great measure serve to cover the shortage in other species.

It is not improbable that a continued shortage of American and European tree-seeds would have a prejudicial effect upon afforestation in certain districts where extension work is now in progress. The substitution of *Pinus radiata* for *Pinus Laricio* and *Pinus ponderosa* in the severe climate of Central Otago would certainly be a very doubtful proposition, while in North Canterbury, where drying north-west winds are a feature of the late spring and early summer months, the transplanting of Monterey pine is usually accompanied by a much lighter percentage of failures than in the case of either of the above-mentioned species.

The total number of trees in the nurseries at the 31st March was 6,049,000, about one-quarter of which are sufficiently large for removal to the plantations during the coming winter.

TREES FOR FARMERS.

There was a marked decrease in the number of trees distributed to farmers and public bodies during the past year, the total number disposed of being 70,824, as against 226,890 for the previous year. Applications for trees were less numerous than usual, and a number of large orders for delivery in the spring had to be cancelled owing to the restricted railway services during that period. The demand was again chiefly for the faster-growing pines, the majority of settlers requiring a species which will quickly provide shelter, and with which a reasonable amount of success in transplanting may be safely anticipated. Few inquiries with respect to eucalypts were received, and the raising and preparation of the plants for distribution, entailing a considerable amount of labour, were actually carried on at a loss. At least two of the nurseries are situated in districts where the severe frosts of winter frequently cause wholesale failures in the eucalypt crop, and for the future it has been decided to restrict the raising of plants to a comparatively small number of the hardiest species, and to encourage the sowing of seeds by settlers who are desirous of establishing plantations.

A large demand for trees during the approaching winter is anticipated, and, as the stocks available for distribution are somewhat limited, it may not be possible to supply all applicants.

LABOUR.

During the greater part of the year labour has been fairly plentiful, a temporary shortage only being experienced in the autumn when harvesting operations were general. With few exceptions, all vacancies have been filled by discharged soldiers, as many as sixty being employed at one period. At Greenvale Plantation all work in connection with the planting and maintenance of trees has been carried out entirely by soldier workmen, but it must be admitted that, as regards the economical working of the station, this class of labour has so far proved rather unsatisfactory. Despite the efforts made to make living-conditions in the camp as congenial as possible, the majority of the men still continue to leave after a very brief period of employment, and although as a rule the vacancies have been promptly filled, it is obvious that the continual changing of hands must affect the progress of the work to an appreciable extent. The Greenvale camp, which provides accommodation for twenty-five workmen, has only on rare occasions been completely filled, and has in fact at times been almost empty, yet during the past year a total number of ninety men have been given employment at this station. This will serve to convey some idea of the difficulties experienced where the carrying-out of operations on any considerable scale is entirely dependent upon returned-soldier labour. It is satisfactory to note that several former employees have been repatriated during the year, and have returned to their old positions in the nurseries, where, during the war period, the shortage of experienced workmen has been most severely felt.

REVENUE.

The receipts for the year, of which details are given hereunder, amounted to £1,104 9s. 5d. The total compares somewhat unfavourably with that of the previous year, this being accounted for by the fact that during the past year there was no surplus grain to dispose of. The thinnings from the shelter-belts at Hammer Springs Plantation continue to meet with a ready sale, the demand being such that probably double the quantity of firewood could have been sold had it been available.

Receipts for the year were as follows :—

	£	s.	d.
Trees (67,624)	233	5	6
Sheep	481	2	9
Wool and skins	150	2	10
Firewood (100 $\frac{3}{4}$ cords). poles, &c.	143	5	1
Grazing	18	16	0
Rentals, &c.	77	17	3
Total	<u>£1,104</u>	<u>9</u>	<u>5</u>

GRAZING OF SHEEP ON PLANTATIONS.

By the grazing of a departmental flock on Conical Hills and Dusky Hill Plantations the fire-breaks have again been kept in a thoroughly efficient state, while the sales of sheep and wool have been the principal sources of revenue received during the year. It was regrettable that the old flock had to be retained for a further season, a considerable number of the sheep being too old to withstand the severe weather experienced in early spring. Sheep which are kept on the plantations for more than one season become so familiar with the most inaccessible parts that they are exceedingly difficult to muster, and for this reason the whole flock is generally disposed of each year. Owing to the general scarcity of feed at the beginning of the year, old ewes could scarcely be given away, and there was no alternative but to return them to the plantations.

The usual difficulty was experienced in obtaining the services of experienced musterers, and the muster for the annual sale in the autumn was only a partial success, this being in a great measure due to the fact that the failure of the pasturage on the fire-breaks, as a result of the protracted spell of dry weather, had caused the sheep to penetrate farther amongst the trees than usual in search of fodder. A returned soldier with some knowledge of stock has decided to undertake the combined duties of shepherd and rabbitier during the ensuing year, and it is believed that much of the difficulty formerly experienced in the management of the flock will be eliminated.

The statement given hereunder shows that the profits on the year's transactions amounted to £195 15s. 8d. Although the return is not large, it may be considered satisfactory when all the adverse factors are taken into consideration. The losses amongst old ewes were somewhat heavy; lambs which had to be sold at the beginning of the year realized poor prices, while the wool-clip was light and of rather inferior quality. Sheep and lambs sold by auction toward the latter end of the year fetched good prices, and it is anticipated that the remainder of the stock in hand will be satisfactorily disposed of.

STATEMENT OF STOCK TRANSACTIONS.

Dr.	£	s.	d.	Cr.	£	s.	d.
Balance forward at 1st April, 1919 ..	792	8	6	Sales of sheep	492	19	6
Purchase of sheep	15	15	0	Sales of wool, skins, &c. ..	154	7	2
Management expenses, mustering, dipping, shearing, &c.	92	8	6	Wool on hand (at valuation) ..	40	0	0
Commission on sales	16	17	3	Stock in hand (at valuation) ..	434	10	3
Fencing	8	12	0				
Balance, being profit on year's transactions ..	195	15	8				
Total	<u>£1,121</u>	<u>16</u>	<u>11</u>	Total	<u>£1,121</u>	<u>16</u>	<u>11</u>

GENERAL.

It is regrettable that a further postponement in the preparation of balance-sheets showing the financial position of the nurseries and plantations has been unavoidable, essential information in connection with the original valuations of the reserves not being available.

The trees available for planting during the coming season number approximately 1,500,000, a fair proportion of which, however, will be required for replacing failures. New areas, aggregating 600 acres, will be planted at Balmoral, Naseby, and Greenvale Plantations.

During the year several officers who have been absent with the Expeditionary Forces returned to their former stations, and the position with regard to the supervision of operations is greatly relieved.

All officers deserve the thanks of the Department for the zealous and capable manner in which they have carried out their duties during the past year.

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

TAPANUI NURSERY, OTAGO.

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

Adverse climatic conditions have again been experienced at this station, cold wet weather being a feature of the spring and early summer months, following which dry conditions amounting practically to a drought extended over a period of three months. The absence of warmth previous to midsummer and the want of moisture in the autumn resulted in an exceptionally short growing season, and tree-raising operations have consequently been attended by only a moderate amount of success.

Raising of Seedlings.—Although the growth of a number of species leaves much to be desired, the germinating-percentage on the whole is satisfactory, Monterey pine and Douglas fir being particularly good crops, considerably above the average. Good germination was also obtained with *Pinus strobus*, *Thuja gigantea*, and *Cupressus Lawsoniana*, while the crop of *Pinus ponderosa* is somewhat thin, and *Cupressus macrocarpa* was almost a failure. Owing to the unfavourable season germination in all cases was unusually slow, much of the seed lying dormant for fully two months. Seedlings generally are small but healthy, *Pinus radiata* being the only species which has made good growth. *Pinus Laricio* seed arrived too late for sowing, and has been stored until next spring. The estimated number of trees raised from seed was 1,461,700.

Transplanted Trees.—As a result of the drought heavy losses have occurred amongst the trees in nursery lines, although everything possible in the way of surface cultivation was done to conserve moisture to the greatest possible extent. The conditions under which tree-planting was carried out were fairly good, and until the latter end of January a very successful season was anticipated; from that time onward, however, an almost complete cessation of growth was noticeable, and failures became numerous. The presence of grass-grub in considerable numbers has also been responsible for deaths, chiefly amongst *Pinus Laricio* and *Pinus radiata*.

Approximately 600,000 trees will be available for planting during the approaching season, leaving a fair proportion of plants in stock which will not be sufficiently advanced for removal.

The output of trees during the past winter and spring totalled 520,627, of which number 43,477 were distributed to farmers and public bodies.

The estimated number of trees in the nursery at the 31st March was 2,469,770.

