1929.

NEW ZEALAND

STATE FOREST SERVICE.

ANNUAL REPORT OF THE DIRECTOR OF FORESTRY FOR THE YEAR ENDED 31ST MARCH, 1929.

Presented to both Houses of Parliament pursuant to Section 64 of the Forests Act, 1921–22.

THE DIRECTOR OF FORESTRY to the Hon. the COMMISSIONER OF STATE FORESTS.

SIR,— Wellington, 9th August, 1929.

I have the honour to submit herewith the annual report of all operations of the State Forest Service for the year ended 31st March, 1929, as required by section 64 of the Forests Act, 1921–22.

I have, &c.,

E. PHILLIPS TURNER,

Director of Forestry.

Hon. W. B. Taverner.

Commissioner of State Forests.

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REPORT.

INTRODUCTORY.

The year 1928–29 constituted a new record for State afforestation in New Zealand and for the British Empire, and one which may not again be reached in this Dominion. This was the establishment of 57,406 acres of new plantations, an increase of 22,300 acres as compared with the previous year, or nearly treble the area planted during 1926–27. This abnormal increase was due to the necessity for providing employment for those out of work during the winter months, by way of an increased and accelerated planting programme involving the engagement of approximately 1,300 labourers at the peak period.

The total area administered by the Forest Service is now 7,776,915 acres, or approximately 12 per cent. of the superficial area of the Dominion. It is considered, however, that this should be substantially increased to ensure a reasonable margin of safety.

The trade depression through which the milling industry has been passing is clearly reflected in the reduced timber-sales for last year, involving a further marked decrease in forest revenue. The re-establishment of this important primary industry is, however, slowly but surely progressing, and there are already signs of increased acceleration in this direction.

The sales of trees and seeds continue to decline slightly, but this was not unexpected.

The major operation of the Forest Products Branch was a thorough investigation of the wood-pulp and paper industry. This matter is referred to in detail in a later portion of this report.

The increased and varied operations of the Service have created a very busy year, and have taxed all members of the staff to their utmost capacity. Without this loyal support and co-operation the results herein recorded could not have been attained with such a degree of efficiency and economy.

CHAPTER I.—THE STATE FORESTS.

1. General.

Summary of Areas under Control.

From the figures shown in Table 1 it will be seen that the net increase in the area under control for the past year is 68,426 acres. The area under permanent State-forest reservation was actually increased by 91,461 acres, but this was offset by a decrease of 22,836 acres of provisional State forests which were made available for settlement or other purposes.

TABLE 1.

STATE AND PROVISIONAL STATE FOREST AND FOREST RESERVES.—AREA (IN ACRES) AT END OF FISCAL YEAR, 1929.

Land District.	Area at End of Fiscal Year 1927–28.			Changes in Area during the Fiscal Year 1928–29: Net Increase.			Area at End of Fiscal Year 1928–29.			Percentage of Area of Land District in Permanent and Provisional State Forest and Forest Reserves.
	State Forest.	Provisional State Forest.	Forest Reserves.	State Forest.	Provisional State Forest.	Forest Reserves.	State Forest.	Provisional State Forest.	Forest Reserves.	
N. Auckland	116,303	57,105	..	799	132*	..	117,102	56,973	..	3·9
Auckland ..	380,172	490,478	2,316	54,571	170*	..	434,743	490,308	2,316	11·3
Gisborne ..	87,696	209,388	11,160	..	..	..	87,696	209,388	11,160	8·75
Hawke's Bay	113,637	1,500	5,254	32*	..	199	113,605	1,500	5,055	4·1
Taranaki ..	69,757	46,175	40,455	..	571	..	69,757	46,746	40,455	6·52
Wellington ..	461,096	113,818	14,007	2,348	3,063*	..	463,444	110,755	14,007	8·34
Nelson ..	27,715	1,975,415	8,470	4,198	631*	..	31,913	1,974,784	8,470	42·74
Marlborough	89,497	120,625	12,062	..	..	..	89,497	120,625	12,062	8·04
Westland ..	2,190	1,712,117	119	..	19,411*	..	2,190	1,692,706	119	43·9
Canterbury..	329,424	..	319	22,599	..	..	352,023	..	319	3·8
Otago ..	133,888	332,350	2,108	6,978	..	..	140,866	332,350	2,108	5·25
Southland ..	136,497	605,376	..	..	..	..	136,497	605,376	..	9·44
Totals ..	1,947,872	5,664,347	96,270	91,461†	22,836*	199*	2,039,333	5,641,511	96,071	..
	7,708,489 acres			68,426 acres			7,776,915 acres			

* Decrease. † Net Increase.

Legislation.

The legislation relating to State forests enacted during the year under review is contained in section 71 of the Public Reserves, Domains, and National Parks Act, 1928, and sections 14 and 20 of the Reserves and other Lands Disposal Act, 1928.

Under the first-mentioned statute power was taken to declare that any State forest shall be a national park on the joint recommendation of the Minister of Lands and the Commissioner of State Forests.

By section 14 of the Reserves and other Lands Disposal Act, 1928, the provisional State-forest reservation over three areas in Waiho, Mount Cook, and Waitaha Survey Districts, Westland Land District, comprising 14,502 acres 2 roods 20 perches, was cancelled, and the lands were set apart as scenic reserves under the Scenery Preservation Act, 1908.

Section 20 of the Reserves and other Lands Disposal Act, 1928, cancelled the reservation of Section 17, Block VIII, Rankleburn Survey District, containing 504 acres, as a scenic reserve and set it apart as a State forest subject to the provisions of the Forest Act, 1921–22.

Removal of Restrictions on Export of Timber.

By Order in Council made on the 24th April, 1928, and published in the *Gazette* of the 28th April, 1928, page 1191, the regulations made under the authority contained in section 47 of the Customs Act, 1913, and section 24 of the Regulation of Trade and Commerce Act, 1914, imposing restrictions on the export of timber, were revoked.

Conditions Relating to the Sale of, and to the Grant of Licenses to Cut Standing Timber.

By Order in Council made on the 25th June, 1928, and published in the *Gazette* of the 28th June, 1928, page 2120, the regulations made under the authority contained in section 34 (6) of the War Legislation and Statute Law Amendment Act, 1918, imposing conditions on the sale of standing timber and on the grant of licenses to cut standing timber on public or private lands of any tenure, were revoked.

2. Finance.

Forestry finance is greatly simplified when it is possible to operate under a long-term programme, particularly with respect to seed purchase and collection, nursery stocks, and land-preparation. During the past three years these aspects have necessarily been subordinated to those of Dominion policy with respect to unemployment and finance generally, but it is hoped that with the return to more stable economic conditions within the Dominion it will be possible to follow the lead of Great Britain at least to the extent of establishing a ten-year programme under main projects.

As will be observed from the detailed statements hereunder, the revenue from indigenous forests is heavily reduced by statutory payments in favour of local bodies and the National Endowment Account, and that during recent years the residue has been little more than sufficient to meet the expenses of supervision and management; consequently the establishment of plantations has been financed almost exclusively from loan-moneys. The value and the equity of these endowments for roading, pensions, and education are unquestionable, but regarded purely from a forestry viewpoint they have had the practical effect of loading upon the 7¼ million acres of State forests during the past four years an equivalent to a "yield tax" of £19,000 per annum, or approximately ⅔d. per acre.

During the past two years the purchase of land has been confined to areas required for the carrying-out of the afforestation objective. Large indigenous-forest areas, however, still remain under the control of private or Native owners, and the bringing of many of these extensive areas under State ownership is desirable from a forestry point of view. In the past, relative financial expediency has, however, been the dominating factor.

A review of the current year's operations, in the form of a Receipts and Payments Account and a comparative analysis of receipts and payments from 1920 to 1928, supplemented by Statements covering the loan authorities and working-balances of the Service since 1927, are presented hereafter under Appendices III, IV, V, and VI. In addition, financial accounts on commercial lines are published by the Treasury in a parliamentary paper (B.–I [Part IV]).

An interesting feature of the accounting machinery has been the recent introduction of a "budget system," whereby the financial requirements are assembled in the field and made available for considered review before the opening of each financial year, with quarterly reviews of physical progress in comparison with the expenditure. This has greatly improved the accuracy of field and financial organization, and tended towards more careful and economical administration.

Stores rules and instructions governing the receipt, issue, and custody of stores were completed during the year, received the sanction of Treasury and Audit, and were issued for the guidance of officers concerned.

Costing systems relative to nursery and plantation operations were also reorganized upon recognized commercial lines, and are now being put into operation throughout all projects, designed in such a manner that officers in charge have constantly available the essential field costing-data to enable them to measure the degree of economy attending the progress of their projects before any serious miscalculation can arise.

Receipts.

The forest receipts for the past financial year from all sources were £90,114, details of which, together with comparisons over a period of three years, are enumerated hereunder:—

TABLE 2.

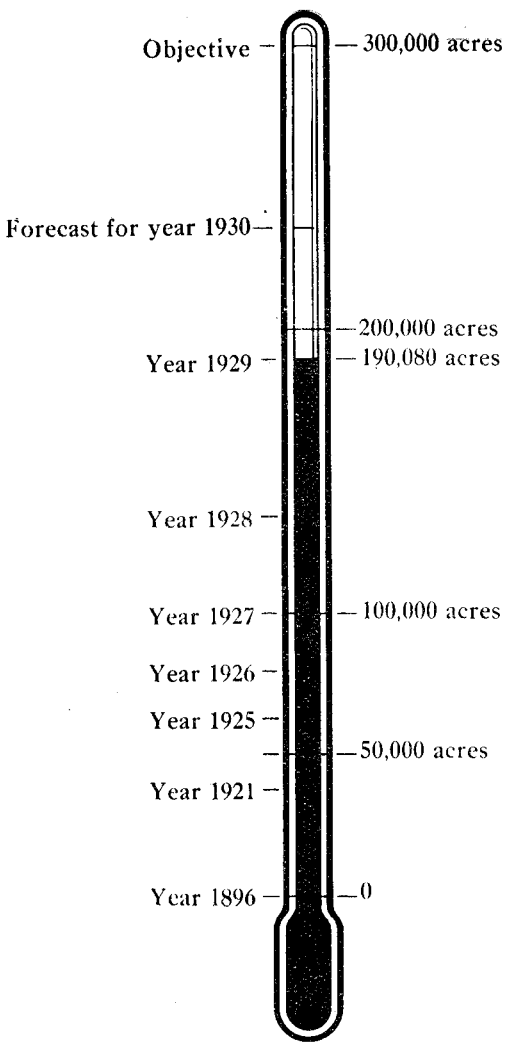
Item.	1928–29.		1927–28.		1926–27.		1925–26.	
	£	£	£	£	£	£	£	£
Forest receipts—								
Timber-sales	49,009		75,756		85,542		107,122	
Timber royalties	7,818		5,274		3,816		6,464	
Timber trespass	137		354		71		83	
Leases—								
Grazing	2,332		3,088		2,806		2,527	
Sawmill-sites, industrial, &c.	1,339		1,845		1,225		1,646	
License and transfer fees	128		121		117		113	
Miscellaneous licenses	137		102		280		167	
Permits—Grazing and miscellaneous	255		333		456		564	
Kauri-gum	221		132		238		627	
Fees for inspections and reports	314		703		620		318	
Interest on overdue promissory notes	93		135		213		149	
Rental of houses	117		80		92		77	
Opossum revenue	4,741		4,098		4,680		4,074	
Miscellaneous	2,798		2,209		544		..	
National Endowment Account allocation	8,249		9,898		14,114		17,044	
	77,688		104,128		114,814		140,975	
Less adjustments	..		..		749		1,969	
		77,688		104,128		114,065		139,006
Nurseries and plantations—								
Trees	8,572		7,711		10,229		10,281	
Seeds	977		1,667		1,934		1,510	
Firewood and poles	1,014		276		178		115	
Grazing	639		438		854		565	
Rental of houses, &c.	885		879		763		672	
Miscellaneous	339		299		543		401	
		12,426		11,270		14,501		13,544
Totals		90,114		115,398		128,566		152,550

Payments.

The net expenditure from the State Forests Account for the past financial year was £325,170, a detailed analysis of which is set out hereunder; also comparisons with the years 1925–26, 1926–27, and 1927–28.

TABLE 3.

Item.	1928–29.		1927–28.		1926–27.		1925–26.	
	£	£	£	£	£	£	£	£
Fixed charges and staff salaries—								
Interest and loan expenses	..	44,189	..	35,040	..	29,077	..	28,132
Allocation of revenue—								
National Endowment Account	7,469		13,885		15,659		9,741	
Local-body payments	7,284		6,983		9,061		6,141	
		14,753		20,868		24,720		15,882
Staff salaries—								
Capital	23,184		16,476		17,075		11,103	
Operational	21,364		27,194		22,783		25,912	
		44,548		43,670		39,858		37,015
Management, establishment, and development—								
Capital charges—								
Indigenous State forests — Buildings, equipment, &c.	4,815		3,474		4,204		3,082	
Fire-fighting equipment, &c.	287		182		73		38	
Educational—Reference library, &c.	140		180		107		213	
Research and experimental equipment	1,732		2,059		2,402		3,615	
Afforestation—Nurseries and plantations	154,184		108,876		78,418		61,315	
Sand-dune reclamation	1,263		1,966		2,312		2,595	
		162,421		116,737		87,516		70,858
Operational expenses—								
Indigenous State forests and general	17,218		15,840		17,839		15,500	
Fire-prevention	1,967		3,166		1,524		1,553	
Educational—Publications, &c.	758		472		1,094		1,164	
Utilization and silvicultural research	5,218		5,181		2,472		2,158	
Preparation of planting plans, &c.	4,944		2,918		1,611		1,358	
Miscellaneous	5,943		257		744		74	
		36,048		27,834		25,284		21,807
Land-purchases—								
Indigenous forest areas	..		830		18,639		16,161	
Plantation-extension	23,211		18,352		11,181		17,764	
		23,211		19,182		29,820		33,925
Totals		325,170		263,331		236,275		207,619



GRAPH 1.—STATE PLANTATIONS ESTABLISHED FROM 1896 TO 1929, FORECAST FOR YEAR 1930 (47,000 ACRES), AND FOREST SERVICE TREE-PLANTING OBJECTIVE.

3. AFFORESTATION OPERATIONS IN GENERAL.

A total area of 57,406 acres was planted during the year, which makes a grand total of 190,000 acres established to date and leaves 110,000 acres of the 1925 objective of 300,000 acres to be completed by 1935. The accompanying graph shows at a glance the progress in State afforestation.

This substantial advance over the programme has occurred by reason of the fact that afforestation has again been utilized by the Government to assist in reducing unemployment during the winter months, and has involved large nursery programmes and extensive plantation operations, which are illustrated by appendices hereto.

The progress made to date and the areas established in each conservation region are analysed in Table 4. An approximate five-year programme is also included, which is based upon the assumption that a gradual improvement in the labour conditions of the Dominion will be experienced.

TABLE 4.

Region.	Plantation.	Area planted.*	Balance of Area available for Planting, including Firebreaks.	Approximate Planting Programme (estimated only).				
				1929.	1930.	1931.	1932.	1933.
		Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.
Auckland	Riverhead ..	5,938	3,765	2,650	750	..	..	..
	Maramarua ..	3,163	10,796	2,650	2,000	2,000	2,000	1,000
	Minor areas ..	1,357	..	..	..	..	..	..
Rotorua	Whakarewarewa ..	7,677	84	..	..	..	..	..
	Waiotapu ..	7,352	700	650	..	..	..	..
	Kaingaroa ..	111,382	84,000	23,000	20,000	17,000	10,000	5,600
Wellington ..	Karioi	6,956	17,980	2,500	4,000	4,000	3,000	2,800
Nelson-Marlborough	Golden Downs ..	2,959	7,900	3,500	2,000	1,200	..	..
	Minor areas ..	347	..	..	..	..	..	..
Westland	Westland ..	1,488	220	200	..	..	..	..
Canterbury-Otago—								
North Canterbury	Hanmer Springs ..	7,365	280	280	..	..	..	..
	Balmoral	17,504	1,330	1,200	..	..	..	..
	Eyrewell ..	3,135	13,750	5,320	3,000	2,500	1,560	..
Central Otago ..	Naseby	2,560	2,990	2,750	..	..	..	..
	Greenvale, Dusky, and Conical Hills	7,944	160	..	..	..	..	..
	Blue Mountains ..	8,318	1,700	1,530	..	..	..	..
	Minor areas ..	867	..	..	..	..	..	..
Southland	Longwood ..	268	..	..	..	..	..	..
	New scheme ..	..	8,000†	..	1,000	1,500	2,000	1,500
	Total ..	196,580	153,655	46,230	32,750	28,200	18,560	10,900

* Includes 7,042 acres established by direct seeding. † Approximate.

Future operations in this respect will to some extent be affected by the Government's pronouncement that the question of forestry is to be regarded as fundamentally a land-use problem, calling for full co-ordination between the Departments of Lands, Agriculture, and Forestry. In future, therefore, all unplanted afforestation areas will be re-examined in conjunction with the officers of those Departments, particularly with respect to soil-analysis and general suitability for settlement purposes. It will be appreciated, however, that the adjustment of a forestry programme is governed largely by such physical factors as the availability of tree-seed from overseas, nursery stocks, suitable land, mobility of equipment, &c., and therefore a period of some years may elapse before any substantial change of objective can be fully effective.