Horse-feed.—40 tons of oatsheaf were harvested from 28 acres sown, and about 20 tons of rye and clover hay were grown on spare nursery breaks.

Buildings.—A small building purchased cheaply from a neighbouring settler, and another originally erected for horse-boxes but no longer required for this purpose, were removed to a convenient site and converted into comfortable quarters for employees. Much-needed improvements to one of the nursery cottages were also carried out.

The daily average number of men employed was 14·6.

Rainfall, Temperature, &c.

Month.				Rainfall.	Number of Days Rain fell.	Temperature.		Number of Days Frosts occurred.
						Maximum.	Minimum.	
1919.				In.		Deg. F.	Deg. F.	
April	.	..	..	5·90	22	64	27	8
May	..	..	..	2·19	14	63	22	17
June	..	..	..	2·94	12	64	22	13
July	..	..	..	4·14	13	60	24	15
August	..	..	..	6·53	19	71	22	16
September	..	..	..	3·98	12	62	26	16
October	..	..	..	3·67	18	72	28	3
November	..	..	..	3·20	20	71	30	2
December	..	..	..	4·00	14	88	32	..
1920.								
January	..	..	..	2·33	15	81	33	..
February	..	..	..	0·58	8	89	32	..
March	..	..	..	1·40	10	85	31	..
Totals				40·82	177	..	..	90

Details of One-year-old Trees, sown 1919-20.

Name of Tree.				Number in Seed-beds.	Amount of Seed sown.	Growth.
					lb.	
<i>Pinus ponderosa</i>	..	..	..	50,000	40	Fair.
„ <i>radiata</i>	..	..	..	750,000	149	Very good.
„ <i>strobus</i>	..	..	..	30,000	5	Poor.
„ <i>muricata</i>	..	..	..	8,000	2	Good.
<i>Pseudo-tsuga Douglasii</i>	..	..	..	600,000	56	Fair.
<i>Cupressus Lawsoniana</i>	..	..	..	6,000	1	Poor.
„ <i>macrocarpa</i>	..	..	..	4,500	7½	„
<i>Thuja gigantea</i>	..	..	..	12,000	1	„
<i>Sequoia sempervirens</i>	..	..	..	200	¾	„
<i>Cryptomeria japonica</i>	..	..	..	1,000	¾	Fair.
Total	..	..	..	1,461,700		

Details of Two-year-old Trees, sown 1918-19.

Name of Tree.					Number in Seed-beds.	Number in Nursery Lines.	Growth.
<i>Pinus Laricio</i>	..	..	..	..	240,000	..	Poor.
" "	..	..	..	..	100,000	..	(Three - year - old).
" "	..	..	..	..	..	..	Good.
" <i>ponderosa</i>	..	..	..	..	17,000	..	Fair.
" <i>radiata</i>	..	..	..	..	22,000	..	Good.
" "	..	..	..	..	..	60,000	Medium.
" <i>muricata</i>	..	..	..	..	..	10,000	Poor.
" <i>pinaster</i>	..	..	..	..	..	4,000	"
<i>Cupressus macrocarpa</i>	..	..	..	..	..	1,000	"
<i>Populus fastigiata</i>	..	..	..	..	..	670	Good.
" <i>monoliferu</i>	..	..	..	..	..	3,300	"
Totals	..	..	..	..	379,000	78,970	
					457,970		

Details of Three-year-old Trees, sown 1917-18.

Name of Tree.					Number in Nursery Rows.		Growth.
					Lined in.	Lined out.	
<i>Pinus Laricio</i>	..	..	..	..	225,000	..	Medium.
" "	..	..	..	..	..	125,000	"
" <i>ponderosa</i>	..	..	..	..	..	180,000	Poor.
" <i>muricata</i>	..	..	..	..	..	13,000	Good.
" <i>pinaster</i>	..	..	..	..	..	900	"
<i>Pseudo-tsuga Douglasii</i>	..	..	..	..	..	5,000	Poor.
<i>Cupressus macrocarpa</i>	..	..	..	..	..	1,200	Fair.
Totals	..	..	..	..	225,000	325,100	
					550,100		

Trees transferred from Nursery to Plantations, &c., 1919-20.

Where sent.	Name of Tree.				Number.
Greenvale Plantation	<i>Pinus Laricio</i>	..	..	..	356,800
	" <i>radiata</i>	..	..	..	78,500
	" <i>Banksiana</i>	..	..	..	5,825
	<i>Larix leptolepis</i>	..	..	..	2,500
	<i>Pseudo-tsuga Douglasii</i>	..	..	..	8,500
					452,125
Conical Hills Plantation ..	<i>Pinus Laricio</i>	..	..	..	9,000
	" <i>ponderosa</i>	..	..	..	1,425
	" <i>radiata</i>	..	..	..	5,600
					16,025
Pukerau Plantation	<i>Pinus Laricio</i>	..	..	..	6,000
	" <i>radiata</i>	..	..	..	3,000
					9,000
Farmers and public bodies	Assorted forest-trees				43,477
Total					520,627

CONICAL HILLS PLANTATION.

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

Owing to unfavourable climatic conditions tree-growth has not been vigorous, but a fair rate of development may be observed over the majority of the older blocks. On the tops of the ridges the effects of the drought are apparent, but on the southern slopes, where *Pinus Laricio*, *Pinus austriaca*, and *Pinus ponderosa* have been chiefly planted, the growth made by each of the species is but little below that of previous years. The absence of sufficient moisture during the autumn months has militated against the progress of spruce; but Douglas fir has made satisfactory headway, averaging fully 30 in. of vertical growth. An early cessation of growth accompanied by premature needle-shedding occurred in the larch compartments. *Pinus radiata*, which occupies the more recently planted blocks, has withstood dry conditions fairly well, and has made on the average 2 ft. of strong healthy growth.

Sheep have kept the internal fire-breaks in a satisfactory state, but along the boundaries it has been necessary to clear a considerable amount of flax and broom which has gradually encroached during recent years, and has become a possible source of danger from fire.

As labour became more plentiful the staff was slightly increased, and it has been possible to undertake a proportion of the various works which urgently required attention.

Preparations are well in hand for the replanting during next winter of small areas on which the original species planted had proved unsuitable.

The daily average number of men employed was 5.

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, fire-breaks, tracks, &c....	...	138½
Total	...	3,672

PUKERAU PLANTATION.

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

The development of the trees has to some extent been affected by the extremely dry conditions which prevailed during the autumn months, the absence of sufficient moisture causing a cessation of growth toward the latter end of February. All compartments have suffered to practically the same extent, the trees being nowhere large enough to cover the ground, and thus help to prevent the evaporation of soil-moisture.

Pinus radiata, which occupies slightly more than half of the total area under trees, has made an average increase in height of 18 in., while the species occupying the areas next in importance, *Pinus ponderosa* and *Pinus Laricio*, show an average increase of 10 in. While the growth made has been less than the average of previous years it has been fairly uniform, and the health of the different compartments of pines is quite satisfactory. In the smaller compartments, which are more or less of an experimental nature, the species which have made the best headway are Douglas fir and Japanese larch.

It has been necessary to keep a small gang of men almost constantly employed in clearing bracken fern and rank grass from around the smaller trees, the expenditure in maintenance having been comparatively heavy.

During the past winter some difficulty was experienced in procuring labour for this station, and consequently the failures which had occurred in former plantings could not be entirely replaced. Preparations for completing the work during the coming season are well in hand, and, if possible, operations will be extended to the remaining unplanted portion of the reserve.

The daily average number of men employed was 3·1.

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

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

DUSKY HILL PLANTATION.

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

The variable climatic conditions experienced here have had a noticeable effect upon the development of trees, growth throughout the plantation being comparatively poor. Under the cold wintry conditions prevailing in the spring and early summer, trees were unusually late in showing any movement, and although vigorous growth was generally in evidence toward the end of summer, it was abruptly checked by the extreme dryness of the autumn season. The effects of dry weather were most noticeable in the larch and spruce compartments, both species having made little height-growth, whilst amongst the former premature needle-cast has been very prevalent. In the blocks of *Pinus Laricio* and *Pinus ponderosa* the most satisfactory progress has undoubtedly been made, and although the average growth may be slightly below that of more favourable seasons, the trees have a healthy and thriving appearance. *Pinus radiata* has not done so well as usual, and amongst oak and ash uneven and generally unsatisfactory headway is to be observed.

The only work necessary in connection with fire-protection has been the clearing of bracken and coarse herbage along the boundary-fence, all internal fire-breaks having been kept in a satisfactory condition by the grazing of sheep.

Several small areas on which the original planting has been unsuccessful have been prepared for replanting with *Pinus radiata* during next winter. Deer have been responsible for some slight amount of damage, and the cover of trees now forms such an effective protection that only on rare occasions has any success attended the efforts to destroy them.

No provision for telephonic communication with this station has so far been made, but it is hoped to have this matter attended to during the coming year.

The daily average number of men employed was 1·5.

Summary showing Area of Dusky Hill Plantation (745½ Acres in Trees).

How occupied.							Acres.
Pines	...	...	...	...	...	...	270½
Larch	...	...	...	...	...	...	234½
Spruce and Douglas fir	...	...	...	...	...	...	93½
Ash, birch, &c.	...	...	...	...	...	...	46½
Miscellaneous mixture	...	...	...	...	...	...	100½
Roads, tracks, fire-breaks, &c.	...	...	...	...	...	...	99½
Total	...	...	...	...	...	...	845

GREENVALE PLANTATION, OTAGO.

(Area, 5,169 acres; altitude, 700 ft.; commenced 1917.)

During the year an area of 216 acres was planted, making a total area of 953 acres in trees. The number of trees dealt with was 452,125, of which 390,825 were planted on new ground, the remaining 61,300 being used to replace failures in the previous year's planting, principally amongst *Pinus radiata*. The conditions under which operations were carried out were not altogether favourable, the labour required for the preparation of the land not being available until the latter end of winter, while progress in the spring was frequently interrupted by wet weather and snowfalls. Under the circumstances it is doubtful if a larger number of trees could have been conveniently handled.

Tree-growth on the whole has not been good, the growing-period having been a particularly short one owing to the cold sodden state of the ground in the spring and early summer months, and to the protracted spell of dry weather experienced in the autumn. Intensely dry conditions, commencing in January, prevailed for practically three months, during which period no rainfall of sufficient duration to benefit the plantation occurred. Considering the unfavourable weather the percentage of failures amongst the trees planted during the past season is not excessive, although somewhat higher than that of an average year. *Pinus radiata* has done rather better than usual, this being due in a great measure to the special care taken in preparing the plants for transport. Failures were chiefly amongst *Pinus Laricio*, which comprised the bulk of the planting, the majority of the deaths occurring on an area which had at one time been under cultivation and on which the soil cracked badly and dried out rapidly. Satisfactory results were obtained with small numbers of Douglas fir, Japanese larch, and *Pinus Banksiana*. Although the absence of moisture in the autumn months caused a cessation of growth amongst the established trees no permanent injury has resulted, the health of the various compartments of pines being quite satisfactory.

During the summer a new area of approximately 750 acres was enclosed, 105 chains of rabbit-proof fencing of a temporary nature being erected for the purpose. An old boundary-fence of a total length of 109 chains was practically renewed, and also made rabbit-proof by the addition of netting.

Fire-breaks have been kept in an efficient state chiefly by ploughing, but owing to the generally rough nature of the ground a considerable amount of hand labour was also necessary. The preparations for the season's planting are not so well forward as is desirable, this being due to the scarcity of labour during the last three months of the year. The number of pits available for the reception of trees is 155,000, and the approximate number still to be prepared is 400,000.

Six small but comfortable huts were erected to provide accommodation for an increased number of workmen, and several tent-frames—on which tents were unsatisfactory owing to the exposed situation—were re-covered with malthoid, which has proved quite satisfactory and comparatively inexpensive. The kitchen and dining-room have been in occupation during the greater part of the year, and have added greatly to the general comfort of the camp.

The daily average number of men employed was 13·3.

Summary showing Area of Greenvale Plantation (953 Acres in Trees).

How occupied.							Acres.
Pines	...	...	...	...	...	...	912½
Douglas fir	...	...	...	...	...	...	8
Miscellaneous trees	...	...	...	...	...	...	32½
Paddocks, fire-breaks, tracks, &c.	...	...	...	...	...	...	55
Unplanted areas	...	...	...	...	...	...	4,161
Total	...	...	...	...	...	...	5,169

RANFURLY NURSERY, CENTRAL OTAGO.

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

The past season as regards rainfall may be described as normal, the total for the year of 22·54 in. being about the average recorded for some years past, although slightly in excess of that of the previous year. Rain fell on 118 days, and frosts—from which only one month was entirely free—were recorded on 124 nights. Gales were prevalent throughout the spring and early summer months, and the autumn was much drier than usual. Growth is generally vigorous in February and March, but this year, owing to insufficient moisture, it has been quite unnoticeable.

Transplanted Trees.—Lining-out operations have met with but a poor measure of success, and out of some 430,000 trees dealt with the number now surviving is only 200,000. The number lined out appears to have been overestimated, but the discrepancy is chiefly accounted for by

failures amongst *Pinus Banksiana*, which in this district appears to be difficult to transplant. Apart from this partial failure most of the trees have struck better than usual, and there is a smaller percentage of deaths amongst both *Pinus ponderosa* and *Pinus Laricio*. The latter, however, have made no vertical growth, and the majority will require to remain in nursery lines for another season. Excepting in specially favoured seasons, transplanting into nursery lines has been always attended here by a heavy mortality in stock, and an effort will be made during the coming season to do away with this operation as much as possible. Past experience has proved that by sowing thinly, and wrenching the trees fairly frequently during the third year, a much better class of tree for permanent planting is obtained direct from the seed-beds than that which can be produced by lining out when two years old. To carry out this proposition an increased number of seed-frames would be required; but the reduction of failures to a minimum and the saving of the cost of lining out should more than counterbalance the expenditure involved.

Raising of Seedlings.—Owing to delays in the delivery of tree-seeds, sowing was commenced later than usual, and was done at various times as the quantities came to hand. The results on the whole are disappointing, *Pinus ponderosa*, which usually germinates well, having been a partial failure. The sowing of *Pinus Laricio* seed which had been in stock for at least two years was also attended with very poor results. *Pinus radiata* has done very well, and a fine crop of seedlings to the number of some 345,000 resulted from the sowing of 60 lb. of seed. The latter will be lined out in the spring, a small number being reserved for the autumn to test the possibility of handling them at this season in preference to spring planting. It is feared, however, that the climate is too severe for this to be successful.

Trees to the number of 402,000 were raised from seed, and the total number in the nursery at 31st March was 920,450. Approximately 250,000 trees will be available for transfer to Naseby Plantation next spring.

Formation.—For the purpose of providing new ground for seed-beds and for lining out an area of 5 acres was levelled and subdivided by roads into convenient plots. This absorbed a considerable amount of labour, the ground being so uneven that it was necessary to first remove the whole of the surface soil, which was replaced after the grading was completed.

Horse-feed.—A fair crop of oatsheaf was harvested from 10 acres of spare land, and this, together with the crop from Gimmerburn Plantation, should provide sufficient horse-feed for the year.

Buildings.—Several necessary additions to buildings are now nearing completion, the work having been delayed considerably owing to difficulties in procuring material and skilled labour.

The daily average number of men employed was 6.

Rainfall, Temperature, &c.

Month.	Rainfall.	Number of Days Rain fell.	Temperature.		Number of Days Frosts occurred.
			Maximum.	Minimum.	
1919.			Deg. F	Deg. F.	
April	In. 4.14	13	69	24	10
May	0.75	6	67	19	20
June	1.52	12	64	9	20
July	1.76	8	58	20	23
August	3.19	12	57	22	17
September ..	2.67	10	66	20	15
October	0.55	8	69	27	7
November ..	2.13	12	68	30	4
December ..	2.43	13	86	31	2
1920.					
January	1.21	10	83	32	1
February ..	1.48	8	90	33	..
March	0.71	6	81	29	5
Totals	22.54	118	..	..	124

Details of One-year-old Trees, sown 1919-20.

Name of Tree.					Number in Seed-beds.	Amount of Seed sown.	Growth.
						lb.	
<i>Pinus radiata</i>	..	..	..	..	345,600	60	Good germination.
„ <i>Laricio</i>	..	..	..	..	22,100	50	Old seed.
„ <i>ponderosa</i>	..	..	..	..	34,300	60	Very uneven.
Total	..	..	..	..	402,000		

Details of Two-year-old Trees, sown 1918-19.

Name of Tree.					Number in Seed-beds.	Number in Nursery Lines.	Growth.
<i>Pinus Laricio</i>	..	..	..	..	152,200	..	Good, sturdy trees.
" <i>ponderosa</i>	..	..	..	..	63,000	..	"
" <i>radiata</i>	..	..	..	..	..	1,800	Poor.
" <i>muricata</i>	..	..	..	..	500	..	Healthy trees.
<i>Populus fastigiata</i>	..	..	..	..	..	680	Fair.
" <i>monolifera</i>	..	..	..	..	..	270	"
Totals	..	..	..	..	215,700	2,750	
					218,450		

Details of Three-year-old Trees, sown 1917-18.