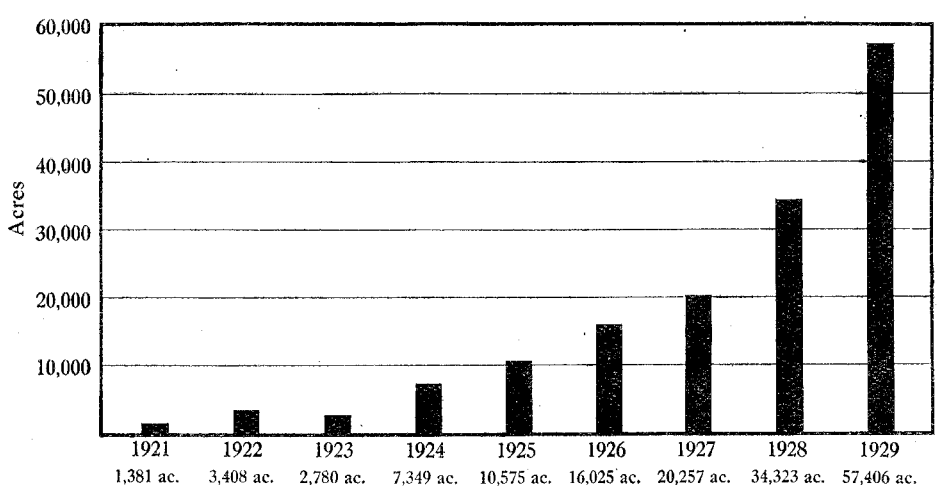
In the past the main planting activities of the State have been carried out upon the Rotorua–Taupo pumice lands, but these remaining areas will now be governed by a policy of careful demarcation and utilization for agricultural purposes. Notwithstanding this fact, however, ample areas should still be available to justify the continuation of planting in the pumice region, although probably on a much smaller scale than heretofore.

The extensive coastal sandy wastes of the North Island and the arid and rocky country of the South Island have been examined for afforestation purposes, but it is considered that both these classes of country are unsuitable, because, although trees can be grown on such lands, the cost would be too great to justify the State in doing so as a commercial afforestation proposition, apart from the fact that such areas are usually remote from markets and are indifferently served by roads and railways. The alternative, therefore, is to select reasonably-sized and suitably-situated blocks throughout the country which are not, and never can be, classed as arable, and are not at present profitable pasture-lands.

If the intensity of pasture-management in the Dominion increases to such a degree during the next half-century as to ensure the profitable settlement of some of this now marginal and ultra-marginal land, arrangements to this end can be made after one forest rotation, and the land thus released will have been appreciably improved by the tree crop, and by forest roads, tracks, and drains; and it will have been revenue-producing in the interim. It is probable that some of the land now being afforested by the State comes within this category; but this proportion is comparatively small, and the initial stages of any policy must of necessity be on general lines, with detailed adjustment later as experience and practice prove desirable.

With the commencement of afforestation for Nelson Region (referred to in last year's report), tree-planting is now proceeding in all forest-conservation regions, with the exception of Southland. The claims of this province have not been overlooked, and numerous properties have been inspected and reported upon in the endeavour to secure an area of sufficient size and suitable access to constitute an economic plantation unit. A *sine qua non* in this connection is land of inferior farming-value in proximity to a railway or main highway, but, as the great bulk of the easily accessible land in Southland is too valuable to be used for tree-planting, it has hitherto not been possible to acquire suitable property. Certain proposals are now receiving Governmental consideration, and it is hoped that the timber requirements of this province will be adequately met in the near future.

A new afforestation project, known as Eyrewell Plantation, was commenced in Canterbury by the purchase of 17,228 acres of poor, freehold, scrub-covered country situated about twenty-seven miles by road from Christchurch, on the banks of the Waimakariri River, and, as will be seen in Appendix II, 3,135 acres have already been planted. With practically no indigenous forests of economical value, Canterbury is less fortunately situated than her sister provinces, and for many years has had to go beyond her borders to secure her domestic timber requirements. It is hoped, however, that this long-felt need will in time be met, in a measure at least, by the extensive exotic plantations at Hanmer Springs, Balmoral, and Eyrewell.



GRAPH 2.—COMPARISON OF ANNUAL TREE-PLANTING OPERATIONS IN STATE-FOREST PLANTATIONS FOR YEARS 1921–29.

Operating-costs.

The following costing statement, based upon actual out-of-pocket expenditure upon afforestation over a period of seven years, has been prepared to illustrate comprehensively the progress made in this aspect of the Service's activities.

TABLE 5.

STATEMENT SHOWING AREA ESTABLISHED, AREA MAINTAINED, NET COST OF AFFORESTATION, AND COMPARATIVE COST OF ESTABLISHMENT PER ACRE.

Year.	New Areas established.	Direct Seeding.	Area maintained.	Direct Cost.	Overhead, Salaries, &c.	Interest paid on Loans.	Total Cost.	Receipts from Sales, Trees, &c.	Net Cost.	Cost per Acre.
	Acres.	Acres.	Acres.	£	£	£	£	£	£	£ s. d.
1922–23 ..	2,800	..	41,400	30,800	8,600	22,000	61,400	7,400	54,000	5 12 2
1923–24 ..	7,300	..	44,200	37,300	9,300	18,200	64,800	8,200	56,600	3 17 7
1924–25 ..	10,600	..	51,500	50,200	9,000	17,400	76,600	11,300	65,300	3 8 4
1925–26 ..	16,000	..	62,100	63,900	11,100	21,000	96,000	13,500	82,500	3 2 10
1926–27 ..	20,300	1,300	78,100	80,700	17,100	24,500	122,300	14,500	107,800	3 4 1
1927–28 ..	34,300	2,400	99,700	110,800	22,000	33,800	166,600	11,500	155,100	3 0 2
1928–29 ..	57,400	3,300	136,400	155,400	23,200	44,200	222,800	12,500	210,300	2 11 11
Total for seven years	148,700	7,000	513,400	529,100	100,300	181,100	810,500	78,900	731,600	3 2 0

For this purpose it has been assumed that the average cost of establishing 1 acre in trees is equivalent to the maintenance of 6 acres or the direct seeding of 3¼ acres.

These costs do not include the value or cost of the land, or depreciation on capital expenditure prior to 1922. Such a costing unit is an arbitrary one, and of value only for comparative and average costing purposes.

Costs of establishment and maintenance vary considerably by reason of climatic, locality, and other factors, but the above accumulated costs are allocated to each project, and appear annually in the summary of plantation operations, published as a part of parliamentary paper B.–I [Part IV].

However, these costs demonstrate that large-scale planting, combined with economy in administration and the judicious use of machinery, has ensured a gradual reduction in the net cost of establishment per acre.

4. WILD LIFE.

As the Service aims at effective control of the terrestrial wild animals within State forests, and its primary responsibility is the conservation and perpetuation of the indigenous forests, together with the establishment of exotic forests where financial and climatic reasons demand it, its present fundamental concern is the control or extermination of certain pests which have been introduced either by way of acclimatization or by domestic species which have become feral. This is vital to the conservation and protection of the forests and their indigenous inhabitants.

It is clear that the water-flow from forested lands is being appreciably affected in many localities owing to these and other agents, which unnecessarily disturb Nature's balance. It is also clear, and has been stressed by many interests other than those of forestry, that much land is being ruined by overgrazing by wild animals, and the consequent erosion of steep and unstable mountain-sides. Thirdly—and this is the prime motive actuating the Service—it is indisputable that our forests are supporting an alien fauna, whose excessive numbers are reflected in an unhealthy condition of the indigenous forests and, in many districts, in a potentially unhealthy condition and an unnecessarily high establishment cost of exotic plantations. In some few districts the presence of this alien fauna renders futile any attempt at afforestation; and, unfortunately, all too often these districts are the ones which would benefit most from judicious planting. Many contingent factors, however, must be considered, the chief being the question of safeguarding those rights which have become vested and must therefore be respected. The Forest Service, of course, confines its activities to the areas within its jurisdiction, and outside these areas it relies upon public sympathy and the co-operation of those societies formed for the safeguarding of kindred objectives. The following is a brief outline of the activities during the year.

Opossums.

During the past year an open season for the taking of opossums was declared throughout New Zealand. The condition of the skins and the reduction of numbers from certain areas point, however, to the advisability of observing close seasons, particularly in many of the southern localities.

Trapping out of season was prevalent, particularly in the Wellington District, in which approximately 50 per cent. of the opossums are caught, and in which the State forests have such easy main-road access. The use of cyanide of potassium for the destruction of opossums is prevalent and widespread, and cannot be too strongly condemned. Detection and proof of the offence are very difficult, and, moreover, this poison causes destruction not only of opossums, but of bird-life also. It is therefore urged that heavy penalties be imposed upon those convicted of using the poison, which is, unfortunately, comparatively easy to procure in many localities.

During the year a rigorous patrol of State forests was maintained, and in consequence twelve convictions for illegal trapping, &c., were secured. Fines totalled £106, and the number of skins confiscated was 624, representing a sale value of £332 11s. 5d.

Although the recorded number of opossums caught throughout New Zealand shows a slight increase, it is believed that the animals have actually decreased, but that more skins are being forwarded for sale through legitimate trading channels owing to more efficient field supervision.

The opossum-fur industry has wide possibilities, but its trade value is yearly depreciating owing to the poor breeding-stock remaining in the forested areas. To enable the industry to maintain a high standard of fur-product it is probably desirable that new blood be imported and liberated. Before this is done, however, the Government requires to be assured that the opossum is not harmful to native bird-life. A thorough investigation should be made of the life-habits of these animals in New Zealand, as the question is of great importance and has a direct bearing upon the formulation of working-plans for each State forest.

An experiment has been commenced in the Wellington Region by the demarcation of one State forest into twenty suitable opossum-trapping areas. The trapping-rights and general supervision, control, and protection over these blocks for five seasons will be ballotted for by selected applicants. It is hoped by this means to procure regular employment for a number of seasonal workers, to reduce the administrative work caused through the large number of applicants desiring trapping-rights, to prevent the destruction of immature opossums, and to increase the efficiency of trappers.

The total revenue and share of licenses paid to the State Forest Account amounted to £4,740 19s. 7d., an increase of £653 compared with the year 1927–28. The whole of this revenue was applied towards the cost of destruction of deer, pigs, and goats in the State forests, and to the protection of native bird-life.

Deer.

The payment of a bounty of 2s. per tail has been continued. In Nelson Region 2,564 tails were received; in Southland, 3,370; Canterbury-Otago, 3,837; Westland, 560. Fifty-three red deer were also destroyed in Golden Downs Plantation, Nelson; 41 were shot in the Rotorua plantations, and 70 on Stewart Island: a total for the year of 10,495.

The establishment of "salt licks" has not yet proved successful in indigenous forests, but there is definite evidence that deer are attracted to the licks in the exotic plantations.

Deer-destruction is now being carried out systematically by parties under Forest officers in all infested areas. Assistance is being given by exporters in testing the world's markets for the utilization of hides, horns, and venison, with a view to enhancing the commercial value of the pest and in order that a reduction in numbers may be achieved at as low a cost as possible.

An official party was engaged in the Lilburn Valley, Southland Region, for a period of three months, during which time 353 red deer were destroyed. In the Blue Mountains Plantation (Canterbury-Otago Region), in which the depredations of fallow deer have been very severe, an official party during a period of three weeks shot approximately four hundred. An official shooting party is at present being organized in the southern portion of the Nelson Region. The anticipated result of this experiment is the destruction of a further one thousand deer. The Service has made arrangements in this region to collect deer-hides and to forward them to various exporters in an endeavour to increase the demand overseas.

The sale value of red-deer hides ranges from 4s. to 5s. 3d. each, according to size and the method of fleshing and drying. There is undoubtedly a good market for medium-sized well-dried red-deer hides for utilization in fine leather-work. Certain overseas manufacturers have been favourably impressed with the qualities of these hides, and it is anticipated that values will increase in the near future.

An experimental shipment of fallow-deer hides was also made, but so far the results have not been successful as a business proposition. Fresh avenues, however, are now being explored.

There is no doubt that at the present time deer constitute the most serious menace to the State-owned forests, and in consequence of their great numbers the forest-floor has in many places been completely despoiled. In many parts of New Zealand regeneration has disappeared, and the plants which furnish most of the honey and berries upon which native birds subsist have been completely destroyed. Deer-destruction has not yet overtaken the annual increase of the herds; malformation is prominent, and good heads are not obtainable in many districts.

Probably the damage is most apparent in high country, above the bush-line. The major alpine plants are obviously a staple diet, and the formation of screes at the headwaters of snow-fed rivers is accelerated and increased in area by the removal of this vegetation. Increased erosion and larger deposits of detritus on low country are the direct result. The true remedy for much of the present high-country erosion, particularly in Canterbury, is afforestation with high-altitude species for protection purposes. This remedy is quite impossible of application in deer-infested country, as the young trees are immediately eaten out.

Notwithstanding the efforts made by some of the acclimatization societies to control this pest, it has reached such proportions, and constitutes such a grave danger to the perpetuation of our native flora and fauna, that it is now a national problem and should be nationally controlled.

From the purely departmental point of view, it would appear that the Forest Service is carrying the chief financial burden of deer-control, and this expenditure must be reflected in the future cost of timber from exotic plantations.

Goats.

Goats constitute a menace to the Taranaki, Wellington, Nelson, and Canterbury forests, and field officers have been instructed to carry rifles and energetically carry out goat-destruction.

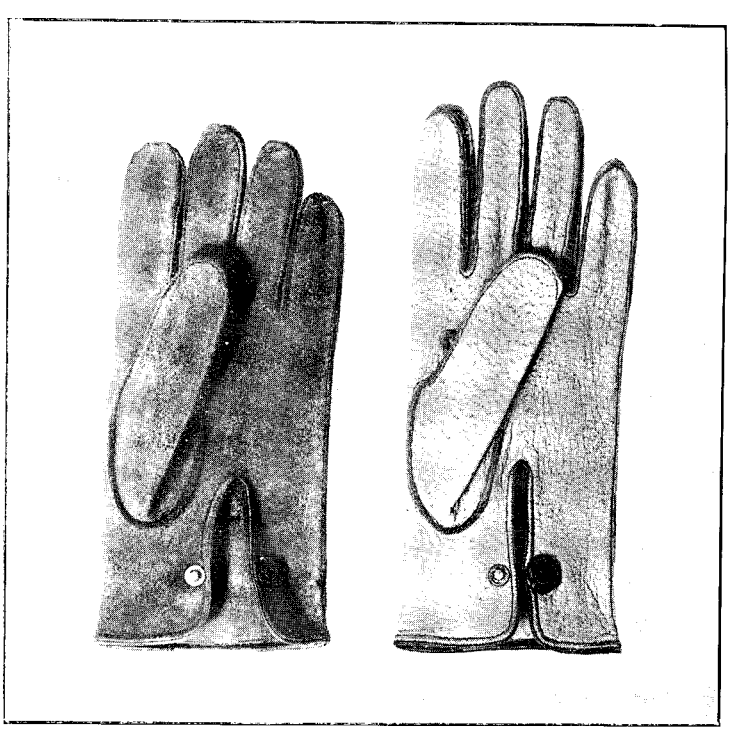
Experimental shipments of hides have been sent overseas, and it is hoped that favourable prices will be received.

The browsing habits of these animals render them second only to deer as destroyers of forest regeneration, and additional sums are necessary to engage shooting parties and to issue free ammunition in certain badly infested areas.

Typical Scrub-area on Site of Eyrewell Plantation.
This land proved unsuitable for farming purposes, and is now being planted in trees.

Portion of Balmoral Plantation.
Showing trees five years after planting. This country is similar to the Eyrewell areas.

LAWSON'S CYPRESS UNDERPLANTED IN AN INDIGENOUS FOREST.



SUEDED AND CLEAR PIGSKIN GLOVES MANUFACTURED FROM WILD-PIG HIDES.—A METHOD OF EXPLOITING A FOREST PEST.

[Face page 9.

Pigs.

The Taranaki portion of the Wellington Forest Conservation Region suffers most from the depredations of wild pigs, and farmers sustain heavy losses during the lambing season. The pest has now spread over the Wanganui River, and complaints have also been received from the southern portions of Wellington District. In the Bay of Plenty (Rotorua Region) wild pigs are present in State forests and unoccupied Crown lands, and in Nelson Region certain areas are likewise affected, but in a minor degree.

During the year 1928 a bounty of 1s. per snout was paid on 11,153 pigs destroyed in the Wellington Region; 1,929 in the Rotorua Region; 359 in the Nelson Region; making a total of 13,441.

Pig-destruction was also carried out in the State plantations, particularly in Otago in the Blue Mountains area. Cyanide of potassium and strychnine were tested for this purpose for a period of three weeks in those localities where pigs were numerous, but with negative results.

Efforts have been made to find an overseas market for pig-hides, and to this end a shipment of hides was sent to America for trial in glove-making. The accompanying photographs of sueded and plain pig-skin gloves illustrate one use to which this leather is applied in America. American pig-hides range in value from 6s. to 8s. each, and if the latter price could be obtained for New Zealand hides the wild pig would soon have a commercial value which would encourage shooting parties without the necessity for a direct Government subsidy.

Stoats and Weasels.

The nests of our native avifauna are seriously endangered by the habits of stoats, weasels, and rats. Stoats and weasels are protected under the Rabbit Nuisance Act, 1908, but consideration should be given to the removal of protection within forest areas, as these animals are undoubtedly forest vermin. By removing protection and permitting the sale of skins it is probable that a reduction in these animals could be quickly achieved. The forest-rat is inimical to our bird-life, and the remarkable reproductive powers of this rodent renders constant destruction vitally necessary. Rat-skins have a market value in the fur trade overseas, and are now receiving attention from the glove trade. A consignment of these skins has recently been shipped abroad in order to test the market referred to.