Name of Tree.					Number in Nursery Lines.	Growth.
<i>Pinus Laricio</i>	..	..	..	..	42,000	Majority too small for transfer.
" <i>ponderosa</i>	..	..	..	..	225,000	Good, healthy trees.
" <i>Banksiana</i>	..	..	..	..	9,000	Selected trees; good results.
" "	..	..	..	..	21,000	Very poor.
<i>Picea excelsa</i>	..	..	..	..	2,000	"
<i>Pseudo-tsuga Douglasii</i>	..	..	..	..	1,000	"
Total	..	..	..	..	300,000	

Trees transferred from Nursery to Plantations, &c., 1919.

Where sent.				Name of Tree.		Number.	
Naseby Plantation	..	..	{	<i>Pinus ponderosa</i> (3-year)	..	48,275	
				" " (2-year)	..	20,700	
				<i>Laricio</i> ..	..	26,550	
				" <i>radiata</i> ..	..	26,975	
				<i>Cupressus macrocarpa</i> ..	..	550	
				<i>Pseudo-tsuga Douglasii</i>	..	1,500	
				<i>Picea excelsa</i> ..	..	1,700	
				<i>Betula alba</i> ..	..	80	
			{	<i>Populus fastigiata</i>	..	500	
Farmers and public bodies	..	..		Assorted forest-trees	..		126,830
							6,472
Total ..	..	..	..	..			133,302

NASEBY PLANTATION, CENTRAL OTAGO.

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

Favourable climatic conditions were experienced during the past year, and the plantation has benefited by an increased rainfall which was fairly evenly distributed over the twelve months. Rain fell on 119 days, the total amount recorded being 29·15 in. Frosts occurred on 186 nights, but on the average the frosts were much less severe than those of the previous year. An exceptionally heavy gale, amounting to almost a hurricane, occurred in the spring, and did a considerable amount of damage to fences and camp buildings.

Trees to the number of 126,820 were received from Ranfurly Nursery, and of this number 76,430 were planted on a new area of 46½ acres at an average cost of 12s. 8d. per thousand, while the remaining 50,400 trees were used to replace failures in the former year's planting. Preparations were made in anticipation of receiving a much larger number of trees, and some 400,000 pits were left available for next season's planting. Consequently it will not be necessary to prepare any further area for next spring; but a proportion of the pits will probably be required to be reopened. The trees planted were of a somewhat inferior class and have made practically no progress, although only a small percentage of deaths is noticeable.

Taking the established portion of the plantation, a decided improvement in the rate of growth may be observed. The absence of the persistent cold winds and generally uncongenial conditions of the previous season has resulted in fine healthy growth in nearly all species, and especially so in the case of *Pinus ponderosa* and *Pinus Laricio*. In the former species specimens may be seen with a clean growth of nearly 3 ft., while the latter have made an average growth of 2 ft., and are in a very healthy condition. Average growth has been made by the older larch, and the more recently planted trees are now beginning to show up well after being retarded for several seasons by unseasonable frosts. The meteorological table shows that not one month in the year was

entirely free from frosts, and it will readily be understood that larch, which is most susceptible to damage by late frosts, has a severe struggle until it reaches a height of from 3 ft. to 4 ft. above ground.

The fencing of the remainder of the boundary—120 chains—was completed, the whole of the area being now entirely enclosed. Some divisional fences still remain intact in order that the rabbit pest may be more readily kept in check. Rabbits have been responsible for a good deal of damage, the constant efforts made to eradicate them having been only partially successful.

It is anticipated that an area of approximately 130 acres will be planted next spring.

The daily average number of men employed was 3.

Summary showing Area of Naseby Plantation (1,822½ Acres in Trees).

How occupied.						Acres.
Pines	...	...	...	...	...	1,519
Larch	...	...	...	...	...	271
Pines and larch mixture	...	...	...	...	...	23
Miscellaneous trees	...	...	...	...	...	9½
Fire-breaks, tracks, roads, &c.	...	...	...	...	...	150
Unplanted land	...	...	...	...	...	503½
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.	
1919.				In.		Deg. F.	Deg. F.	
April	..	..	..	4.98	12	67	23	10
May	..	..	..	0.68	6	66	18	18
June	..	..	..	1.60	9	55	11	25
July	..	..	..	2.24	8	54	18	28
August	..	..	..	4.45	13	54	16	25
September	..	..	..	3.20	11	61	18	24
October	..	..	..	0.80	8	65	23	15
November	..	..	..	3.22	11	65	26	17
December	..	..	..	2.84	13	82	24	9
1920.								
January	..	..	..	2.21	11	79	22	6
February	..	..	..	2.01	9	90	30	1
March	..	..	..	0.92	8	76	28	8
Totals				29.15	119	..	..	186

GIMMERBURN PLANTATION.

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

The only work undertaken at this station has been in connection with the growing of horse-feed, which, owing to the dry season experienced, has not proved very successful, the estimated yield of oatsheaf from 30 acres sown being only 22 tons. The wheat grown during the previous year is still in stack, all efforts to induce the owner of a threshing plant to go so far out having proved unavailing. Pigeons and other birds are doing a considerable amount of damage to the stacks, and in order to prevent the total loss of the crop it will probably be necessary to cart the whole of it to Ranfurly Nursery, where there would be a possibility of getting it threshed. The past year's experience further proves the uncertainty which attends cropping in this district, and, as the expense is somewhat heavy owing to the distance between the plantation and nursery, it is very doubtful if the growing of horse-feed here is a payable proposition.

The past season has not been favourable to tree-growth, and very little improvement in the development of the trees in the reserve can be recorded. No records of the rainfall in this district are available, but the average probably amounts to little more than 14 in. annually, which is insufficient for the healthy growth of forest-trees. Under the circumstances it is not advisable to resume the planting of the reserve.

The daily average men employed was 0.25.

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

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

HANMER SPRINGS NURSERY, CANTERBURY.
(Area, 40 acres; altitude, 1,225 ft.)

Rain fell on 111 days during the year, with a total precipitation of 45·50 in., as against 48·94 in. for the preceding year. The highest shade temperature (93°) was registered on the 18th December, and the lowest (9°) on the 26th June. Frost was recorded on 117 days during the year, an increase of eighteen days on the records of the year previous.

Tree-growing.—The usual success has not attended operations over the past twelve months, and only very medium results have again to be recorded. Until the newly acquired nursery area is brought under cultivation good results cannot be expected. It is anticipated, however, that the new ground will be ready for tree-growing operations next spring, when it is hoped that our efforts will be attended with a greater measure of success. The transfer of 1,156,000 seedlings to the nursery lines was not attended with very satisfactory results, the percentage of losses being very heavy and subsequent growth not good. Seed-sowing again gave but poor results; from 194 lb. of seed only 1,104,877 trees were raised. It is estimated that the nursery contains 2,688,877 trees at the present time, of which approximately 745,800 are fit for transfer to plantations, &c. Trees to the number of 688,250 were sent out to the plantations, and 17,675 to farmers, making a total of 705,925 trees transferred for the season.

Horse-feed.—A very fair crop of oatsheaf was harvested, and it is estimated that approximately 25 tons are now in stack. The amount grown, however, is not sufficient for the season's requirements, and additional chaff and oats will have to be purchased to see the season through. From the areas under clover two crops were harvested, and the area sown in lucerne during the spring produced a light crop by the end of February. The carrot crop proved a failure; but the area under turnips turned out well.

General.—During the summer much-needed improvements were effected to buildings generally, the additions to dwelling and hot-water service being greatly appreciated. Two serviceable horses were purchased, and one young animal was broken into harness. It is anticipated that another young horse will be brought into work during the coming season. A good deal of labour was necessary in keeping roads, fences, &c., in good order and repair.

An area of 15 acres suitable for nursery-extension purposes was recently purchased, and will be brought under cultivation during the approaching winter.

It is proposed to purchase a new wagon, a double-furrow plough, and other implements, those at present in use being almost completely worn out. A small portable engine capable of driving wood-sawing and chaff-cutting plants could be advantageously employed at this station, and should pay the initial cost in a comparatively short time.

Meteorological records and tree schedules are appended.

The daily average of men employed throughout the year was 10·2.

Rainfall, Temperature, &c.