The Service has conducted several experiments with various poisons to discover whether it is possible to secure one which will be fatal to rats and do no harm to other animal-life, and it is expected that success in this direction will shortly be attained.

Bird-life.

Bird-life comes under the administration of the Department of Internal Affairs, which administers the Animals Protection and Game Act, and practically all native birds are protected. In addition, the Forests Act, 1921–22, provides that all State-forest reserves and provisional State forests are in effect, bird sanctuaries. Consequently no native bird can be legally shot or destroyed within a State forest without the consent in writing of a Conservator of Forests, and to date no such consent has been given. The conservation of bird-life throughout forested areas is regarded as an important duty of the Forest Service, but this protection and propagation in some districts are contingent upon the vast numbers of deer, stoats, weasels, and rats being drastically reduced.

Bird-protection work is made a charge upon opossum revenue, but it is to be regretted that this revenue is not sufficient to provide for more than a partial destruction of the forest pests.

Most Forest field officers are rangers under the Animals Protection and Game Act, and, as they are located throughout the country and are in constant touch with the scattered rural population, they have unique opportunities to protect bird-life.

I have pleasure in recording again the good will and co-operation which exist between the Service and the New Zealand Native Bird Protection Society, which has done good work in consolidating public opinion in the direction of bird-conservation and every possible assistance is being given to the society to continue and extend its sphere of usefulness.

Special efforts are being made to assist other Departments in remote districts where Forest officers are the only regular visiting State representatives. This principle, which could well be extended, has so far been applied mainly in the southern portion of Westland, where the Service has made itself responsible, under the direction of the Departments of Internal Affairs and Marine respectively, for supervision of the white herons' nesting-grounds and of seal-rookeries on the foreshore.

5. Forest Reconnaissance, Demarcation, and Surveys.

With a view to ascertaining the forest resources of the Dominion, a preliminary inventory was completed in 1923, which provided a groundwork for the compilation of plans towards the conservation and silvicultural management of the indigenous forests, and estimates of the forests and timber content with sufficient accuracy to enable a forecast of the Dominion forest resources to be prepared in terms of my predecessor's report in 1925.

The necessity of carrying forward this work with an increasing degree of intensity until a detailed and reliable inventory of timber stocks and areas can be produced to function both for national purposes and as a guide to the timber industry has been fully appreciated, but necessarily subordinated upon the grounds of staff organization. In the meantime, therefore, it has been considered wise to carry out only those demarcations, appraisals, &c., which could be justified upon the grounds of normal demands by the timber industry, and to concentrate the staff resources upon duties incidental to the carrying-out of the afforestation objective.

With the completion of that objective substantially assured, however, it is now possible to revert gradually to the compilation of a revised accurate inventory. Preliminary plans to that end have already been laid down, were fully discussed at the recent annual conference of executive officers, and progress will be accelerated to the degree to which qualified officers can be released for that purpose.

Meantime both afforestation surveys, &c., and indigenous-forest reconnaissance are proceeding to the full limits of available resources. These are well ahead of programme, and during the year have included the following major projects: (1) The preparation of land for planting during the incoming year; (2) preliminary surveys and layout of firebreaks and compartments; (3) reconnaissance of 16,683 acres of timbered areas; (4) topographical surveys of 77,516 acres; (5) appraisement of 8,314 acres of indigenous forest; (6) layout surveys of 87,072 acres for afforestation.

In this respect it is desired to place on record the value of the basic records and progressive co-operation available from the Department of Lands and Survey, which have greatly facilitated progress and accomplishment.

6. Forest Fires.

Generally speaking, the last "fire season," in direct contrast to the previous one, was favourable from a forest-protection standpoint, and although during the driest months the usual number of small fires occurred State-forest areas were never in serious danger.

During "burning-off" operations in the vicinity of the Waipoua Kauri Forest (North Auckland) a fire was responsible for the scorching of one kauri-tree, but was fortunately extinguished before further serious damage was done.

In the Kaingaroa Plantation (Rotorua Region) a fire, which is believed to have originated on Native land, spread across the Rangitaiki River, and before it could be extinguished 30 acres of two-year-old drill-sown insignis-pine trees were destroyed. No definite proof of the origin of this fire could be established, as the offender was undetected.

One fire also occurred in the Westland experiment area, by which approximately 16 acres of two-year-old trees were burned.

With these exceptions, the only damage to State or provisional State forests was the burning of some cut-over and second growth on fern lands.

It is hoped that in the incoming year it will be possible to set up hygrograph stations in certain specially selected parts of the country, and so far one such apparatus has been erected at Karioi, and another is kept for special observation at Wellington. By properly considering the relative humidity of the air during the various seasons it should be possible to get the greatest fire-protection results with a minimum of effort and expenditure.

7. Forest Protection.

Fire Districts.

The fire districts constituted to minimize the fire risks and danger to the indigenous and exotic forests continue to function satisfactorily, and the owners of properties included in the boundaries of these districts recognize the obvious advantages which thereby accrue.

The value of the forest fire district principle, which was a distinct advance in forest legislation so far as this Dominion and probably many other portions of the Empire were concerned, is now being realized in many other parts of the world, and the Service frequently receives requests from overseas for detailed information in regard thereto.

Two new fire districts were proclaimed during the year to safeguard new plantation projects, and the boundaries of one existing district were extended to embrace adjoining lands which had been acquired to extend Balmoral Plantation. Two applications—one from a private afforestation company and one from a local body—for the constitution of fire districts were approved, and the districts duly proclaimed, while three others which come under the same category are now being dealt with. The fire districts now gazetted total thirty-four.

8. Timber Sales.

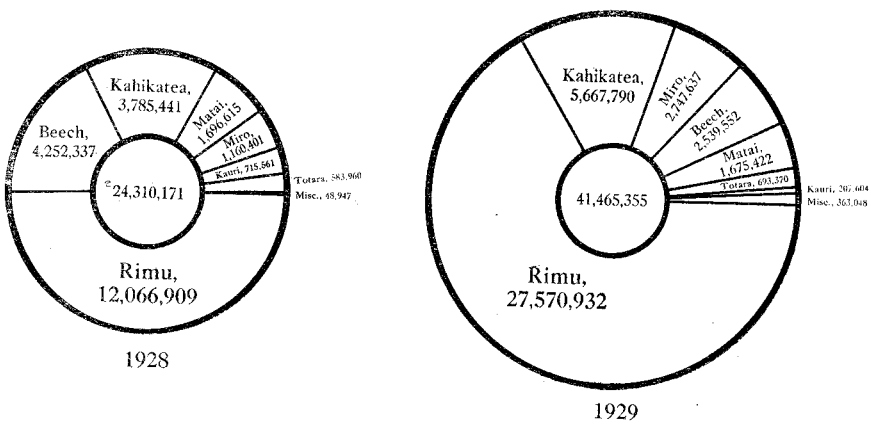
Table 6 shows the quantity of timber sold and cut from State forests during 1928–29, as compared with previous years, and evidences the depression through which the milling industry has been passing. The position is, however, improving, and this is demonstrated by the increased output from areas previously purchased.

TABLE 6.

Fiscal Year.	Number of Sales.	Value of Timber sold during the Year.	Quantity of Timber sold during the Year.	Receipts from all Timber Licenses in Force during the Year.	Estimated Quantity cut from State Forests during the Year.
		£	Feet, B.M.	£	Feet, B.M.
1928–29	53	44,732	41,465,355	65,213	42,835,500
1927–28	49	34,000	24,310,100	91,282	36,654,000
1926–27	52	52,125	43,144,000	103,524	64,639,000
1925–26	65	80,565	73,659,000	130,132	79,009,000
1924–25	54	96,158	69,253,000	134,731	102,369,900
1923–24	61	266,388	212,085,000	68,295	52,297,000
1922–23	52	95,357	78,830,000	47,462	..
1921–22	40	38,208	35,669,000	24,320	..
1920–21	5	17,055	6,987,000	16,815	..

Note.—Receipts shown above for the periods 1920–21 to 1923–24 do not include the half-share of receipts paid into the National Endowment Account from State forests on national-endowment lands.

The attached graph shows the quantities of the various species comprised in Forest Service timber-sales for the last two years.



GRAPH 3.—STATISTICS OF THE SERVICE TIMBER-SALES FOR THE YEARS ENDED 31ST MARCH, 1928 AND 1929.
(Quantities shown in feet, board measure.)

9. FOREST EXTENSION.

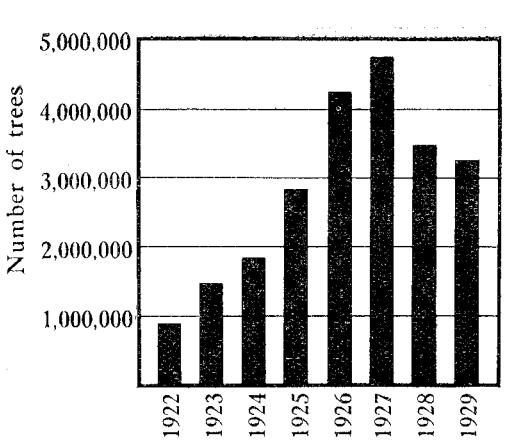
Sale of Trees and Seeds.

Although the attention hitherto given to this work was somewhat relaxed last year, there was but little falling-off in the total sales of trees and seeds. For the reasons mentioned in last year's report, an even greater decline would not have been surprising, and notwithstanding the keen private competition now existing, and the extensive afforestation being undertaken by public and private tree-planting companies, &c., the tree stock and seed supplied by the Service still find a ready sale. In addition to the figures quoted in the appended table, a total of 1,679,000 trees was transferred from Rotorua Nursery and 446,000 from Westland Nursery for planting in other regions, as well as 462 lb. of seed, the great bulk of which came from Rotorua. As in the past, small packets of seeds were distributed to State schools throughout the Dominion, and this accounted for another 210 lb.

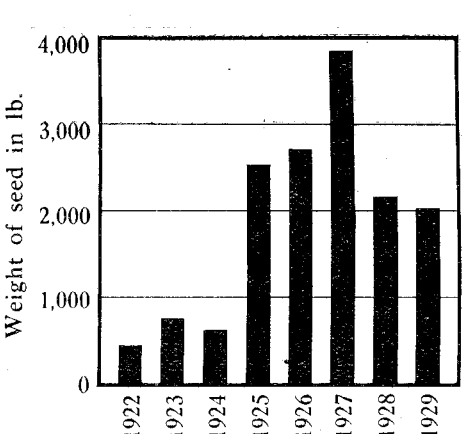
TABLE 7.

Year.	Trees for planting. (Number.)	Forest-tree Seeds. (Weight in Pounds.)	Year.	Trees for planting. (Number.)	Forest-tree Seeds. (Weight in Pounds.)
1920	277,235	130	1925	2,831,932	2,529*
1921	520,702	240	1926	4,226,174	2,692*
1922	897,552	436	1927	4,760,490	3,861*
1923	1,475,581	746	1928	3,481,398	2,156*
1924	1,839,512	618	1929	3,260,916	2,035*

* Includes domestic and overseas sales.



GRAPH 4.—COMPARISON OF FOREST SERVICE SALES OF YOUNG FOREST TREES FROM 1922 TO 1929.



GRAPH 5.—COMPARISON OF FOREST SERVICE SALES OF FOREST-TREE SEEDS FROM 1922 TO 1929.

10. Recreational Use of the Forests.

The indigenous forests continue to operate as a source of recreation to increasing numbers of students, trampers, campers, and hunters. At the same time it is very gratifying to record a decrease in acts of vandalism, such as careless lighting of fires, damage of native vegetation, destruction of bird-life, &c. It would appear, therefore, that the public as a whole is realizing its sense of ownership of the State forests and responsibilities which such ownership demands.

During recent years numerous tramping clubs have been formed, which are devoting a great portion of their members' holidays and week-ends to healthful exploration, generally under experienced leaders. As they travel without dog or gun, and as forest protection and Native bird preservation are usually conditions of membership, the Service endeavours to meet their convenience on all possible occasions.

11. Publications.

Forest Atlas.

Nine atlas maps were completed and were recorded during this period, together with 125 general plans under the permanent Forest Atlas.

The nine atlas maps show an area of 132,793 acres, and make a total of seventy-eight maps completed up to date, covering an area of 1,060,153 acres of State forests and plantations, which represents the permanent demarcation of 14·1 per cent. of the total area controlled by the Service. Topographical maps which are incidental to the systematic layout of fire-breaks, planting blocks and compartments, have been prepared for portions of Riverhead, Maramarua, Kaingaroa, Blue Mountains, and Naseby Plantations, and maps of the species subsequently planted are under preparation. Ten maps of State forests have been certified by the Surveyor-General, as required by section 25 of the Forests Act, 1921–22. Five atlas sheets were lithographed, from which 1,000 sheets were printed, and 1,977 compiled plans, tracings, graphs, &c., were prepared. Applications from the public for the inspection of maps of the Forest Atlas record and for data are regularly received, and the value of the information which is readily available with respect to forests, &c., is apparent from the increased number of inquiries received during the year.

Photographic Record.

The total number of negatives now recorded is 7,750, of which 1,469 were added this year, while 6,471 prints, fifteen lantern-slides, and eighteen enlargements were prepared. A keen demand has been experienced from private individuals and companies both here and abroad, and overseas Government Departments, for photographs of forests, plantations, &c., and prints have been supplied as required.

Educational Publications and other Literature printed during the Year.

2,000 copies "Trees of New Zealand."
2,000 copies Circular No. 25: "Farm Shelter."
1,000 copies "Forests and Forestry in New Zealand."
500 copies Leaflet No. 10: "Taxation on Land."
500 copies Leaflet No. 7/28: "Commercial Forestation."
200 copies Leaflet No. 7A: "Commercial Forestation."

12. Reference Library.

The thanks of the Service are due to Mr. L. MacIntosh Ellis, late Director of Forestry, for a donation of approximately 150 publications, comprising reports, pamphlets, books, &c., made on the eve of his retirement, which have been classified and catalogued as a part of the library.

New publications and pamphlets, &c., acquired during the year totalled 500, representing the latest contribution to modern forestry literature.

A complete catalogue of the library has been prepared and distributed to all regions, thus bringing field officers into direct contact with all available forestry literature. This catalogue is arranged in order of classification, and is known as a classed catalogue, which is the generally accepted form for technical libraries, as it brings all the books on a subject together, with subdivisions or extensions following. The classification system followed for forestry subjects is that prepared by the Society of American Foresters, which has since been adopted for the Dewey decimal classification, or D.C., as it is generally known.

CHAPTER II.—ADMINISTRATION AND FIELD ORGANIZATION.

1. Staff.

From the viewpoint of staff organization the year has presented many problems and difficulties, and, although these have been or are being rapidly overcome, they have thrown a heavy burden and responsibility upon many sections of the personnel.

Important changes amongst senior officers of the staff as outlined hereunder, together with the extended afforestation programme and policy of absorbing the greatest possible number of seasonal employees during the winter period, have been the principal contributing factors to this condition of affairs.

Resignations, &c.

Several responsible officers have resigned from the Service during the year, the most outstanding loss being the retirement of the late Director, Mr. Leon MacIntosh Ellis, who, after eight years of most valuable work for this Dominion, entered into private practice as a consulting forester in Australia.

Mr. A. N. Perham, Forest Assistant, Rotorua, resigned to accept an important appointment as Forestry Officer to the recently constituted Wellington City and Suburban Water-supply Board.

Mr. V. T. Fail, Forest Assistant and Land Surveyor, likewise left the Service to assume a responsible position with a private afforestation company.

Mr. C. H. Reece, Forest Extension Officer for the South Island, resigned in order to undertake work in a private capacity.

The field staff suffered a severe loss during the past year by the death of Ranger Johnston.

The Engineer in Forest Products returned to the Dominion towards the middle of the year, and a report on the investigations into the suitability of selected New-Zealand-grown woods for pulping and papermaking which he had been carrying out for some months at Madison Forest Products Laboratory, U.S.A., in co-operation with the American forest authorities, was presented to Parliament under the title "Pulp and Paper Making" (C.–3A).

TABLE 8.

STAFF ORGANIZATION.—SUMMARY ANALYSIS OF PERMANENT STAFF AS AT 31ST MARCH, 1929.

Forest Conservation Region.	Administrative Officers.	Chief Inspector.	Technical and Special Officers.	Conservators.	Clerical Staff.	Forest Rangers.	Forest Guards and Others.	Total Permanent Staff for Years ended 31st March, 1929.	1928.	1927.	1926.	1925.	1924.	1923.	1922.	1921
Auckland ..	..	..	..	1	3	4	4	12	11	9	8	6	6	6	7	8
Rotorua ..	..	..	2	1	5	8	6	22	21	21	23	19	20	21	20	20
Wellington ..	..	..	..	1	5	4	1	11	13	9	10	8	7	7	6	6
Nelson ..	..	..	..	1	2	4	1	8	6	7	7	7	7	7	6	7
Westland ..	..	..	..	1	3	4	1	9	7	9	8	5	6	6	8	7
Canterbury-Otago	..	..	..	1	6	8	8	23	21	23	19	20	19	18	21	18
Southland ..	..	..	..	1	2	4	..	7	7	7	6	6	6	6	6	7
Central Office ..	2	1	5	..	19	2	1	30	26	26	25	24	25	24	25	24
Totals ..	2	1	7	7	45	38	22	122	112	111	106	95	96	95	99	97

TABLE 9.

COMPARISON OF TOTAL EMPLOYEES.

	Year.								
	1921.	1922.	1923.	1924.	1925.	1926.	1927.	1928.	1929.
Permanent staff	97	99	95	96	95	106	111	112	122
Temporary officers	8	10	15	23	24	28	31	34	34
Labourers*	168	181	244	280	368	483	764	1,300	1,200†
Total	273	290	354	399	487	617	906	1,446	1,356

* As at September in each year. † Forecast.

As will be observed, the year under review shows an increase in the permanent personnel of ten over the previous year, which has arisen partly through increased programme, and partly by granting permanent tenure to certain temporary officers. Also several activities of the Service have been reorganized, and, although the appointment of junior routine officers shows an increase in numerical strength, the increased efficiency which has thereby been gained is greatly in excess of the additional financial outlay and has ensured a general acceleration of activity throughout all sections of the work.

2. HONORARY FOREST RANGERS.

The continued assistance and co-operation of the honorary forest ranger staff, which now stands at ninety-six, constitute a very valuable public service which is voluntary and carries no honorarium.

In many localities, the honorary rangers function as local agents, reporting and assisting to suppress fires, detecting poaching, trespass, shooting of native birds, &c.

3. UNEMPLOYMENT.

Afforestation has always been recognized as one of the avenues peculiarly suited for the relief of unemployment, as the greater part of the planting-work is comparatively unskilled in character and the labour is required at the time when trade depression is generally greatest—*i.e.*, the winter months.

The following summary illustrates the measure in which forestry operations have assisted in relieving unemployment during the past three years throughout the Dominion.

TABLE 10.

SUMMARY OF LABOUR COMPLEMENT EMPLOYED DURING THE PAST THREE WINTER PERIODS.

Month.	1926.			1927.			1928.		
	Number of Unemployed.	Number of other Labour.	Total.	Number of Unemployed.	Number of other Labour.	Total.	Number of Unemployed.	Number of other Labour.	Total.
May	50	319	369	60	368	428	340	402	742
June	98	331	429	120	360	480	630	403	1,033
July	137	308	445	330	320	650	720	468	1,188
August	158	321	479	460	326	786	740	499	1,239
September ..	164	319	483	480	324	804	880	415	1,295
October	128	284	412	140	325	465	530	379	909

These figures do not include the permanent field staff of some seventy controlling officers, but include the semi-permanent standing labour complement of from four to five hundred men who are employed practically all the year round upon general maintenance work, fire patrol, &c., in the summer, and during the winter period form the basis of planting crews as foremen, leading hands, &c.

CHAPTER III.—RESEARCH AND EXPERIMENTS.

1. FOREST ENTOMOLOGY.

The past year has been marked by several outstanding changes of organization, and will probably in future be regarded as the beginning of intensive forest entomological research work. Dr. David Miller, the Government Entomologist, attached to the Agriculture Department, who had been giving his services for forest entomological work as an addition to his normal duties, was appointed to the staff of the Cawthron Institute, and shortly afterwards, Mr. A. F. Clark, Dip.For., who had been working for the Forest Service during part of the previous year under Dr. Miller's direction in Wellington, was transferred to Nelson. Fortunately, however, arrangements were made with the Cawthron Institute, whereby Mr. Clark's work would still be carried out in conjunction with Dr. Miller, and it was thus possible for the Forest Entomological Officer to have full facilities for use of the laboratories, library, and insectaries of the Cawthron Institute, and to keep in touch with all allied lines of research which are going on there. This is an extremely satisfactory arrangement, and cordial thanks are due to the Cawthron Trust Board and to the Director of the Institute for the very complete way in which they have assisted the Forest Service in this matter.

The work that has been carried on has consequently extended from the previous matters of routine identification and general surveys of insect conditions, and the following definite programmes have been put in hand: (*a*) Systematic examination of all tree-seeds imported for the Forest Service; (*b*) an intensive forest survey from the insect point of view; (*c*) a systematic examination of imported hardwood poles.

Besides these matters actual contact has been maintained with the whole of the parasite work carried out by the Cawthron Institute, including, what is most important from the Forest Service point of view, the introduction, rearing, and liberation of the ichneumon parasite of wood-wasp (*Sirex juvencus*).

Results to date prove clearly that insect-life is freely imported with all tree-seed. Very few lots were found to be absolutely free from infestation, and it was definitely established that the chips and litter that are present in most seed lots are as great a source of danger in this respect as actual seeds. The source of danger in imported poles, particularly in unbarked poles, was proved beyond shadow of doubt.

The forest insect survey was completed for (*a*) the northern portion of Canterbury; (*b*) Taranaki to a line twenty miles north of New Plymouth; (*c*) portion of Nelson Province.

The conclusions to be drawn from the survey to date may be expressed in general terms as under:—

(1) The silvicultural conditions obtaining in privately and publicly owned plantations are unsatisfactory, and from the entomological viewpoint they are extremely unsatisfactory.

(2) The factors affecting the attack of *Sirex juvencus* are: (*a*) Site; (*b*) silvicultural condition of the stand; (*c*) probable fungus attack; (*d*) attack by *Chermes pini*.

(3) The attack of *Chermes pini* is more serious than is usually supposed.

(4) The life-cycle of *Chermes pini*, from field observations, does not follow the European cycle. The apparently slow spread of *Chermes pini* is probably caused by the absence of winged migrants, the insect reproducing continuously upon pines.

(5) The growing of spruce in New Zealand is not possible without *Myzaphis abietina* being controlled and greater care being exercised in choosing the site for this tree.

(6) The growth of eucalypts in New Zealand is becoming increasingly difficult, and work upon the major pests should not be relaxed.

(7) The redistribution of *Rhizobius ventralis* should still be continued where necessary, as its host (*Eriococcus coriaceus*) attacks *Eucalyptus viminalis* and *Eucalyptus obliqua* as well as *Eucalyptus globulus*.
(8) Every effort should be made by suitable publicity methods to encourage private and public owners of plantations to improve the condition of their stands.
(9) The immediate needs are to deal with the major pests, improve the conditions of the plantations, supervise the importation of foreign timbers and seeds, and increase the number of suitably trained field observers. The last point is most important, as these men are continually in the field and are literally the "eyes" of the Service.

The time is yet too early for publishing any detailed results of the forest survey, but everything examined has been fully recorded, and it is hoped the project thus inaugurated will be carried quickly to completion. A knowledge so obtained of New Zealand forest-insect life will place this branch of research on a much more satisfactory footing than ever in the past. One point of first importance, however, has already been established, and deserves more than passing comment. Among the privately-owned plantations there are one or two which have been more or less completely burned, the damage being so great that they can never produce timber of value. The forest survey has already established the fact that these areas are now carrying a dangerously large insect population, the numbers present being quite disproportionate to the numbers in neighbouring unburned plantations. Where no steps of any sort are being taken to put such plantations in reasonable order, they are plainly jeopardizing other plantation property, the owners are receiving rating concessions which are unjustified, and the unhealthy plantations are exactly analogous to untended and derelict orchards. Eventually legislation may be required to cope with this menace in the same way as orchard pests are dealt with, and meantime evidence will be assembled in order that this problem, which will undoubtedly be of the first magnitude in future forestry, may be effectively met in advance.

2. Silvicultural Research.

During the past year the research into the silvicultural requirements of rimu in the West Coast forests of the South Island was pursued by Messrs. Foweraker and Hutchinson, of Canterbury University College School of Forestry. This line of research has been subsidized by this Service for the past eight years, and has been perseveringly and enthusiastically carried on first by Mr. Foweraker alone, and later, by both working in collaboration.

This type of research is necessarily slow and laborious, and great care must be exercised to avoid publication of premature results, which are often misleading, and not infrequently do more harm than good. Both investigators have exhibited most commendable restraint in this direction. This work has been proceeding for eight years, and it is now particularly gratifying to be able to report that definite results have been obtained worthy of publication and justifying both a continuation and an extension of the work. Publication of full reports of some of the work in professional papers, so that it may go on permanent record as scientific work of value, has been authorized. Results in brief to date are—

(1) It has been definitely established that the sex distribution of rimu is approximately uniform both numerically and spatially. This will have an important bearing on silvicultural treatment of the species.
(2) Proportion of available crown-space utilized by rimu in an average West Coast natural stand has been ascertained.
(3) Conditions necessary for germination of rimu-seed in the forest humus have been investigated and definite results obtained so far as the forest-floor is concerned. Further investigations on the next stage—viz., forest cover and environment to secure optimum survival—are amply justified.
(4) Interim results of the increment studies on rimu poles and standards are encouraging, but no definite figures will be published until 1933 at the earliest. However, it is fitting to record here that the investigators state that "there seem to be good grounds for maintaining that the increment in rimu is greater than popular opinion will admit, and that there is every reason to push forward the full investigation of growth throughout the whole life-cycle of the tree."

In connection with these results it is well to reproduce here the third resolution of the Empire Forestry Conference concerning forestry in New Zealand:—

> "*Management of Indigenous Timber Forests.*—The silvicultural study of the indigenous species has been commenced, but has not yet proceeded sufficiently far to warrant the adoption of any definite system of management, and all that has been done so far in the interests of the forests is to protect them from damage by fire and grazing. We understand that as soon as sufficient knowledge has been gained as a result of silvicultural study some suitable system of management will be applied. *We would here take the opportunity of emphasizing the necessity for extending silvicultural research to the utmost extent possible.* When sufficient information is available regarding the rate of growth of the various indigenous species and the possibility of regenerating them economically, the question will have to be decided to what extent they are to be perpetuated or to be replaced by exotic species of faster growth should these prove to be of greater economic value. We would emphasize the importance of retaining large areas of indigenous forest for the production of commercial timber, as well as for scientific and sentimental reasons, provided it does not prove to be the case that results more beneficial to the country at large can be obtained by the introduction of exotic species."

It is especially to be noted that the results as herein recorded were not available to the Conference, and they therefore justify and emphasize the text of the recommendation.

Proposals for stabilizing and accelerating this important section of forestry work will therefore be submitted at an early date for Government consideration.

3. Forest Utilization.

Forest and mill utilization studies have been carried on during the year in continuation of the work commenced in 1926, and sufficient data are becoming available to enable definite conclusions to be formed as to the percentage of wood actually used in New Zealand sawmills, and also the percentage of grades obtained from the general run of logs in various parts of the country. This work is of direct utility in connection with the timber-sales operations of the Service, and should, when published, be of some considerable interest to the sawmill operators, as so far very little data based on definite facts have been available on this subject.

Another completed investigation was the test of the accuracy of various percentages of timber cruises as compared with a 100 per cent. cruise, the objective being to definitely establish the degree of accuracy given by the various forms of timber cruising.

Tapping of kauri for resin, referred to in previous reports, was continued and expanded. The present results show that the average yield from freshed taps cut on kauri rickers in 1924 is diminishing at an even rate, while the flow from unfreshed taps cut at the same time has now completely ceased in all cases. From large trees similar results were obtained. The increase in yield from taps placed higher up on the boles of the trees was verified. Yields per tap from those near the ground compared with those in the crowns were almost equal, taps at the top portion of the bole (within 15 ft. of the base of the crown) yielded 50 per cent. more resin, and those in the intermediate portion of the bole 35 per cent. more than those placed near the ground and in the crown.

Manufacture of Newsprint.

The question as to whether newsprint can be produced in New Zealand in open competition with the imported product is still engaging attention. In addition to laboratory and mill studies in North America, the Service investigated the financial and economic aspects of the newsprint industry both in America and Europe, and has also been engaged upon a survey of the commercial possibilities of establishing the industry in the Dominion, which included wood-supplies, transportation, chemical supplies, water, power, fuel, manufacturing facilities, labour conditions, markets, &c. Many of the field examinations have already been made, and it is hoped before the end of the year to present a report on the various commercial aspects of pulp and paper manufacture.

Considerable interest is now being evinced by the commercial community in this matter, and already syndicates have been formed or are in the course of formation to exploit the industry. In the interests of the public generally it must be mentioned that the manufacture of pulp and paper is so highly technical in character and involves such a large initial capital investment that the utmost care should be exercised in its establishment to ensure successful results.

Plantation Inventories.

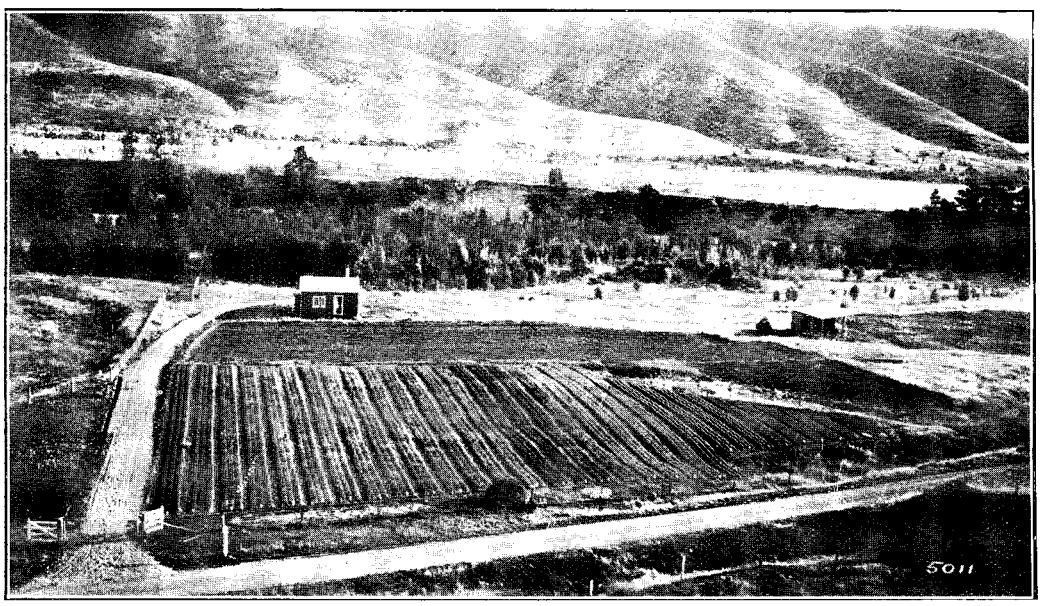
During the year inventories of the chief old plantations were completed. This work of cataloguing the older plantations was completed in 1928. It marks one of the main steps towards scientific forestry in New Zealand, and gives for the first time a reliable indication of the growth and yield of the various species in our plantations, and also the volume of wood at present available. The knowledge that this work throws on the growth and yield of the various species so far planted in New Zealand is invaluable in the establishment of new plantations, and should operate to a great extent as a guide to future operations. The plantation inventories form the first part of the compilation of forest working-plans for the plantations, and are, in fact, the major part of the working-plans, the compilation of which would have been impossible without a detailed knowledge of the volumes and growth available. The compilation of the first forest working-plans for the major plantations is now in hand, but, as a large amount of work is still entailed, several years will probably elapse before the work is completed.

4. Forest Ecology.

Dr. L. Cockayne, F.R.S. (Honorary Botanist to the Service), in collaboration with the writer, prepared and published during the year a book of 171 pages and 118 illustrations (mostly photographs taken by an officer of the Service), entitled "The Trees of New Zealand." This work was completed just before the visit of the delegates to the Empire Forestry Conference, and was greatly appreciated by these overseas visitors as a valuable aid to the identification of our main forest species. It is also meeting with a ready sale to schools, colleges, &c., as well as to the general public.

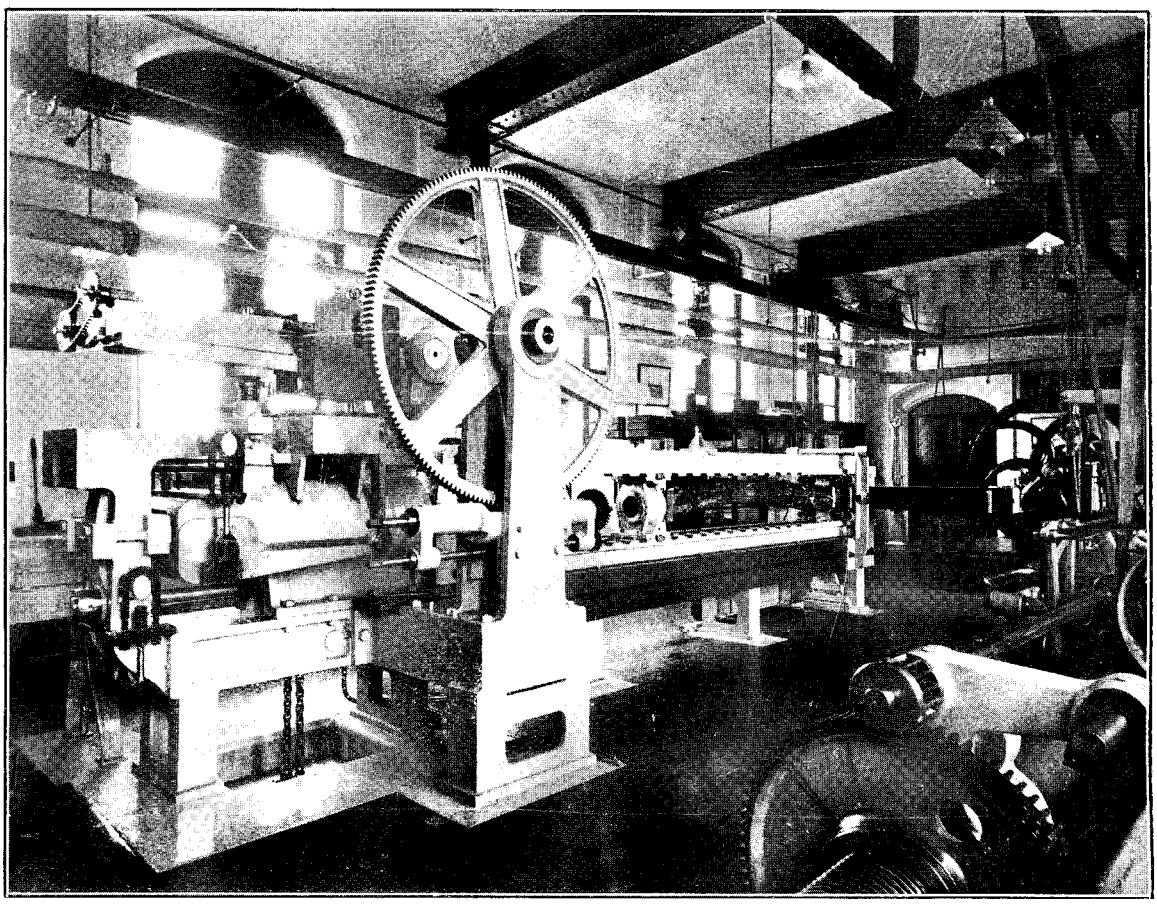
The second edition of Dr. Cockayne's book, "The Vegetation of New Zealand," was issued from the press in December last. As mentioned in last year's report, this work presents an entirely new classification of the forests, and devotes considerable attention to the matter of their life-histories.