Month.				Rainfall.	Number of Days Rain fell.	Temperature.		Number of Days Frosts occurred.
						Maximum.	Minimum.	
1919.				In.		Deg. F.	Deg. F.	
April	..	..	..	2·21	9	77	17	20
May	..	..	..	0·90	5	66	10	29
June	..	..	..	3·60	10	61	9	25
July	..	..	..	4·90	16	66	11	25
August	..	..	..	4·24	19	61	12	23
September	..	..	..	7·62	12	68	13	27
October	..	..	..	2·66	13	71	18	12
November	..	..	..	6·19	9	74	27	6
December	..	..	..	3·38	8	93	27	4
1920.								
January	..	..	..	3·82	8	83	28	2
February	..	..	..	5·18	7	91	34	..
March	..	..	..	0·17	5	83	30	4
Totals	..	..	..	44·87	111	..	..	177

Details of One-year-old Trees, sown 1919–20.

Name of Tree.					Number in Seed-beds.	Amount of Seed sown.	Growth.
						lb.	
<i>Pinus radiata</i>	..	..	..	..	800,000	115	Medium.
„ <i>ponderosa</i>	..	..	..	..	50,000	60	„
„ <i>strobus</i>	..	..	..	..	20,000	5	„
„ <i>muricata</i>	..	..	..	..	25,000	4	„
<i>Cupressus macrocarpa</i>	..	..	..	..	5,000	4	„
„ <i>Lawsoniana</i>	..	..	..	..	4,000	$\frac{1}{2}$	„
<i>Betula alba</i>	..	..	..	..	200,000	5	Good.
Total	..	..	..	..	1,104,000		

Details of Two-year-old Trees, sown 1918-19.

Name of Tree.					Number in Nursery Lines.	Growth.
<i>Pinus Laricio</i> ..	..	..	..	..	600,000	Medium.
„ <i>ponderosa</i> ..	..	..	..	..	150,000	„
„ <i>radiata</i> ..	..	..	..	..	40,000	„
„ <i>muricata</i> ..	..	..	..	..	30,000	„
<i>Cupressus macrocarpa</i> ..	..	..	..	..	2,000	„
<i>Populus monolifera</i> ..	..	..	..	..	30,000	„
„ <i>fastigiata</i> ..	..	..	..	..	7,000	„
Total ..	..	..	..	..	859,000	

Details of Three-year-old Trees, sown 1917-18.

Name of Tree.					Number in Nursery Lines.	Growth.
<i>Pinus Laricio</i> ..	..	..	..	..	360,000	Strong.
„ <i>ponderosa</i> ..	..	..	..	..	230,000	Fair.
„ <i>Banksiana</i> ..	..	..	..	..	60,000	Medium.
„ <i>pinaster</i> ..	..	..	..	..	2,000	„
„ <i>Taeda</i> ..	..	..	..	..	300	„
<i>Cupressus macrocarpa</i> ..	..	..	..	..	5,000	„
„ <i>Lawsoniana</i> ..	..	..	..	..	1,500	„
<i>Populus monolifera</i> ..	..	..	..	..	30,000	„
„ <i>fastigiata</i> ..	..	..	..	..	7,000	„
Total ..	..	..	..	..	695,800	

Trees transferred from Nursery to Plantations, &c., 1919-20.

Where sent.				Name of Tree.			Number.
Hanmer Springs Plantation	..	{	<i>Pinus Laricio</i>	..	..	71,900	
			„ <i>ponderosa</i>	..	..	28,250	
			„ <i>radiata</i> ..	..	..	27,000	
			<i>Pseudo-tsuga Douglasii</i>	..	..	32,400	
			<i>Eucalyptus viminalis</i>	..	..	10,000	
						169,550	
Balmoral Plantation	..	{	<i>Pinus Laricio</i>	..	..	370,000	
			„ <i>ponderosa</i>	..	..	49,000	
			„ <i>radiata</i> ..	..	..	86,500	
			„ <i>muricata</i>	..	..	10,000	
						515,500	
Tapanui Nursery	..	..	<i>Cupressus macrocarpa</i>	..	..	3,200	
Farmers and public bodies	..	..	Assorted forest-trees	..	..	17,675	
Total ..	..	..	..	..	..	705,925	

HANMER SPRINGS PLANTATION, CANTERBURY.

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

The work throughout the past year was almost exclusively confined to the general upkeep of the plantation; some thinning, however, was done in the shelter-belts where necessary, and a number of snow-thrown larch were cut out. With the exception of 24,000 Douglas fir used to plant up a disused cropping-area, the replacing of failures constituted the only planting carried out—145,550 trees, comprising *Pinus Laricio* (71,900), Douglas fir (8,400), *Pinus ponderosa* (28,250), *Pinus radiata* (27,000), and *Eucalyptus viminalis* (10,000), being utilized for the purpose. The strike, however, was not altogether satisfactory, the gums proving a total failure. The plantation as a whole is presenting a very fine appearance, and tree-growth throughout has been well maintained. There has been no appearance of disease, with the exception of the green-leaf blight on isolated *Betula alba*, and the usual American blight on *Pinus austriaca*.

The older larch plantations are now showing signs of the need of thinning, and the commencement of this work will probably be necessary in the near future. A ready market can be found locally for all timber cut out, and the proceeds of sales would easily cover the cost of the work. As the result of thinnings of *Pinus radiata*, *Pinus muricata*, and snow-thrown larch 123½ cords of firewood and 244 posts and poles, of a total value of £177 2s. 7d., were disposed of during the year.

Attention was given to the safeguarding of the plantation against fire, and all boundary fire-breaks were ploughed or disked, the internal fire-breaks also receiving attention as far as possible. The usual attention was given to keeping the rabbit pest in check, a permanent rabbitier being engaged for this work, his time being occupied between Balmoral Plantation and Hanmer Springs. The clearing of growth around young trees was done where necessary; the grubbing-out of gorse, broom, and brier entailed a good deal of labour. This work, however, will not be necessary when the trees are forward enough to take care of themselves, which will probably be in another two or three years. There is no sign of damage by deer or other animals.

The daily average number of men employed was 8·2.

Summary showing Area of Hanmer Springs Plantation (2,906½ Acres in Trees).

	How occupied.	Acres.
Pines	...	1,409
Pines and Douglas fir mixture	...	140½
Larch	...	1,177
Douglas fir	...	20
Spruce	...	60
Alder	...	71½
English birch, poplars, willows, &c.	...	28½
Paddocks and cropping-areas	...	230
Roads and fire-breaks	...	150
Land unsuitable for planting, including swamps, river-beds, &c.	...	381½
Total	...	3,668

(Survey incomplete; areas approximate only.)

BALMORAL PLANTATION.

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

The climatic conditions of the past season cannot be said to have been favourable, drying north-west winds having been very prevalent during the spring and early summer months. From the further experience gained of this locality, where the soil is generally of the very poorest description and periods of extreme dryness are frequent, it is quite evident that its afforestation will not be easily accomplished, and that a particularly robust and well-rooted class of tree is essential to ensure a reasonable amount of success annually.

The year's work comprised felling scrub, pitting, and planting, maintenance-work forming only a small item of expenditure. It is regrettable to have to report that the general results obtained from the past season's planting were not good, the loss among the trees dealt with being very heavy. *Pinus Laricio*, which comprised the bulk of the trees planted, was almost a total failure, the rate of loss being 95 per cent. In *Pinus ponderosa* the failures were not quite so heavy. This abnormally heavy death-rate may be mainly attributed to north-west gales which were experienced during the planting period.

All established trees are making excellent headway, and, with the exception of *Pinus austriaca*, which is in places affected by the aphid, have a healthy and vigorous appearance. Trees to the number of 515,500 were planted during the year, and of this number 397,660 were planted on new area, and 117,840 were utilized to replace failures in former plantings. The number of pits opened during the year was 1,356,818, and it is estimated that 841,309 pits are now available for the coming season's planting. The area cleared of scrub was 479 acres, all timber suitable for firewood being set aside for camp use and carted to depots. The new area planted with trees was 260 acres, but it is estimated that almost the whole of this will require replanting.

As the area set aside for afforestation purposes at this station is overrun with rabbits, a permanent rabbitier was engaged to keep the pest in check. Repairs to tools, fences, &c., entailed some labour during the year.

The foreman's cottage, together with the necessary outbuildings, was completed early in the year, and six new huts were erected to provide accommodation for an increased number of workmen. The building of a small smithy will be undertaken at an early date, and the erection of a cookhouse for workmen is also under consideration. As the areas now being operated upon are some distance from the camp, arrangements will soon have to be made for the transfer of the camp to a more central position.

The daily average number of men employed was 13·1.

Summary showing Area of Balmoral Plantation (992 Acres in Trees).

	How occupied.	Acres.
Pines	...	978½
Douglas fir	...	10
Poplars and English birch	...	3½
Fire-breaks, tracks, paddocks, &c.	...	680
Unplanted land	...	5,964
Total	...	7,636

APPENDIX B.