Other work performed by the Honorary Botanist was the publication of an account of hybridism in the forests of the Dominion in the "Birthday Book" of Professor A. J. Cajander, the eminent Finnish forester; a study of the comparative rate of growth of indigenous trees in the Esplanade Garden, Palmerston North; an examination of certain of the plantations at Whakarewarewa in order to ascertain what species Nature has introduced therein—an important matter of which accurate knowledge is essential; and a study of the vegetation of Rainbow Mountain, Rotorua, from the viewpoint of succession—an aspect of forest ecology fundamental for silviculture.

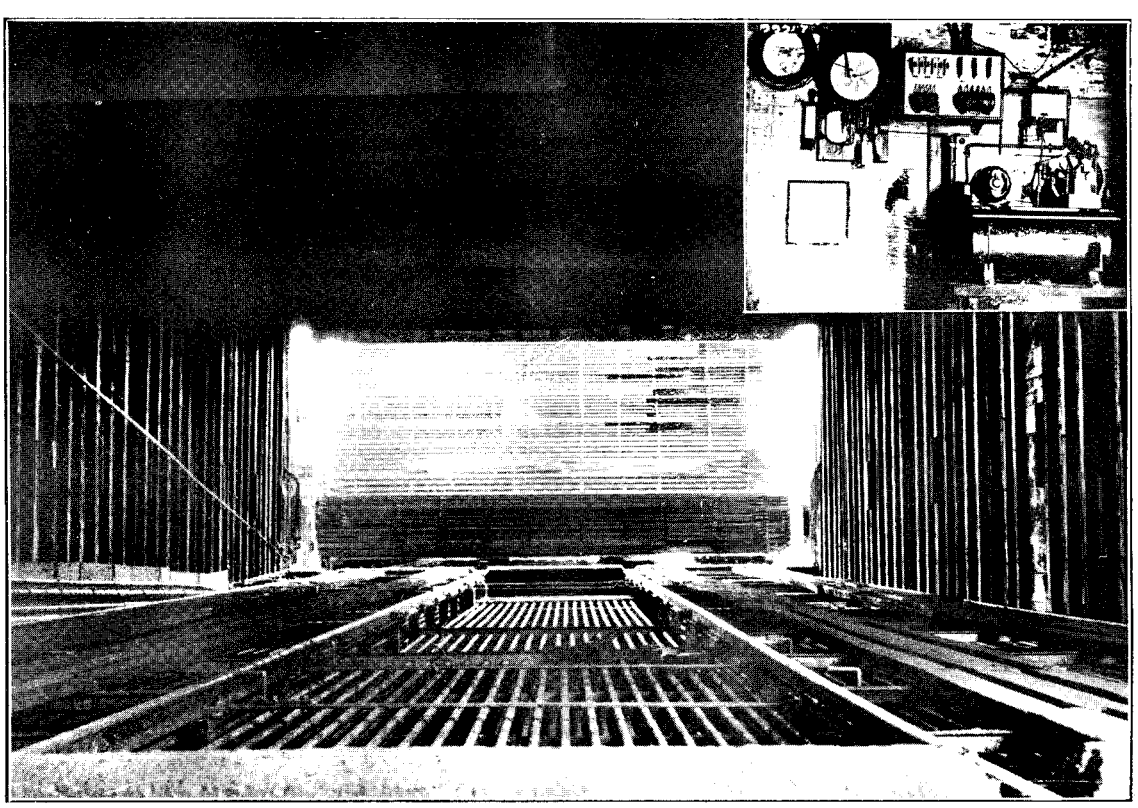


SMALL NURSERY, GOLDEN DOWNS PLANTATION, NELSON.
Small nurseries in proximity to the project materially assist in the economical establishment of plantations.

RIMU REGENERATION, ROTORUA REGION.



Testing full-sized Mine-props in compression.—Forest Engineering in co-operation with Canterbury College.



Interior of a Scientifically Controlled Kiln.

This internal fan progressive kiln, designed by Professor Tiemann, of the Forests Products Laboratory, Madison, U.S.A., for C. E. Otley, Ltd., of Christchurch, is the first of its kind in New Zealand. The inset shows the automatic kiln-control instruments, which automatically maintain the temperature and humidity conditions in the kiln, and prevent the damage to timber which would result from inefficient hand control.

[*Face page 17.*

Honour to Dr. Cockayne.

It may not be out of place here to refer to the very distinguished scientific honour conferred upon Dr. Cockayne during the past year by the award of the Darwin Medal. This medal, the world's highest award made on behalf of biological science, was founded by the Royal Society as a memorial to the famous naturalist, and was first awarded in 1890. It is granted every two years—in reward for work of acknowledged distinction (especially in biology) in the field in which Darwin himself laboured. The award may be made either to a British subject or to a foreigner, without distinction of sex. Dr. Cockayne is the first scientist in the Southern Hemisphere to be singled out for this high honour, and when it is mentioned that on the roll of Darwin Medallists appear the names of such eminent leaders in scientific thought and research as Sir J. D. Hooker, Ernst Haeckel, T. H. Huxley, and August Weissmann—to select but a few at random—the value of this award may be seen in its true perspective.

5. Experiment Stations and other Experimental Works.

Rangitikei Sand-dune Station.

This station has now been placed on a maintenance basis in charge of a custodian, and consequently planting operations have been greatly curtailed. All the fixed sand-dunes were planted up in previous years, and the remaining areas considered suitable for planting—*i.e.*, a total of 32 acres—were planted during the year with 9,500 *Pinus pinaster* and 12,500 *P. muricata* two-year-old trees. The blanking of previous areas also accounted for 102,350 trees.

The planting of marram-grass over an area of 218 acres was commenced in May and was continued at intervals till the end of August, and during most of this time, with the exception of a period towards the end of July, when a dry drift sand was encountered owing to a minimum rainfall during the previous two months, the weather conditions were favourable for practically all the work undertaken.

The experimental plantings of flax (*Phormium tenax*) carried out in previous years are surprisingly successful when it is remembered that the soil is of a light sandy nature and that drained swamp-land is best suited to this plant. Although it is yet too early to draw any definite conclusions from the interim results obtained as to the commercial success of flax-culture at the station, it is at least certain that healthy and vigorous growth has already been secured at comparatively low cost.

The tree-nursery continued to give good results, and during the past year nearly half a million trees raised there were utilized for planting in other parts of the Wellington Region.

Westland Forest Experiment Area.

Experimental planting was continued at this station, and a further 200 acres were planted with the following species: 144 acres with 97,920 *Thuya plicata*, 44 acres with 30,000 *Pinus radiata*, and 12 acres with *Eucalyptus Gunnii*; whilst blanking was carried out on 300 acres, *Cupressus Lawsoniana* being the main species used, the balance being made up with *Cryptomeria japonica* and *Thuya plicata*. As the new area planted was open country, line-cutting and planting costs were considerably reduced as compared with previous years.

Thuya plicata has again proved that it is peculiarly adapted to the climatic conditions of the West Coast, and a 98-per-cent. strike was obtained, with an average growth of 8 in. for the first year, in the plantation. The strike of *Cryptomeria japonica* was even better, but the average growth was slightly less. *Cupressus Lawsoniana* recorded a strike of 85 per cent. and *Eucalyptus Gunnii* 86 per cent., with an average growth of 4 in. and 3 in. respectively. *Pinus radiata* was not so successful, the strike being 73 per cent. and the average growth only 3 in. It is hoped that this latter species will do better when longer established. The results of the previous years' plantings, which may now be clearly seen, show that blocks of *Thuya plicata* planted in 1925–26 are over 5 ft. 6 in. in height while *Cupressus Lawsoniana* planted a year later are also doing well under all conditions. It is problematical, however, whether in later years this species will be able to withstand the competition of the faster-growing indigenous second growth. *Pinus ponderosa*, which for two years bore a stunted appearance, showed a growth of nearly 2 ft. last year, and is making splendid headway in spite of thick blackberry undergrowth.

It has been found necessary to clear away the second growth which so rapidly springs up, as otherwise in a few years the trees would probably be smothered, and to date 350 acres have been treated in this way. The most persistent weed is blackberry, which spreads so quickly and clings to the trees. This work must for some years prove the biggest obstacle in keeping down the maintenance costs of the plantation, as it is necessarily expensive to carry out.

All main creek-beds in the plantation were cleared of slash and other debris, to prevent flooding, as experience has proved that the growth on drained dry soil is much more rapid than on wet and waterlogged areas. A fire-break was laid out on the southern boundary of the plantation to minimize the fire danger from locomotive sparks.

Direct Seeding.

Experiments on a comparatively large scale have been in hand for a number of years to test the possibility of establishing plantations by direct seeding, but the results to date have not been very successful, except in certain pumice areas where the soil conditions are particularly favourable. It has, therefore, been decided to curtail future expenditure on these experiments until conclusive evidence of success is available.

Selection of Suitable Planting Species.

To ascertain the type of seed of various North American species best suited to New Zealand conditions crops have been raised from seed of *Pinus ponderosa*, *P. monticola*, *Pseudotsuga Douglasii*, *Thuya plicata*, *Tsuga heterophylla*, and *Picea Englemanii* collected from different localities in North America, varying from the western coastal slopes to the inland dry-belt areas in western Canada, and from altitudes varying from 1,100 ft. to 8,000 ft. above sea-level. Final results are naturally not yet available, as comparative studies have to be made over a complete rotation.

Growth of Pinus Sylvestris *in Mycorrhiza-infected Soil.*

In co-operation with the research branch of the British Forestry Commission, plants of *Pinus sylvestris* have been raised in New Zealand nurseries in soil treated with mycorrhiza, which is favourable to the growth of this pine. This was done by treating the nursery beds with soil from old Scots pine forests, with soil from mycorrhiza-carrying nurseries, with soil containing infected rootlets, and with soil containing spores of *Scleroderma vulgare*. The results to date are not yet conclusive.

Fumigation of Tree-seed.

After a two-years trial it has been found that, with the exception of formalin solution, the fumigation of tree-seed by chemicals has no appreciable harmful effect on subsequent germination, but in some cases appears to increase it. Formalin solution was found to be universally injurious to the germination of all five species which were treated. Carbon bisulphide increased the germination in four out of six species dealt with; this chemical is easy to apply and is also an effective insecticide.

Gas fumigation with a mixture of potassium permanganate and formaldehyde, and also treatments with solutions of mercuric chloride and of sulphurous acid, showed no appreciable harmful effects either on the germination or on the subsequent growth of the seedlings.

As a result of this study and of correlated studies carried out by the Forest Entomologist, all seed imported by the Service is at once subjected to fumigation with bisulphide of carbon as a matter of ordinary routine. Risk of importation of seed-feeding insects is thus entirely eliminated, without detriment to seed-viability.

6. Forest Economy.

Forest-products Investigations.

New Zealand has in her native and exotic forests three distinct types of trees, on and in connection with which extensive research has yet to be carried out if their maximum utilization is to be secured. These include the much-utilized indigenous softwoods; the little-used indigenous hardwoods; and the introduced species, which are in general not yet sufficiently mature for commercial utilization. The main activities in research are directed towards the utilization of waste material in the former type and the maximum utilization of the other types.

Although hardwoods are estimated to total 40 per cent. of the existing volume of commercial indigenous forests, they account for less than 3 per cent. of the annual forest cut. This is due not so much to faults in our own system as to two basic and external causes—firstly, the restriction of the important coniferous forests to the Northern Hemisphere, from which practically all advances in modern civilization have sprung; and, secondly, the evaluation throughout the ages of the position of softwoods solely upon the most primitive conception of wood-use, workability and durability, with resulting economy of labour.

Again, until the present century, sawing and hewing have been the most universal manner of converting the forest into usable products. During the past decade, however, revolutionary advances have been made in forest-products research, and it now appears feasible that in the future timber logs may be produced for utilization in the manufacture of, firstly, fabricated and built-up products, and, secondly, shaped and moulded products, rather than converted into the sawn and hewn material of to-day. This possible future method of wood-utilization, which may be conveniently referred to as the "disintegrating method," and, as such, considered to include all processes involving the breaking-up of wood, whether by mechanical or chemical means, into small bundles of fibres or into the individual fibres themselves, and their recombination into desired shapes and forms, is, indeed, in use to-day. For example, disintegrated wood is being produced, moulded, and made into paper, fibre containers, wall-boards, box-boards, reinforced wooden beams, sedan tops for motor-cars, milk-bottles, and innumerable other moulded and shaped products. The pulp and paper industry exemplifies the place of hardwoods in disintegrating schemes. Two years ago the thought of utilizing any other hardwood but aspen in the industry was considered impossible—and this hardwood only produced a bulky and opaque pulp suitable for book-paper. During the last year, however, the Service, in co-operation with the Madison Forest Products Laboratory, succeeded, by the development of a refined rod-mill beating treatment of the raw pulp, in manufacturing a newsprint sheet containing 85 per cent. of hardwood (tawa) pulp, the resulting sheet being superior to standard softwood paper in practically every respect. Failure to appreciate the possibilities in the processing of hardwood pulps had hitherto been the reason for their neglected use. As an illustration of the possibilities involved and the basic economic facts supporting the argument, consider sedan tops for motor-cars. Hitherto these have been constructed of many pieces of wood laboriously bent, shaped, and put together, with several coverings of cloth and artificial leather, &c., all being subject to fairly rapid wear and deterioration. Now they are being moulded from disintegrated wood, with only a fraction of the labour formerly employed, and at the same time made more serviceable.

The major importance of this future method of wood-use lies in the increased utilization of hardwoods which will occur; in the far greater yields which will be secured from all types of forest-trees; and in the method of management of exotic stands, which will conceivably be worked to produce high increments and poor quality—that is, knotty logs—for which the psychology of sawing will be one of quantity rather than quality. The basic use for the sawn material will be not only for casing and boxing purposes, but as core stock for the mounting of clear veneers cut from the hardwood forests. Here again some of the processes have already become economic; doors of built-up softwood cores with hardwood veneer faces being in common use to-day.

To develop the species and industries involved in wood-utilization schemes it is essential that detailed information be secured. With reference to species themselves, information is needed on strengths, structures, weights, and any other physical or mechanical property appropriate to the use to which the species is to be put. In respect to an industry it is imperative, on the other hand, that accurate information be readily available on supplies of raw material needed, costs, freights, &c. To cover the lack of knowledge in the subjects mentioned above, forest-products research studies are being carried out in New Zealand.

The range of forest-products research in New Zealand can be gauged by the following typical results of work carried out during the year under review:—

A uniform classification and grading scheme has, by co-operation with other Departments and interests, been devised for local timbers, in which, with more efficient seasoning practices, lower grades and qualities of native timbers will be permissible under the building by-laws. This will serve to secure increased utilization of native timber, and by allowing a more balanced use of the product of the log will directly benefit the sawmilling industry. The utilization of the little-used species has been promoted throughout the wood-using industries, some motor-body builders now using tawa and miro for their motor-bodies, and many brewers tawa and silver beech for barrels and casks.

In the field of kiln drying, the Service co-operated with the purchaser of a modern scientifically equipped kiln in developing successful and efficient schedules for a number of different species. Air-seasoning practices have been improved throughout the Dominion, and studies commenced and model piles erected at Mamaku, Manunui, Ohakune, and Wellington. A study on the shrinkage of timber in commercial sizes was completed on five species, giving valuable data on excess required in sawing green timber of the species in order that they may season to a specified size.

Strength tests carried out on green or air-dry material of seven species of native and exotic woods, including maire, rata, mangeao, Douglas fir, Corsican and ponderosa pine, have advanced the testing programme of the Forest Service to a point where international standardized tests have been made on twenty-four species of native and exotic woods. The completion of tests on structural-sized specimens of insignis pine and rimu has allowed a commencement to be made on the preparation of grading rules and working-stresses for structural timbers. A study into the nail-holding power of local timbers was carried out on three species, and the completion of the tests will enable species to be grouped for their suitability and interchangeability in the manufacture of boxes. Strength tests were carried out on *P. ponderosa* mine-props from a fire-killed plantation at Hanmer. Routine examination of box-bindings in connection with standard specifications were continued.

Preliminary experiments and an economic survey were commenced regarding the preservation of various forms and species of timbers with water-soluble preservatives.

Considerable progress was made in the study of the pulping and papermaking properties of local timbers, the work being carried out in co-operation with the Madison Forest Products Laboratory, Madison, Wisconsin; the Great Western Paper Mills, Ladysmith, Wisconsin; and the Consolidated Water Power and Paper Co., Wisconsin Rapids, Wisconsin, U.S.A. The tests proved that a commercial grade of newsprint can be produced from insignis pine alone or from a combination of insignis pine and tawa, and of kraft papers (*i.e.*, wrappings, &c.) from rimu, insignis pine, Corsican pine, Austrian pine, and European larch. Coming from one of the foremost pulp and paper research institutes in the world, these results may be accepted as conclusive, particularly so as they include both laboratory and actual commercial pulp and paper-mill trials. The results, too, in one respect have a far-reaching significance in commercially demonstrating the wide range of papers and other products which can be manufactured from hardwood pulps suitably produced and processed and intelligently combined with varying proportions of softwood pulps.

Microscopic studies into the zoning of rimu and miro have proved that the cells of the middle zone or coloration appearing in the cross-section of logs of these species, and commonly referred to in the trade as outer heart or inner sap, contain a considerable quantity of heartwood products, the latter deposit, however, decreasing as the true sapwood is approached. Under these circumstances timber adjacent to true heartwood of the species can be expected to be more durable, and, as the presence of heartwood products denotes a corresponding absence of starches and sugars, &c., can also be expected to be more resistant to insects, as the latter live on these foods. This fact has been allowed for in the uniform grading and classification rules recently devised for local timbers, and in which a medium quality is defined to be used in place of all heart, but which requires to average only 50 per cent. of the latter in any board, provided any cross-section of the board contains at least 25 per cent. heart.

Experiments carried out in co-operation with the American Paint and Varnish Research Institute indicate that bled kauri-gum is inferior to fossil gum in the manufacture of varnishes and lacquers.

Sap-stain and moulds developing on freshly manufactured veneer were studied under commercial conditions, and recommendations made for their control.

Customs regulations, which it is hoped will be gazetted shortly, were drawn up to prevent the introduction of insects in poles, piles, and general forest-produce.

7. Current Studies.

Altogether over thirty major investigations are in progress. These include a sawmill and wood survey in Mamaku region; the introduction of shop grades into hardwood-grading rules; the wood requirements of the cooperage and motor-body-building industries; the collection of sawmilling statistics; the suitability of woods for butter-boxes, and of coatings to eliminate tainting therein; the utilization of short lengths of timber in motor-body, agricultural-implement, and brush-back manufacture; the grading of building-timbers; the utilization of little-used and minor species; the operation of locally installed dry kilns; the physical properties of plantation timbers; the air seasoning of timber and erection of model piles throughout the country; the strength-testing of local and exotic timbers; the grading rules and working-stresses to be used for structural timbers; the testing of cross-arms; the testing of mine-props; the testing of telegraph-poles; the bulking of butter; the design and strength of dairy-produce containers; the testing of box-bindings; the nail- and screw-holding power of woods; the preservation of telegraph-poles; the installation and service records of treated post and pole lines; the routine examination of wood-preservatives; the volumetric content of cordwood; the microscopic anatomy of the beeches; the suitability of heartwood and sapwood of hardwoods for tight cooperage stock; the utilization of bled kauri-gum; the destructive distillation of spent kauri-chips; the sap-stain and moulds developing in modern veneer plants; and the minimizing of introduction of insects on imported forest-produce.

CHAPTER IV.—THE TIMBER TRADE.

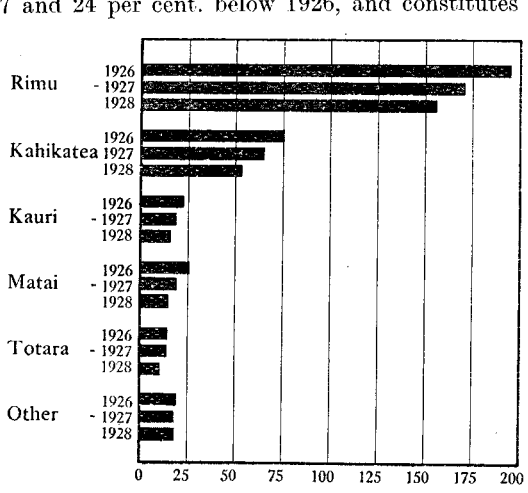
1. Production.

The following table showing the reported output in feet b.m. of the various species of timber from New Zealand sawmills during the years ended 31st March, 1926, 1927, and 1928 has been compiled from figures supplied by the Government Statistician.

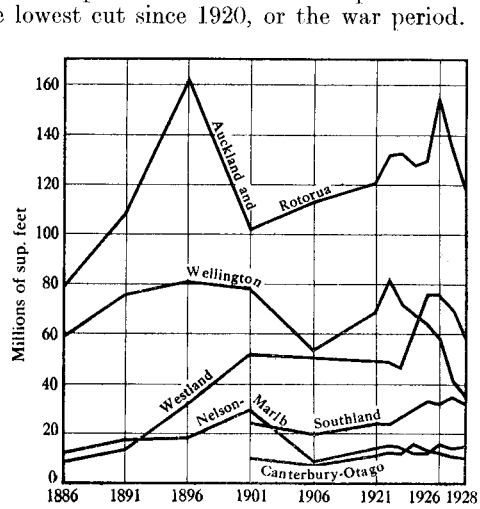
TABLE 11.

Species.	1926.		1927.		1928.	
	Quantity.	Per Cent.	Quantity.	Per Cent.	Quantity.	Per Cent.
	Ft. b.m.		Ft. b.m.		Ft. b.m.	
Rimu	195,452,000	55·4	171,489,000	56·0	156,314,000	58·0
White-pine ..	75,635,000	21·4	65,328,000	21·3	53,736,000	19·9
Matai	26,141,000	7·4	19,380,000	6·3	15,207,000	5·6
Kauri	22,766,000	6·4	18,475,000	6·0	15,874,000	5·9
Totara	14,110,000	4·0	14,179,000	4·6	10,728,000	4·0
Beech	8,701,000	2·5	8,596,000	2·8	7,923,000	2·9
Insignis pine ..	7,072,000	2·0	6,668,000	2·2	7,695,000	2·9
Other	3,348,000	0·9	2,389,000	0·8	2,306,000	0·8
Totals ..	353,225,000	100·0	306,504,000	100·00	269,783,000	100·00

The sawmill production for the year ended 31st March, 1928, as reported to the Government Statistician was approximately 270 million feet b.m. This represents a decrease of 12 per cent. below 1927 and 24 per cent. below 1926, and constitutes the lowest cut since 1920, or the war period.



Graph 6.—Production of Rough-sawn Timber for Years ended 31st March, 1926, 1927, and 1928.



Graph 7.—Trend of Sawn-timber Production by Forest Conservation Regions for the Period 1886 to 1928.

The trend of regional timber-production for the period 1886 to 1928 is shown in the accompanying graph. Auckland and Rotorua Regions, combined with Gisborne (*i.e.*, Auckland Province), maintained the premier position, although decreasing 11·9 per cent. in cut compared with 1927. The positions of the other provinces remained the same as last year, but it is to be noted that Wellington again decreased proportionately more than the other major provinces, and that Southland now almost rivals it in timber-production. The latter province, indeed, produced more timber than during the boom year 1926; but this factor denotes a building-up of stock rather than any increase in sales.

With the exception of insignis pine, which reported a slight increase, the production of all species for the year ended 31st March, 1928, was less than that for the preceding period. Rimu again reported the largest absolute decrease, amounting to 15 million feet b.m., although this amounted to only an 8-per-cent. decrease in the cut of the species. The largest proportional decrease was in totara, with a reduced cut of 3½ million feet b.m., or 25 per cent. of its previous production.

The average f.o.r. mill value per 100 ft. b.m. (all species) for the year ended 31st March, 1928, was 18s., compared with 19s. 2d. for the preceding year, and represents a decrease in value of over 2s. per 100 ft. b.m. on 1921–25 returns.

2. Manufacturing Technique.

In the field of logging and sawing, manufacturing technique showed little improvement. Accumulated stocks from previous years of over-production, the necessity for curtailing current production, and the prevalence of price-cutting have all combined to curtail monetary returns to the millers, with a consequent lack of capital available for improved machinery or equipment.

Methods of conditioning and merchandizing timber, however, continue to steadily improve. Millers are appreciative of the air-seasoning practices recommended by the Service, and their keen interest is apparent in the manner in which they have allowed the Service to carry out air-seasoning studies at their mills and to erect model piles. Insanitary yards, poor drainage, and low foundations still remain, and represent the most serious defects in the present methods of seasoning timber. Further progress has been made in artificial seasoning, and an operator who installed the only modern scientifically controlled kiln in New Zealand expresses complete satisfaction with the results obtained, as a steady increase in trade has resulted.

Marketing of timber was also investigated, and grading and classification rules were developed to improve the standard and conditions under which native timbers are cut and marketed. It is considered that these new rules will place native timbers in more equal competition with the imported product.

3. Exports.

The export trade in timber for the year ended 31st December, 1928, was the lowest since statistics have been collected, and in totalling only 35,029,000 ft. b.m., valued at £377,480, represented a decrease in quantity of approximately 2 million feet b.m. and in value of £49,000 compared with the preceding year.

In accordance with decreased exports and overstocked yards, competition for orders was keener, and all-round decreases in values were reported.

TABLE 12.

Exports of Sawn Timber and other Forest-produce.

(From information supplied by the Comptroller of Customs. All figures refer to the years ended 31st December, 1926–28.)

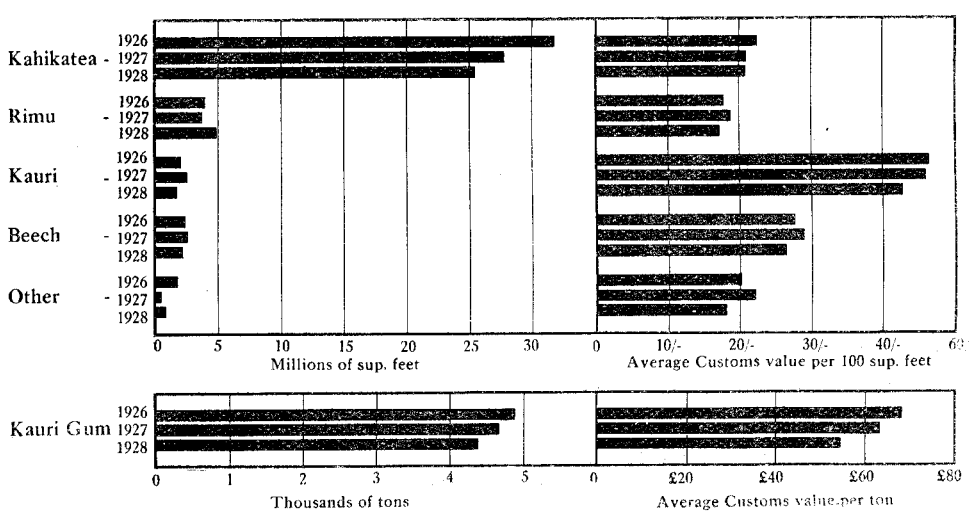
Item.	1926.		1927.		1928.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
	Ft. b.m.	£	Ft. b.m.	£	Ft. b.m.	£
White-pine	31,768,000	356,860	27,802,000	289,980	25,439,000	262,390
Rimu	4,008,000	35,840	3,841,000	36,180	4,867,000	42,290
Beech	2,393,000	33,100	2,581,000	37,330	2,246,000	29,780
Kauri	1,987,000	46,320	2,476,000	57,090	1,670,000	35,700
Other (New Zealand) ..	310,000	3,510	464,000	4,870	750,000	6,850
Other (foreign)	1,488,000	14,620	17,000	480	57,000	470
Totals	41,954,000	490,250	37,181,000	425,930	35,029,000	377,480
	Tons.	£	Tons.	£	Tons.	£
Kauri-gum	4,877	332,770	4,674	298,630	4,394	240,140
Tanning-bark	99	1,130	38	650	43	580
Fungus	87	11,250	141	20,310	12	1,270

Only 1,670,000 ft. b.m. of kauri, valued at 42s. 9d. per 100 ft. b.m., was exported during the year, compared with 2,476,000 ft. b.m., valued at 46s. 1d. per 100 ft. b.m., during the previous year. The high price of this species debars it from any but special and luxury uses, and no considerable trade in the species can be expected.

Beech continues to enjoy a steady trade, and although exports (2,246,000 ft. b.m., valued at 26s. 6d. per 100 ft. b.m.) fell a little below the 1927 figures (2,581,000 ft. b.m., valued at 28s. 11d. per 100 ft. b.m.) this does not represent a serious decline in demand. It would appear, however, that the uses of the species could be increased threefold by efficient advertising and extension work within the industry. At present, utilization for wine-casks, in addition to increased use by motor-body building and agricultural-implement manufacturers, will probably tend towards increased utilization of the species.

White-pine, which supplies the bulk of our export timber trade, continues to experience lean times, and the export figures of 25,439,000 ft. b.m., valued at 20s. 8d. per 100 ft. b.m., compared with 27,802,000 ft. b.m., valued at 20s. 10d., during the previous year, and 31,768,000 ft. b.m., valued at 22s. 6d., during 1926, reflects the present trend in the trade. A combination of circumstances, including poor Australian dairy seasons, overstocked markets, and the competition of low-grade Baltic and North American softwoods, have contributed to the state of the market, and, although a little improvement can be anticipated for the current year, it may take some years to again establish the trade in the position it previously enjoyed.

The export of rimu improved, and totalled 4,867,000 ft. b.m., valued at 17s. 4d. per 100 ft. b.m., compared with 3,841,000 ft. b.m., valued at 18s. 10d. per 100 ft. b.m., for the previous year. No doubt the reduction in price, allowing rimu to compete more closely with Baltic timbers, and the lifting of the embargo on export, thereby giving merchants some security of supply, have led to the increased trade. While the main proportion of rimu exported consists of clean O.B., which is accepted overseas on a less rigid specification than in New Zealand in admitting defects which are sound and able to be dressed, this grade has to compete with Baltic timbers of a very knotty nature, which are reputed to be landed in Australia at a cost of only 13s. 6d. per 100 ft. b.m.



GRAPH 8.—ROUGH-SAWN TIMBER AND KAURI-GUM EXPORTS FOR YEARS ENDED 31ST DECEMBER, 1926–28.

Miscellaneous native species were exported during the year to the extent of 750,000 ft. b.m., valued at 18s. 2d. per 100 ft. b.m., compared with 464,000 ft. b.m., valued at 22s. 2d. per 100 ft. b.m., for the previous year. This total consists mainly of O.B. matai and a little tawa. The export of O.B. matai, which increased owing to the lifting of the export embargo, may be expected to increase somewhat; but here again no large trade promises to develop, owing to price debarring it from competition with other imported timbers mentioned above. Tawa, on the other hand, owing to the formation in New Zealand of a marketing organization for its seasoning and sale, can be expected to develop a steady trade, as it has a variety of uses throughout wood-using industries.

Following the trend of previous years, the export of kauri-gum again decreased, the quantity shipped amounting to 4,390 tons, valued at £54 per ton, compared with 4,670 tons, valued at £64, exported during 1927.

4. IMPORTS.

New Zealand's import timber trade has remained practically constant during the past three years, both as regards quantities of timber and the proportions of each class imported. The average price of all species, however, has shown considerable fluctuation, increasing from 24s. 10d. per 100 ft. b.m. in 1926 to 25s. 5d. in 1927, and falling again to 24s. 5d. in 1928. During this period increased duties were placed on certain qualities and kinds of imported timbers, the revised tariff coming into force early in 1928. The decline in the average value of all species during 1928 can be attributed to the efforts of foreign exporters to overcome to some degree the effect of the increased duties by selling their timber at a reduced price. Other factors, such as reduction in shipping freights and the importation of special sizes admitted at decreased duties, have tended to lessen the effect of the increased duties as a protection to the local industry.

TABLE 13.

IMPORTS OF SAWN TIMBER AND OTHER FOREST PRODUCE.

(From information supplied by the Comptroller of Customs. All figures refer to the years ended 31st December, 1926–28.)