EXTRACTS FROM REPORTS BY THE CONSERVATORS OF STATE FORESTS.

NORTH AUCKLAND.

R. P. GREVILLE, Conservator of State Forests (Commissioner of Crown Lands).

The timber industry generally throughout the North Auckland Land District during the past year has been very brisk, and the scarcity of supplies of sawn timber is every day becoming more acute. Notwithstanding the steadily increasing prices the local demand still keeps up, and great difficulty is being experienced in getting orders fulfilled. Many applications are being received to purchase Crown forests, and high royalties are being offered. Settlers are also now finding a ready market for small lots of standing timber hitherto rejected by sawmillers as being of no value owing to being inaccessible and costly to work.

Local Trade.—In spite of the high prices of timber and high cost of buildings and furniture, both trades have been kept very busy.

Export Trade.—The quantity and value of New Zealand sawn timber exported from Auckland and Kaipara ports during the year was as follows:—

	Sup. ft.	£
Kauri	3,919,610	45,763
White-pine	20,151,300	181,857
Rimu	2,346,887	19,123
Other kinds	4,399,959	17,921
Totals	28,463,707	£264,920

showing a decrease in quantity exported of 24 per cent. and an increase in value of about 15 per cent. on the 1919 returns.

Sawmills.—There are at present about twenty-two sawmills in operation within the North Auckland District, employing about 1,250 hands, and producing approximately 70,000,000 sup. ft. of sawn timber per annum. On the 5th January, 1920, a fire caused the entire destruction of a large sawmill in the Ponsonby district owned by Cashmore Bros. (Limited), and in addition to the loss of the mill and machinery, large stocks of sawn timber were more or less destroyed, resulting in an actual loss of about £5,000, and thereby also adding to the shortage of supplies of timber. The re-erection of this mill is not contemplated, but other sawmillers are proposing to erect one or two large mills in the North if satisfactory arrangements can be made for the purchase of private and Crown bushes.

Prices for Sawn Timbers.—The prices of sawn timber have substantially increased during the year, and at time of writing further increases are being made. The following is a comparative statement showing the increased prices of the various kinds of timber in one particular line of each since the year 1914 to March, 1920:—

	1914.	1920.	Increase
	s. d.	s. d.	per Cent.
Kauri	28 0	45 0	60·7
Rimu	25 0	40 6	62·0
Matai	23 0	41 6	80·4
Totara	25 0	53 0	112·0

Forest Fires.—The Crown forests in this district have been immune from fires during the year.

Timber-measuring.—The total quantity of timber measured during the year was 8,333,423 sup. ft., at a cost, including line-cutting and inspections of other timber, of 1·32d. per 100 sup. ft.

Timber-sales.—The sales of timber made by this Board during the year ended 31st March, 1920, are given below in superficial feet.

—	Kauri.	Rimu.	Kahikatea.	Totara.	Miscellaneous.	Total.	Value.
							£
Crown lands	37,244	..	..	..	40,000	77,244	95
National-endowment lands	892,493	200,000	..	4,310	..	1,096,803	2,507
Education reserves ..	576,652	60,000	148,772	..	..	785,424	1,410
State forests	2,250	..	..	..	..	2,250	3
Totals	1,508,639	260,000	148,772	4,310	40,000	1,961,721	£4,015

The total amounts received as timber royalties and rents for extensions of time during the years are as follows: Crown lands, £107 10s. 9d.; State forests, £426 15s. 6d.; national-endowment lands, £521 6s. 10d.; education reserves, £349 16s. 10d.; total, £1,405 9s. 2d.

Timber-floating Licenses.—Total licenses existing, 65; new licenses issued, 8; licenses renewed, 49; licenses transferred, 2; licenses lapsed, 9.

AUCKLAND.

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

The general condition of the timber industry during the past year has been one of considerable difficulty. Timber-merchants have found it practically impossible to obtain adequate supplies to meet the demand, owing partly to the difficulty of obtaining sufficient skilled labour for bush operations, partly to difficulty of transit to the markets, and partly to the great demand that has arisen as the result of the resumption of building, both for commercial and housing

purposes. Public works of various kinds are being also delayed by the impossibility of securing needed supplies, and efforts have been made to secure arrangements that would ensure a reasonably adequate supply of timber for such purposes, but without success. Discharged-soldier settlers have shared with the rest of the community in having their works, such as the erection of buildings, cow-sheds, and fencing, delayed, at times under circumstances which hampered them considerably in the initial stages of their enterprise. Owing to almost all merchants finding it impossible to build up stocks, there is a great shortage of seasoned timber for joinery and similar purposes.

A number of small mills have been started owing to the great demand for timber, but have not very greatly helped to meet the abnormal demand.

Prices have continued to rise, the last increase having been sanctioned by the Board of Trade; and, while the increasing prices have had no effect upon the demand, the result has been a substantial addition to the cost of building, which has further checked the erection of houses, except for sale.

There has been a satisfactory absence of fires in forests during the year, no serious fires having been reported.

During the year three measuring parties have been engaged practically the whole of their time in the Rangitoto-Tuhua No. 9 Block, near Ongarue, the block comprising about 12,000 acres, which is estimated to average about 10,000 ft. per acre. The quantity of timber measured was 34,080,593 ft., at a cost of £1,294 4s. 7d., averaging slightly under 1d. per 100 ft.

The amounts received on account of royalties and for extensions of time were: For State forests, £76 8s. 1d.; from Crown lands, £1,103 10s. 7d.; from lands for settlement, £22 12s. 6d.; and from national-endowment lands, £1,680 19s. 7d.: being a total of £2,883 10s. 9d.

HAWKE'S BAY.

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

In the northern (Gisborne) end of the district the conditions of the timber industry are very good, and owing to the extra post-war demands for timber the millers have great difficulty in filling orders.

There are five mills working in the northern district—one at Matawai, three at Motuhora, and one at Te Karaka. The output from the log of each kind of timber during the past year is as follows, in superficial feet: Rimu, 5,125,497; matai, 102,528; white-pine, 2,143,727; totara, 12,288; birch, 2,727: total, 7,386,767 sup. ft.

The net wholesale prices charged by timber-merchants in the large centres really require further explanation. The prices were raised on the 1st October, 1919, on the 6th March, 1920, and again on the 1st August, 1920. The millers' price on trucks or skids at the mill from the 6th March to the 1st August, 1920, was—For O.B. rimu and matai (average), 17s. 9d.: rimu—building heart, 21s. 8d.; dressing heart, 29s.; selected heart, 35s.: matai—building heart, 23s. 6d.; dressing heart, 31s.: no fixed price for white-pine or totara. The millers allow the merchants 10 per cent. discount on the above prices, but from the 1st August have raised the price another 2s. per 100 sup. ft. on O.B. and 2s. 6d. per 100 on other timber. Up to the 1st August the timber-merchants were charging 28s. 7d. for O.B. timber, 29s. 10d. for building heart, 42s. 6d. for clean heart, and 50s. for selected heart of rimu. The timber-merchants allow the builders $7\frac{1}{2}$ per cent. discount on these prices. From the 1st August the merchants have raised their prices another 2s. 3d. per 100 sup. ft. on O.B. and 2s. 9d. on other timber.

Approximate Duration of Supplies, &c.—This is a little difficult to estimate, as it is probable that a lot of broken country that would not be considered suitable for milling a few years ago will now be worked. If the price is sufficient to warrant the extra expenditure a lot of broken country with scattered trees will be milled, thus increasing the production. Under present conditions, however, the trade supplies may last another twelve years or thereabouts.

Timber formerly little used.—Tawa is a timber that might be used much more than it has been in the past, more especially for inside work and temporary buildings. A good deal, I believe, is being used in this manner at Tauranga and other Bay of Plenty centres. When exposed to weather it is probably equal to sappy O.B. rimu, and, although somewhat heavier, is quite equal to white-pine for tallow-casks and some other purposes of the kind.

Destruction by Fires.—No timber of any value has been destroyed by fires in this district during the year.

With respect to the southern end of the Hawke's Bay District, there are four mills at present operating—viz., at Puketitiri, Patoka, Ongaonga, and Tangarewa—the two latter being small plants. There is an increased use in the production and use of willow, poplar, and *Pinus insignis*. So far as this part of the district is concerned, the trade supplies will probably not last more than another three years or thereabouts.

The revenue from licenses and sales of timber from Crown lands amounted to £52.

As there is apparently going to be a great shortage of milling-timber in a few years' time, the most use should be made of all the native timbers, as with the most energetic afforestation policy it will take many years to grow sufficient timber to meet requirements.