Item.	1926.		1927.		1928.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
	Ft. b.m.	£	Ft. b.m.	£	Ft. b.m.	£
Australian hardwoods ..	23,365,000	365,730	26,398,000	418,830	23,706,000	356,330
Douglas fir	16,937,000	120,460	17,638,000	125,680	16,713,000	116,850
Cedar	8,905,000	106,480	2,390,000	24,270	2,066,000	20,690
Hemlock and spruce ..	7,271,000	76,960	5,586,000	67,890	7,694,000	83,400
Redwood	3,500,000*	48,450	7,583,000	85,580	7,478,000	87,350
Other	6,526,000	108,370	2,173,000	62,470	2,859,000	74,230
Totals	66,504,000	826,450	61,768,000	784,720	60,516,000	738,850
	Number.	£	Number.	£	Number.	£
Laths, rails, palings, &c. ..	14,280,000	26,690	10,156,000	15,420	7,368,000	11,230
	Tons.	£	Tons.	£	Tons.	£
Tanning-bark	2,250	23,240	865	12,350	1,442	23,650
Wood-pulp	2,710	35,880	3,156	38,470	2,382	28,910

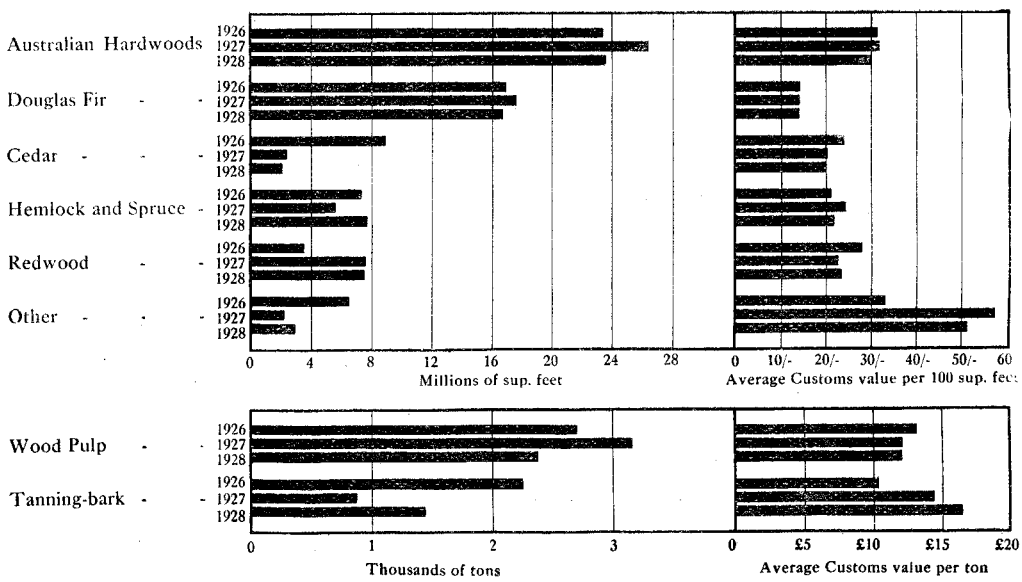
* Redwood estimated for 1926.

During 1928, 60,516,000 ft. b.m., valued at £738,850, were imported, compared with 61,768,000 ft. b.m., valued at £784,720, in 1927, and 66,504,000 ft. b.m., valued at £826,450, in 1926.

Hardwoods, chiefly from Australia, and in the form of rough-sawn timber for bridge and constructional work, poles, and sleepers, maintained a steady trade and price. Oak and other minor hardwoods for the various wood-using industries were imported to the extent of approximately 3 million feet b.m. during the year. In all, hardwoods account for approximately 44 per cent. of our total timber imports.

Softwoods, in the form of Douglas fir for construction and interior finish, redwood and cedar for joinery and weatherboarding, and hemlock and spruce for dairy-produce containers and general boxing, were imported to the extent of 33,951,000 ft. b.m., valued at £308,290, compared with 33,197,000 ft. b.m., valued at £303,420, introduced during 1927. Douglas fir is imported mainly in large sizes in the rough-sawn merchantable grade, the baulks being resawn locally, mainly into inch boards. The low price of the latter, combined with their lightness and ease of handling, owing to being thoroughly seasoned, has been largely responsible for their preference to the lower grades of native species for centreing and falsework in the construction of large buildings. During the past two years approximately 10 million feet b.m. of redwood and cedar have been imported. The imports in 1926 of cedar and redwood were in the ratio of 3 to 1, whereas the position has now been reversed, redwood being imported in place of cedar. The efforts of the Redwood Export Bureau in reducing prices and in establishing an agency in Australia, has resulted in a firm trade being established in New Zealand for the species. At the ruling prices, heart matai, rimu, and totara cannot compete with redwood for weatherboarding. Hemlock and spruce, which are imported mainly as dressed timber, showed an increase of almost 3 million feet b.m., due mainly to the heavy increase in the import of fruit-cases. Butter-boxes, too, increased in importation to the extent of 200,000 ft. b.m., while imported cheese-crates decreased by a slightly larger quantity. It would appear that the latter are not so dependable as the white-pine and silver-beech crates.

The importation of tanning-bark and wood-pulp fluctuates considerably. Thus 1,442 tons of tanning-bark and 2,382 tons of wood-pulp were imported during the year, compared with 865 tons of tanning-bark and 3,156 tons of wood-pulp during 1927. The price of tanning-bark has increased from £10 6s. per ton in 1926 to £14 6s. per ton in 1927 and £16 8s. per ton in 1928, and it appears that these prices will force the use of local tanning-barks to a greater extent in the future. Wood-pulp maintained a steady price of approximately £12 per ton, as in the previous year.



GRAPH 9.—TIMBER, WOOD-PULP, AND TANNING-BARK IMPORTS FOR YEARS ENDED 31ST DECEMBER, 1926 TO 1928.

In analysing the trade with various countries exporting to New Zealand, the position is unsatisfactory as was the case during the previous year, British possessions reporting a decrease of approximately 5 million feet b.m., which foreign countries gained.

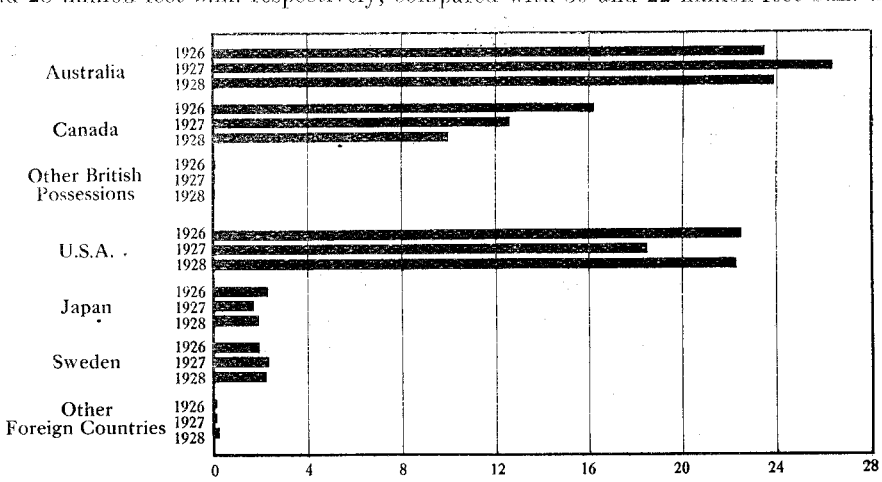
TABLE 14.

IMPORTS OF TIMBER INTO NEW ZEALAND, 1926–28, ACCORDING TO COUNTRY OF EXPORT.

(From statistics supplied by the Comptroller of Customs.)

Country of Export.	Calendar Year					
	1926.		1927.		1928.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
	Ft. b.m.	£	Ft. b.m.	£	Ft. b.m.	£
Australia	23,458,000	368,870	26,423,000	420,130	23,886,000	362,210
Canada	16,159,000	139,260	12,596,000	94,880	10,001,000	74,910
Other British colonies ..	54,000	2,320	50,000	2,450	39,000	1,900
Total, British Empire	39,671,000	510,450	39,069,000	517,460	33,926,000	439,020
United States of America ..	22,537,000	228,880	18,534,000	182,460	22,305,000	214,570
Japan	2,262,000	58,250	1,749,000	47,630	1,952,000	48,950
Sweden	1,902,000	25,440	2,274,000	32,570	2,156,000	30,930
Other foreign countries ..	132,000	3,430	142,000	4,600	177,000	5,380
Total, foreign countries	26,833,000	316,000	22,699,000	267,260	26,590,000	299,830
Grand totals ..	66,504,000	826,450	61,768,000	784,720	60,516,000	738,850

The approximate quantities of timber imported from British possessions and foreign countries were 34 and 28 million feet b.m. respectively, compared with 39 and 22 million feet b.m. during 1927.



GRAPH 10.—IMPORTATIONS OF TIMBER FROM COUNTRIES TRADING WITH NEW ZEALAND FOR THE CALENDAR YEARS 1926–28.

Canada and Australia, which supply 99 per cent. of the timber imported into New Zealand from British possessions, share between them the decreased trade referred to above. The decline has been apparent to Canadian operators, and the comments thereon in the *British Columbia Lumberman* regarding export of timber during 1928 are worthy of reproduction. The report, *inter alia*, states,—

"The Empire markets of Australia, New Zealand, South Africa, India, and the British West Indies all show decreases. This is a truly unfortunate setback, and indicates the urgent necessity for trade-extension activity in the sister Dominions of the Crown. Happening in the year of an Empire Forestry Convention, it further proves that, comforting as are the resolutions of that splendid body, the establishment of a big inter-Empire trade in forest-products must primarily be the work of export and efficient trade agencies. No greater argument for the establishment of improved tariff relations with the southern Dominions can be secured than by a precis of the comparative export figures of British Columbia and the United States covering shipments to New Zealand and Australia for the last twenty years. The same figures also speak loudly in favour of the proposed subsidized assistance by the Ottawa Government to lumber-carrying vessels loading at British Columbia ports. The notable increase in cargo shipments to eastern Canada is a good feature of a report that is, with the one exception noted, a very favourable one."

The United States of America, on the other hand, which supplies approximately 83 per cent. of the timber imported from foreign countries, and 37 per cent. of our total timber imports, obtained 90 per cent. of the increased trade referred to. If Australian hardwoods, which are used almost entirely for constructional purposes, and do not compete to any extent with our local timbers, are excluded from the imports, it is found that the United States supply over 60 per cent. of the imported timbers which compete with local building and cooperage timbers.

5. Timber Industry and Markets.

A severe decline in timber-production, moderate but proportionately large importations, lowest exports since the beginning of the trade, and price-cutting have all aided in placing the timber industry in a depressed condition. The causes for this are all interrelated and more or less well known. New Zealand sawmills have a producing-capacity at least 100 per cent. in excess of present consumption, and owing to the small size of the average mill, its short life, and the tendency for merchantable timber to become more inaccessible, the inherent tendency of the miller is to work as near full-time conditions as possible. Under-capitalization of plant makes it essential for many operators to effect sales immediately on cutting, to enable wages and current expenses to be paid. On the other hand, over-production during the previous three years has carried an accumulation of stocks at most mills, for which no immediate sale has been apparent, and has led to a "buyers' market" in the trade. As a result, operators have cut prices to a point which in many cases allows little margin of profit, and in some instances does not return the cost of production. Moreover, the forcing of timber upon a slow market by price-cutting has led to an artificial and speculative demand in advance of real consumption, and has demoralized the price structure without increasing the total sale of timber. Indeed, the price-fluctuations and price-cutting which have been prevalent throughout both Islands have reduced the annual returns to the industry during the past three years by approximately £500,000, but have not increased the total sale of its products by a single board foot.

During the past year the industry has made a genuine attempt, by internal reorganization, to effect an improvement in its condition, and in this respect has been aided to a considerable extent by the State. Uniform classification and grading rules have been devised through the agency of the Government and the Sawmillers' Federation, and an increase in the utilization of local timber, combined with a more balanced consumption of the product of the log, can be confidently expected when the new scheme comes fully into operation. In the main producing districts the sawmillers have succeeded in organizing marketing associations, which have the power to control production and establish a firm price policy. This does not in any way imply price-fixation and increased cost of timber to the consumer, but guarantees a fair and reasonable return to the producer of the timber. The Dominion Federated Sawmillers' Association has investigated ruling conditions with minute care, and as a result of its deliberations is seeking parliamentary power during the coming session to efficiently organize the timber industry. The Bill, which is known as the Timber Industrial Efficiency Bill, is an attempt by the industry to govern itself from within by the formation of a Board, with power to institute uniform classification and a system of cost accounts, to collect and distribute information relating to economic industrial methods and practices, to make an investigation for the purpose of eliminating waste, and, in general, to bring about improvements for the benefit of the industry.

The much-discussed question of railway freights on timber was further investigated, and a study inaugurated to determine the possibility of freighting timber by weight instead of by measurement. The former system, which is in vogue in many foreign countries, gives seasoned timber a decided advantage in freight charges, and thus considerably aids those millers who season timber in their bush yards.

CHAPTER V.—GENERAL.

1. Visit of Empire Forestry Conference.

An event of both interest in and importance to the forestry world was the visit to the Dominion of the delegates to the Empire Forestry Conference, which opened its sessions in Perth, Western Australia, on 21st August, 1928, and after including in its itinerary all the six States of the Commonwealth, arrived in New Zealand on 8th October and visited both Islands, concluding its sittings in Auckland on the 23rd of that month.

This is the third occasion upon which the Conference has been called together, the initial meeting being in London in 1920, and the second in Canada three years later. It is proposed to hold the next Conference in South Africa in 1933.

Foresters attended from all parts of the Empire, including Canada, several provinces in India, South Africa (and the other British African territories), Cyprus, North Borneo, Ceylon, Burma, Federated Malay States, &c.

The proceedings were presided over by the Right Hon. Lord Clinton, Chairman, British Forestry Commission. The New Zealand delegates were the Hon. O. J. Hawken, Commissioner of State Forests; the Right Hon. Sir Francis Bell; the Hon. Sir. R. Heaton Rhodes; Dr. L. Cockayne, F.R.S.; Professor H. H. Corbin, B.Sc. (Agriculture), Forestry School, Auckland University College; C. E. Foweraker, M.A., Lecturer-in-charge, School of Forestry, Canterbury University College; A. Hansson, M.F. (Yale), Chief Inspector, State Forest Service; W. T. Morrison, Conservator of Forests, Rotorua; and the Director of Forestry, of whom the three last mentioned attended both the Australian and New Zealand sessions.

For the Dominion tour all the other executive officers of the Service were appointed associate delegates, as well as certain gentlemen who have been associated with and have rendered outstanding service in the cause of forestry in a scientific and semi-official capacity.

Briefly, the objects of these Conferences may be described as twofold—firstly to stabilize forestry practice throughout the Empire for the safeguarding of future timber-supplies, and co-ordinating and improving generally matters of policy, administration, trade, marketing, &c., and the technical and research branches of forestry; secondly, to assist the countries in which they are held by an exchange of the knowledge and experience of forestry matters acquired by the delegates throughout long years of administration in other parts of the Empire.

In addition to the subjects just referred to, other kindred ones, such as timber supply and consumption, labour in relation to forestry, forestry in relation to climate and erosion, forest surveying, forestry education, forestry technique, &c., were discussed, and forestry principles applicable to conditions prevailing throughout the Empire were enunciated in general terms.

In pursuance of the policy of co-ordination, the Director of the Imperial Institute and representative of the Empire Marketing Board, London, the Director of the Imperial Forestry Institute, Oxford, and a representative of the Timber Trades Federation of the United Kingdom also travelled with the Conference, the two former being delegates, and the latter an associate delegate.

Conference Recommendations.

Indigenous Forests.—The Conference appointed a committee to furnish a report on New Zealand forestry, and the following extracts from this report are quoted for general information.

Dealing with those indigenous forests which are maintained primarily for protective reasons in mountainous country, with the object of preventing erosion and the silting-up of rivers, the committee states:—

"We recommend that steps be taken to complete the process of reservation as rapidly as circumstances will permit, in order that the further destruction of these forests may be prevented. We recommend also that all forests of these categories be placed under the administration of the State Forest Service, as this should tend towards economy and efficiency in maintenance."

With respect to those which are maintained primarily for the supply of timber, the committee uses these words:—

"We recommend that all areas remaining to be dedicated as permanent forest should be reserved for this purpose as soon as possible."

Exotic Plantations.—Under this head, amongst other remarks, the committee makes this observation:—

"No scheme of planting other lands unsuitable for agricultural purposes has been formulated for the years subsequent to 1935, but it will be necessary to prepare a scheme providing for systematic afforestation up to the time when the oldest plantations reach commercial maturity. This will provide a regular series of age-classes, and ensure the working of the plantations on a sustained-yield basis, a matter of vital importance in connection with the establishment and maintenance of local industries."

Thinnings in Plantations.—As this is a world-wide forestry problem, the committee report is quoted in full:—

"Although the plantations visited are apparently in a healthy condition, it is obvious that thinnings are urgently required. It is important that this work should be pushed on to the utmost extent possible, particularly in the case of larch. For this purpose it is advisable that a scheme of thinning should be prepared which will ensure that each plantation is thinned at least once every ten years. Until some use—such as wood-pulp—can be found for the material cut in thinnings, this work is likely to prove costly; but against this it should be noted that the ultimate benefit to the crop, through enhanced increment and a better quality of individual stems, may more than compensate for the expense involved in thinning. The low cost of establishing the plantations is a further justification for expenditure on thinning operations. In the meantime, every effort should be made to find a use for the large quantities of material available from thinnings."

Marketing of New Zealand Timbers.—An addendum to this report was presented by the British timber-trade representative, and, as his observations on the possibility of establishing markets in Great Britain for our more important timbers are of interest to sawmillers and timber-merchants generally, they are likewise quoted in full:—

"Kauri-pine (*Agathis australis*) has been sold in England for about forty years, but owing to the stopping of exports the sale has declined. This is a very useful wood where large sizes of clean wood are required, and although the cost has greatly increased there will still be a limited demand.

"White-pine (*Podocarpus dacrydioides*) was sold in England many years ago, but as this wood is required for butter-boxes the export has ceased.

"Rimu (*Dacrydium cupressinum*) was introduced on the English market many years ago, but was not favourably received owing to other woods of a similar character being sold at a much lower price. This wood should be kept in the Dominion and not exported, as New Zealand will require all that can be produced for furniture and interior fittings of houses.