TARANAKI.

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

I beg to report as follows:—

In this district the bulk of the sawmilling is done in the northern end of the district. Eight mills are operating in the northern end, and about five in the central and southern end of the district. The approximate output would run into about 13,000,000 ft., about half being kahikatea, and the rest chiefly rimu. I have left out one mill with an output of about 5,500,000 ft., as its timber is mostly drawn from the Auckland Land District. Small plants are being put in from time to time to work any area of timber worth while and within a few miles of a railway. A large proportion of the output of the smaller mills is sold to the larger ones for further working up.

In the southern end of the district milling in a small way in the native bush may last for another ten years or more; but in the northern end the present mills will cut out sooner, and even now the bush is being worked over a second time. Attention is beginning to be directed to the conversion of *Pinus insignis* trees for box and case timber.

The timber in the Waitaanga Plateau, mentioned in last year's report, should be investigated. On account of the cost of getting to it, it will require to be let in large areas. One generally adverse feature in the remaining forest is the increased cost of laying down trams (sometimes involving tunnelling through ridges) and the scarcity of experienced labour.

There has been little increased utilization of timbers formerly little used.

No forest has been destroyed by fire during the year.

The following royalties were received: Crown land, £1,013 10s. 2d.; national endowment, £166 14s. 10d. (not paid to State Forests Account).

WELLINGTON.

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

The general condition of this industry is absolutely sound, the mills having more orders on hand than the labour available will enable them to fulfil. A mill turning out 10,000 sup. ft. per diem before the war will now cut only about 7,000 to 8,000 sup. ft. per diem.

There are fifty-eight mills operating, their output being about 350,000 sup. ft. per diem, or about 2,000,000 ft. per annum for each mill, the timber being principally rimu. A number of people are now cutting kahikatea logs and forwarding them by rail to a town factory, which helps to supply crate and box material for dairy-produce.

The prices of sawn timber generally have increased 10 to 15 per cent., a price-list for random lengths disclosing the following quotations, which, though satisfactory to a wholesale dealer, is worthless to a private purchaser for special lengths.

<i>Sawn Timber.</i>						Per 100 sup. ft.			
						s.	d.	s.	d.
Heart—									
Scantling	...	...	...	...	...	22	0	to	36 0
Bridge and building scantling	...	...	...	...	...	25	0	„	37 0
Dressing quality	...	...	...	...	...	30	0	„	38 0
Clean	...	...	...	...	...	35	0	„	40 0
Rough heart	...	...	...	...	...	17	6	„	24 0
Ordinary building—									
Scantling	...	...	...	...	...	16	6	„	17 6
Boards, planks, &c.	...	...	...	...	...	17	6	„	20 6
Dressing quality	...	...	...	...	...	19	6	„	23 0
Second class—									
Scantling	...	...	...	...	...	13	0	„	14 0
Boards, planks, &c.	...	...	...	...	...	14	6	„	16 0
Rough lining	...	...	...	...	...	11	6	„	12 0
Heart, 1s. 6d. extra.									
<i>Dressed Timber.</i>									
Weatherboards—									
Heart	...	...	...	...	...	33	0	„	40 0
Rough heart	...	...	...	...	...	25	0		
Ordinary building	...	...	...	...	...	22	6	„	25 0
Seconds	...	...	...	...	...	17	6	„	18 0
Flooring—									
Heart	...	...	...	...	...	33	0	„	40 0
Rough heart	...	...	...	...	...	25	0		
Ordinary building	...	...	...	...	...	22	6	„	25 0
Seconds	...	...	...	...	...	17	6	„	18 0
Match lining—									
Heart	...	...	...	...	...	33	0	„	40 0
Ordinary building	...	...	...	...	...	22	6	„	25 0

At the present rate of milling most of the mills will cut out in nine years. Small mills are now commencing to cut the logs on milled, felled, and grassed areas. No timbers formerly not used are at present being utilized.

There was no damage to existing forests by fires during the year.

The amount of rents received from State forest areas was £417 3s. 6d., and no royalties were received. The milling-labour problem is acute, and dissatisfaction exists amongst the employees, they being under the belief that the prices charged for timber cut during one day's work pay the wages for a week. The position (to the sawmillers) is, however, not quite so good as claimed, but certainly there is ample margin to justify a considerable increase in the royalties charged.

MARLBOROUGH.

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

Owing to the scarcity of timber for building, every available tree is now being sought after. In addition to the three main mills—Marlborough Timber Company (Opouri), Ward and Co. (Wakamarina), and Bryant Bros. (Pelorus Valley)—mills have been put into the Ronga and Opouri Valleys, the foot of the Rai, and the Mount Rutland State forest, while others are being put into places that would have been scorned in pre-war days.

There are altogether eleven sawmills working in this land district, and the approximate amount of timber cut per annum is—Beech, 160,000 sup. ft.; totara, 5,000; matai, 166,000; rimu, 2,344,000; kahikatea, 1,054,000.

The revival of the industry can, however, only be of short duration, because the areas of bush now being worked are very limited. It is quite evident that in a few years Marlborough must obtain timber-supplies from elsewhere, and a higher price will consequently have to be paid.

During the year £1,528 was received in royalties, from the following sources: Crown lands, £238; State forests, £1,290.

The net wholesale prices per 100 sup. ft. for timber in Blenheim as follows: O.B. rimu, 29s.; heart rimu, 35s.; matai, 44s.; beech, 42s. 6d.; white-pine, 28s. Prices for timber at Kaikoura are generally 25 per cent. dearer than in Blenheim.

As stated in a previous report, the cheapness of water carriage, the working of the forests, and protection from fire make 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 seafront of the Wairau Plain which might be placed in the hands of the foresters. It is low-grade land that could be acquired for very little.

NELSON.

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

The timber industry in this district at present has a bright outlook, and operations show increased activity. Stocks at some of the mills are very low. In view of the brisk demand for all descriptions of timber, the energies of those connected with the business are consequently likely to be severely taxed to meet requirements. It may be expected, with the increased rate in wages and the influx of population, that many will be attracted to mill and bush work: thus the labour difficulty that presented itself at the time of my last annual report might reasonably be provided against.

During the period under review thirty-one mills were working, of which fourteen were cutting from private property. The total output from these was 6,216,000 ft. of sawn timber, made up as follows:—Rimu, 4,501,267; birch, 564,360; white-pine, 1,063,260; totara, 6,225; yellow-pine, 28,788; miscellaneous, 52,100: total, 6,216,000.

The royalties and rents received from the various classes of land were: State forests, £35 7s.; national endowments, £726 5s. 6d.; other endowments, £121 8s. 11d.; Crown lands, £827 1s. 10d.: total, £1,710 3s. 3d.

The net wholesale prices in this city for ordinary building and clean heart timber are:—Rimu—ordinary building, 25s. 6d.; clean heart, 32s. Matai—rough heart, 28s.; clean heart, 39s. 6d. White-pine and red-birch—ordinary building, 25s. 6d.; clean heart, 32s. Brown-birch, 35s.; totara piles, 1s. per foot.

As to the approximate duration of supplies of timber here, it is a matter very difficult to estimate. There are large areas of bush in the district consisting of birch with some rimu which are not being worked at present owing to other areas being more accessible, but it is quite possible that as timber becomes scarce mills will be shifted further back; in fact, several mills in the south have recently been removed into more remote localities, and the bush they are dealing with yields good quantities of rimu and birch, which augurs well for similar undertakings in places heretofore considered out of the way and unworkable. Accordingly, as the more suitable classes of timber are becoming scarcer or more difficult to obtain, those of secondary quality that were previously discarded are now being utilized by millers, and find a ready market. To illustrate the point it may be noted that areas previously worked are again being applied for, in order to deal with smaller trees and those which were at one time considered unmarketable. There is, moreover, very little waste material about the mills, as was the case in times past. Most of this is now used locally, or exported for conversion into boxes. Amongst varieties of timber until recently not much in demand brown-beech and black-beech are now readily disposed of for constructing bridges, buildings, &c., whilst silver-beech is being used for making cases and for other purposes. A considerable amount of *Eucalyptus* and *Pinus insignis* was milled during the past year for manufacturing fruit-cases and for the erection of buildings. Several cottages close to the city are built of these timbers. The milling of exotic timbers cannot be carried on for long at the present rate of cutting, as there is no great quantity of them suitable for milling in this district.

About 100 acres of mixed bush in Aorere Valley was destroyed by fire during the year. As there was a long spell of dry weather during spring and summer seasons, there is no reason to complain of the loss thus sustained, for worse results might have been expected, as selectors are frequently burning off felled bush on areas adjoining forest lands. It is difficult to suggest how to prevent fires extending to standing forest on Crown lands. Tenants holding areas adjoining them should use every care not to start burns when the wind is blowing towards the forests. One would think that it would be unnecessary to direct attention to this necessity. Perhaps the opinion is held by some that they have a better chance of securing a larger area if the bush is disposed of in this way.

The fruit industry is likely to considerably expand within the near future, with the result that treble the quantity of timber will be required for fruit-cases. As white-pine, pukatea, and *Pinus insignis*, which have been utilized to supply this demand in the past, will be cut out in a few years, provision should, I think, be made to produce timber to take its place, and to this end I would suggest the afforestation of certain poor land suitable for the purpose. Farmers in localities adjacent to the fruitgrowing districts, recognizing the need for supplying the demand referred to, are steadily planting portions of their land with *Pinus insignis* and other exotic trees.

WESTLAND.

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

As anticipated in last annual report, the output of sawn timber for the twelve months ending 31st March, 1920, shows a considerable increase, being 48,202,000 sup. ft., or 8,061,900 ft. over the previous year: this is mainly due to more labour being available owing to the return of men from the late war.

About 85 per cent. of this output was rimu, the balance being mostly white-pine, with a small quantity of brown-birch (*Fagus fusca*). About 15,000,000 ft. of the total cut has been taken off freehold and 33,190,300 off Crown and endowment lands. Shipping facilities have been satisfactory, and although at times, owing to scarcity of boats, millers had very large stocks on hand, I believe no mill had actually to stop cutting for lack of storage space, and at the close of the year stocks on hand would not exceed 3,000,000 ft.

The sawmilling industry in Westland is generally in a very flourishing condition; the demand for timber exceeds the supply, and if labour were available to fully man all the mills the output could be increased by probably 20,000,000 ft. yearly. There are forty-four mills, five of which are not working at present; besides these, two large mills have just been completed, and several small mills are in course of erection.

Only one sawmill area and reservation has been so far taken up in State forest in Westland—viz., 630 acres in the Kanieri Survey District, near Rimu. This has been recently granted to a company of discharged soldiers, but they have not yet started cutting operations. Until the Proclamation of the provisional State forest areas in May last this was the only State forest in the land district. These provisional State forest areas at present include nearly the whole of the Crown lands in Westland, and it is anticipated that most of the national-endowment lands will shortly be similarly proclaimed.

There has been an unprecedented demand for timber areas during the past year, some 40,000 acres having been taken up under the Mining Act, most of this area being first-class bush which would yield some 20,000 sup. ft. per acre.

Some bush lands supposed to have been cut out years ago are also being taken up again by small parties, much smaller timber being now cut than would formerly have been considered profitable.

Exclusive of those deemed to be goldfields revenue under section 148 (a) of the Mining Act, the following rents and royalties have been received (they are not, however, paid to State Forest Account): From national-endowment land, £8,365 0s. 3d.; from Crown lands, £49 16s. 5d.; from other endowments, £3 12s. 6d.: total, £8,418 9s. 2d.

Prices obtained for timber show a considerable rise from last year, the following being realized f.o.b. at Greymouth: Rimu—clean heart, 24s.; clean, 18s.; ordinary building, 14s. White-pine—12 in. and over, 23s. 6d.; under 12 in., 22s. 6d.; seconds, 17s. 6d.; seconds for fruit-cases, 15s.

Any estimate as to the length of time that the millable timber in the district will last is necessarily only a very rough one, as there are no very definite data to go by; but I consider that at the present rate of output there will be enough accessible timber for from thirty to forty years.

During the past year no milling-bush has been destroyed by fire in this district.

The only timber formerly considered of little use for which the demand is increasing is brown-birch (*Fagus fusca*), which is chiefly used for bridge-work and in connection with mining. Silver-pine is becoming scarce, though always in good demand for sleepers, posts, &c.

CANTERBURY.

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

The Conservator of Canterbury reports that he has nothing to add to his report of last year.

From a price-list supplied it is seen that the merchants' price of timber at Christchurch is: For rimu and white-pine—unseasoned O.B. up to 8 in. wide, 29s.; up to 10 in. wide, 35s. 9d; for black-pine—clean heart up to 8 in. wide, 54s. 6d; for totara—clean heart up to 12 in., 59s. 6d.; for New Zealand beech (birch) up to 8 in., 40s.; for *Pinus insignis*, 25s.—all at per 100 sup. ft.

The amount received as rent from State forests during the year was £510 12s. 8d.

OTAGO.

ROBERT SADD, Conservator of State Forests (Commissioner of Crown Lands).

The timber industry in Otago is in a flourishing condition. The demand is much greater than the supply, and builders generally find it difficult to get sufficient timber from the mills. The labour-supply is still short, though not perhaps so bad as it had been during the previous two or three years. The shortage of railway trucks has hampered the industry to some extent.

There are eight mills working steadily, and two or three others about to start. The total output last year would be about 7,000,000 sup. ft., but the possible output with plenty of labour would be much more. The different classes of timber milled would be approximately as follows: Rimu, 3,500,000; miro, 1,500,000; matai, 200,000; totara, 50,000; kahikatea, 200,000; birch, 1,450,000.

In Otago the bush, with rare exceptions, is mixed; but rimu and miro are the most plentiful generally. Birch is next in order of quantity, and as a timber for general purposes it is coming more into demand as time goes on. Totara and kahikatea (white-pine) are becoming scarcer every day.

The amounts received as timber royalties and rents were as follows: Crown lands, £246 14s. 3d.; national-endowment lands, nil; State forests, £130 14s. 5d.

The wholesale prices of timber in Dunedin were as follows: Rimu, O.B., 8 in. wide, 29s.; 10 in. wide, 31s.; rimu, heart, 8 in. wide, 35s. 6d.; 10 in. wide, 37s. 6d.; rimu, clean heart, 8 in. wide, 38s. 6d.; 10 in. wide, 40s. 6d.; black-pine (matai), all heart, up to 8 in. wide, 46s.; totara, all heart, up to 8 in. wide, 51s. 6d.; all the foregoing at per 100 sup. ft. An advance of 2s. per 100 is shortly to be made on these prices. Miro is the same price as matai, and kahikatea the same price as rimu.

The supply of timber in Otago should last probably 18 to 20 years yet. There is yet a fairly substantial area of unexplored and unsurveyed bush in this land district; but the probability is that the greater part of that is birch forest. Much of it, too, is rather inaccessible, and the expense of getting it out will be very heavy.

No part of the forest has been destroyed by fire during the past year.

SOUTHLAND.

THOS. BROOK, Conservator of State Forests (Commissioner of Crown Lands).

The general condition with regard to the timber and milling industry in Southland for the year ending 31st March, 1920, is not yet satisfactory, chiefly owing to the shortage of labour, most of the mills working half-handed, thus resulting in a small output. The demand for timber is very good, but the mills under present conditions are unable to cope with it. The demand for white-pine (kahikatea) and beech (*Fagus Menziesii*) is still increasing, but some millers are sending out green beech manufactured into cheese-crates, &c., which is not desirable, as it tends to injure the beech trade.

There are thirty-nine mills working out of forty-eight in working-order during the year, seven of which were in Crown land, sixteen in State forest, twelve private, two Native, one private and Crown, and one Native and Crown.

The quantity of each timber produced during the year was as follows: Rimu (red-pine) and miro, 10,000,000 sup. ft.; kahikatea (white-pine), 5,600,000; beech, 4,100,000; matai (black-pine), 400,000; totara, 350,000; total, 20,450,000 sup. ft.

The royalties and rents received were as follows: State forests, £2,380; licenses and sales of timber from national endowment, £50; licenses and sales of timber from Crown lands, £537; licenses and sales of timber from lands for settlement, £3; total, £2,970.

Merchants' price-list as follows: O.B. rimu and beech—up to 8 in., 18s. 6d.; up to 10 in., 20s.; clean quality, 21s. 6d. and 23s. 6d. respectively; heart, 23s. and 24s. 6d. Matai—up to 8 in., 21s. 6d.; all heart, 29s. Totara—up to 8 in., 26s.; all heart, 33s. Trade discount to merchants only is 10 per cent. if delivered in their yards, and 7½ per cent. if delivered to customer.

Although a decidedly dry year, there has been practically no destruction by fire of any maiden bush. The Otautau Sawmilling Company's mill, near Otautau, was burnt out, a northerly gale spreading the fire through 300 acres or more of old workings.

The timber areas in Southland are, as a rule, now being cleanly cut out, very little timber of any commercial value being left standing. The approximate average cost of producing sawn timber is about 10s. 6d. per 100 sup. ft.

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