"Beech (*Nothofagus fusca* and *N. Menziesii*): Samples of these woods were sent to the Imperial Institute a few years ago, and reported on, but owing to the price being so much above English beech no market could be found. However, both of these are useful woods and may find a market in England for special purposes, such as motor-car bodies, &c.

"One feature against the export of New Zealand woods to the English market is the very high freight of 12s. per 100 superficial feet, which until recently was 15s.

"*Pinus radiata*: If every effort is made to produce as much clean timber as possible suitable for joinery-work, this wood will meet with great success. The knots being mostly sound, an ample supply of flooring-boards can be produced to replace imports of Scots pine from Europe."

2. Private Commercial Afforestation.

The total area acquired by private companies throughout the Dominion is approximately 213,200 acres, of which 202,800 acres, or 94 per cent., is situated in the central North Island pumice region, extending roughly from west of the Rotorua–Taupo Road southward from Putaruru to Lake Taupo.

The growing of timber as a commercial enterprise was first undertaken in 1923, and rapid progress has since been made in the formation of softwood forests by a number of companies, sixteen of which have rendered returns to the Government Statistician indicating that 104,175 acres had been planted at 31st March, 1928. The following extract from the Monthly Abstract of Statistics for December, 1928, is quoted for general information:—

"Two kinds of organizations have been formed to carry out the various ventures. The first is the joint-stock company, where the property in the forests is vested in the company, each shareholder receiving a share of the profits according to the amount of capital contributed; the second is a private company registered with a comparatively small capital, but in which the investing public do not become shareholders. The company contracts with each investor that, in consideration of his paying the prescribed amount of cash, it will convey to him at the end of a given term a certain area of land duly planted according to a prescribed agreement. The interests of the investing public are watched over by trustees appointed by investors, and the lands concerned are conveyed by way of mortgage to the trustees until the time for conveyance to the investor arrives. Of the sixteen returns received from companies engaged in forestation operations during the year ended 31st March, 1928, six were from companies organized on the latter basis; but, though in the minority in point of numbers, their operations bulk very large in the figures for all companies."

Detailed figures of last year's planting are not yet available, but it is understood that the objective of one company was 36,000 acres, so that on a conservative estimate it may be stated that the total acreage planted by all companies will equal at least 40,000.

This remarkable growth of private afforestation over the short period of six years will probably be recorded as one of the most outstanding developments in New Zealand within that period. Certainly it has been responsible for the introduction into the Dominion of large overseas investments, which have been substantially expended in labour-absorbing operations, principally during the winter months, but the degree of national benefit which will eventually be received depends upon the extent to which these funds have been wisely expended.

As apparently some doubt still exists in the minds of a section of the general public regarding the official attitude towards these enterprises, the policy of the Government may be summed up in a few words. The Government does not support nor grant a monopoly or concession to any company beyond extending generally departmental facilities or advice upon request, and co-operation in demonstrating the utility and profitableness of tree-growing. It does not, however, undertake to safeguard the interests of private investors, who must personally satisfy themselves with respect to the *bona fides* of any company in which they propose to invest.

APPENDICES.

APPENDIX I.

SUMMARIZED REPORTS ON STATE AFFORESTATION.

Auckland Region.

Plantations and Nurseries.

Riverhead.—Planting at Riverhead Plantation was continued with an objective of 2,650 acres, but this was exceeded by 146 acres, which makes a total of 2,914 acres for the year, as compared with 2,615 for the previous year, and a grand total of 5,813 acres to date. Spot-sowing experiments were carried out in an endeavour to overcome the small-bird pest. The following species were tried: *Pinus canariensis*, *Eucalyptus eugenioides*, *Pinus pinea*, *P. halepensis*, *P. sylvestris*, and tung-oil, with fairly satisfactory results. The acquisition of additional small areas to remove what is at present a potential fire danger, and to improve existing boundaries, &c., is being proceeded with as opportunity and funds permit, and will, it is anticipated, be completed in the ensuing year. The trees in the nursery are estimated to total 3,517,400, and these will be utilized for future planting.

Maramarua.—As mentioned in last year's report, this area was acquired in 1927 for plantation purposes, and, following the usual preliminary work of roadmaking, laying off fire-breaks, erection of necessary buildings, &c., planting was commenced last season, when 2,860 acres were established in trees. The labour for these forestry operations was largely recruited from the unemployed in Auckland City, and, although the majority were quite inexperienced in this class of work, a few weeks' practice was, in most cases, sufficient to make them fairly efficient. These remarks also apply to Riverhead Plantation.

Waipoua.—Planting was continued on a small scale, and 16 acres were afforested with a large variety of species. Blanking of previous year's planting was undertaken, and 18,479 seedlings were used in this way.

Rotorua Region.

Tree-raising.—Climatic conditions have been favourable to nursery operations generally throughout the year. This, together with improved methods in soil treatment and technique generally, have combined to place the nurseries both at Kaingaroa and Rotorua in a very satisfactory condition. The total number of tree-seedlings raised for the season is estimated at 22,205,600, which makes a total of 31,686,200 young trees in stock. Seed sown totalled 2,968 lb., comprising *Pinus radiata*, *P. muricata*, *P. ponderosa*, and *P. Laricio* in open lines, and the remainder, principally *Sequoia sempervirens*, *Pseudotsuga Douglasii*, *Cupressus Lawsoniana*, *C. Benthamii*, *C. macrocarpa*, and a few eucalypts in protected beds. Very satisfactory crops of seedlings of all species have resulted, although in some species a little less vigorous growth would have been preferred. Trayed stock for farmers' sales is in excellent condition.

Tree-planting.—Trees totalling 16,885,000 have been planted out on 30,990 acres of Kaingaroa Plantation, and it is pleasing to record that, while the area thus dealt with exceeds all previous records, the establishment costs have again been reduced. This is particularly satisfactory, as a large proportion of labour employed was of the "relief" type, with little or no previous experience in such work. Weather conditions were generally favourable for the major planting operations, and good rains in the late spring and early summer had a beneficial effect on the newly planted areas.

Thinning.—Thinning operations have been continued on a small scale at Whakarewarewa Plantation, and material to a value of £73 has been removed under permit from an area of 28 acres, comprising principally compartments of *Pinus austriaca* and eucalypts. At Waiotapu Plantation 8½ acres of *Pinus muricata* were thinned for fuel purposes for the planting-camps at Kaingaroa. A small quantity of *P. Laricio* posts and poles were also obtained from this plantation for use by the planting-gangs. The whole area thinned to date from both plantations is 1,032 acres.

Tree and Seed Sales.—Trees to a total number of 4,169,050 were disposed of as follows: Sales to farmers, &c., 2,493,874; transfers of stock to other regions, 1,667,957; issues to schools, 7,219. The actual seed sold was 1,877 lb., while 418 lb. was transferred to other regions, and issues to schools accounted for 209 lb., making a grand total of 2,504 lb.

Fire Protection.—From a fire point of view the past season was much more favourable than the 1928 period, although on several occasions for short periods the fire danger was acute, and was accentuated by the location of railway-construction gangs on Taupo Road close to Whakarewarewa Plantation. This necessitated greater vigilance on the part of fire patrol officers than would otherwise have been the case, but valuable co-operation in this respect was received from the departmental officers in charge of the railway-works. New fire-breaks were laid off, and maintenance-work on old breaks carried out where necessary.

Equipment.—A Caterpillar tractor and a Russell Super-Mogul grader were purchased and placed in commission at Kaingaroa Plantation for road and fire-break work. These two machines are doing excellent work, have already justified their purchase, and are essential for coping with the extensive operations being undertaken on Kaingaroa Plains. The Ford motor fleet has been strengthened by the acquisition of two utility vans and two 30 cwt. trucks. A Bolens garden tractor was acquired for Rotorua Nursery. The use of this latter implement has greatly reduced the costs of weeding and the intercultivation of tree stock, and is particularly serviceable, as the soil at the nursery is free, light, and clean.

Wellington Region.

Karioi Plantation.—Planting was continued at this station, and at the end of the season an area of 5,410 acres was planted with 2,966,000 trees, *Pinus radiata* being the predominant species. In addition 297 acres were direct seeded, 191 lb. of seed being used for the purpose. Planting was commenced in May and completed in October, but a good strike did not result, owing to the severe climatic conditions. Blanking to replace losses in the 1927 planting was undertaken.

Nurseries.—A new nursery was established on an area of 10 acres at an altitude of 2,700 ft. about eight miles from Karioi Homestead, and the stock raised here will be used for planting on the high country adjoining. This will minimize transportation expenses; reduce weeding-costs, as virgin ground was used; and will produce a hardy class of seedling, well able to withstand the rigorous climatic conditions of this high country. The nursery was sheltered from the prevailing strong wind experienced at this altitude by 53 chains of manuka protection fences. A supplementary nursery of 4 acres was also established close to the homestead, which makes a total of 30 acres now under cultivation for this purpose. A total of 1,204 lb. of seed was sown, which produced, in round figures, 9,000,000 seedlings.

Flax-culture.—An experimental area of 20 acres was planted with 57,000 flax-plants *(Phormium tenax)*, and the result to date shows a mortality of less than 5 per cent., which is very satisfactory.

Telephone Communication.—The residence of the Officer in Charge was connected by telephone lines with the various planting-camps, which necessitated the erection of eight miles of line. Direct communication with Ohakune Exchange has also been secured.

Nelson–Marlborough Region.

Golden Downs Plantation.—Planting was continued, and when the season closed a further 2,465 acres of new plantations were established with 1,676,200 trees. The area available for planting was augmented during the year by the acquisition of 1,253 acres of adjoining land, about 20 per cent. of which is in beech forest. The nurseries were extended to meet the requirements of the increased planting programme, and a stocktaking in February last revealed an estimated crop of more than 6,000,000 seedlings.

Dumgree Plantation.—As this plantation has been on a maintenance basis for some years, the main work consisted of blanking (8,000 trees) and routine work, such as reconditioning of fire-breaks, underscrubbing, cleaning, &c. From the small nursery attached 50,500 trees were sold locally and 87,000 transferred to Golden Downs Plantation.

Seed-collection.—This work was continued, and 487 lb. of tree-seed was collected and cleaned—a slightly smaller quantity than in the preceding year—the chief species being *Sequoia sempervirens* (139 lb.), *Pinus canariensis* (96 lb.), *Cupressus Lawsoniana* (93½ lb.), and *Pinus pinaster* (92 lb.).

Canterbury–Otago Region.

Tree-raising.—Excellent crops of seedlings were obtained at both Tapanui and Balmoral Nurseries, although the damp weather was responsible for a heavy growth of weed. 1,198 lb. of seed was sown at the former station, and 1,765 at the latter. The tree stocks on hand, although slightly smaller than last year, are sufficient for coming requirements and are made up as follows:—

TABLE 15.

Station.	One-year.	Two-year.	Three-year.	Total.
Hanmer and Balmoral ..	4,464,600	3,600,700	233,400	8,298,700
Tapanui	4,143,500	5,921,000	455,000	10,519,500
Naseby..	104,300	664,600	730,900	1,499,800
Totals	8,712,400	10,186,300	1,419,300	20,318,000

Tree-planting.—The new area planted totalled, in round figures, 12,300 acres, and approximately 8,711,000 trees were used. This was distributed as follows: Blue Mountains Plantation, 5,000 acres, 3,497,400 trees; Balmoral Plantation, 4,200 acres, 3,070,200 trees; Eyrewell Plantation, 3,100 acres, 2,143,400 trees. The Blue Mountains area is hilly and difficult of access, while practically the whole area at Eyrewell is densely covered with manuka scrub. Maintenance-work was carried on at Hanmer Plantation, and in addition an area of 1,348 acres was blanked up.

Southland Region.

Tree-planting on a small experimental scale on cut-over areas and underplanting were carried out in Longwood, Catlins, and Wakaia State Forests. The results to date indicate that, provided second growth is not dense and vermin is absent, shade-bearing trees can be successfully established.

Sample Plots.—In order to study increment and silvicultural treatment on native-beech forest, three small plots, with a central control plot, were laid off in Longwood State Forest. The plots, which are 1 chain square, have been treated to various degrees of thinning, and the trees have been measured and classified according to diameter.

APPENDIX II.

Summary of Operations in Nurseries.

Name of Nursery.	Year of Establishment.	During Year ended 31st March, 1929.										From 1896 to 1929.		
		Total Expenditure.				Trees in Nurseries.				Trees in Nurseries.		
		Tree-growing.	Maintenance.	Buildings, &c.	Total.	Estimated Number of Trees raised during Year.	Output of Trees.		Number of Trees estimated in Nursery at 31st March, 1929.	Estimated Number of Trees raised during Period.	Output of Trees.	
							Number of Trees sent to Plantations during Year.	Number of Trees sent to Outside Places during Year.			Number to Plantations.	Number to Outside Places.
		£ s. d.	£ s. d.	£ s. d.	£ s. d.							
Rotorua	1898	7,927 0 8	1,632 16 9	478 11 7	10,038 9 0	9,344,510	7,502,350	4,169,050	16,799,100	146,379,000	106,328,700	23,251,200
Hanmer and Balmoral	1902	3,298 17 8	2,257 5 7	94 0 4	5,650 3 7	4,464,640	5,736,337	209,553	8,298,800	37,894,200	27,063,500	2,531,900
Tapanui	1897	3,699 3 9	1,955 4 9	385 11 10	6,040 0 4	4,143,500	3,128,475	616,949	10,519,600	39,176,200	24,668,200	3,988,400
Naseby	1921	206 17 11	345 9 8	228 13 1	781 0 8	104,300	368,900	69,340	1,499,800	3,187,200	1,297,300	390,100
Riverhead	1926	1,660 2 1	283 7 5	41 7 2	1,984 16 8	2,889,607	3,627,393	..	3,517,400	8,968,200	5,450,800	..
Maramarua	1928	Included in Plantation Expenditure.				2,826,002	..	..	2,826,000	2,826,000	..	..
Kaingaroa	1927	2,047 9 7	272 9 1	363 7 11	2,683 6 7	12,861,101	9,543,622	..	14,887,100	30,751,200	15,864,100	..
Karioi	1927	2,748 13 8	67 6 0	274 15 5	3,090 15 1	8,970,300	2,286,000	..	10,806,000	13,092,000	2,286,000	..
Tangimoana	1921	311 3 9	95 7 5	7 10 1	414 1 3	..	124,350	27,616	229,500	1,122,700	865,600	27,600
Golden Downs ..	1927	3,391 6 8	361 2 7	489 12 10	4,242 2 1	6,320,900	1,131,900	100	6,655,700	7,787,700	1,131,900	100
Westland	1922	622 3 9	274 5 6	25 9 5	921 18 8	68,000	339,905	502,148	448,100	1,939,600	989,400	502,100
Waipoua	1925	..	..	..	..	81,628	18,479	..	90,400	183,700	93,300	..
Puhipuhi	1925	..	..	..	..	..	17,200	..	69,400	199,200	129,800	..
Dumgree	1924	..	..	..	..	65,700	94,480	50,500	65,000	567,000	396,500	105,500
Totals ..	..	25,912 19 6	7,544 14 9	2,388 19 8	35,846 13 11	52,140,188	33,919,391	5,645,256	76,711,900	294,073,900	186,565,100	30,796,909

APPENDIX II—*continued.*

SUMMARY OF OPERATIONS IN PLANTATIONS TO 31ST MARCH, 1929.

Plantation.	Year Established.	1928–29. Number of Trees planted on New Area.	1928–29. Number of Trees used to replace Losses.	1928–29. New Area planted.	1928–29. New Area of Direct Formation.	Total Expenditure for Year.	Total Number of Trees received from Nurseries.	Number of Trees used to replace Losses.	Total Area planted.	Total Expenditure: Cost to Date.
				Acres.	Acres.	£ s. d.			Acres.	£ s. d.
Riverhead	1926	1,876,751	280,639	2,914	125	12,883 19 8	4,007,039	280,639	5,813	26,225 8 3
Maramarua	1928	1,898,250	..	2,860	303	14,314 10 1	1,898,250	..	2,860	17,535 3 11
Puhipuhi	1904	..	57,200	..	..	667 3 2	1,632,250	632,250	1,200	15,291 16 7
Whakarewarewa	1898	..	..	..	..	4,598 17 4	20,626,050	3,999,464	7,677	139,265 4 10
Waiotapu	1901	..	..	..	..	3,582 16 2	23,529,152	4,883,134	7,352	114,739 8 5
Kaingaroa	1913	16,884,972	161,000	30,990	2,754	44,079 14 1	77,380,017	3,568,285	105,153	272,749 7 0
Karioi	1927	2,966,000	543,000	5,410	297	10,002 12 6	4,415,205	543,000	6,659	24,612 10 9
Golden Downs	1927	1,676,200	..	2,465	..	10,049 6 3	2,012,120	..	2,959	12,965 15 11
Hanmer Springs	1901	..	522,725	..	..	5,855 14 7	13,666,103	2,664,524	7,365	93,995 10 8
Balmoral	1916	3,070,210	..	4,185	88	13,795 14 6	13,848,338	987,710	17,416	93,388 2 1
Eyrewell	1928	2,143,390	..	3,135	..	15,668 1 4	2,143,390	..	3,135	15,668 1 4
Blue Mountains	1925	3,497,375	..	5,035	..	21,902 16 4	5,938,410	131,500	8,318	46,970 1 1
Naseby	1900	..	..	..	..	1,809 11 2	6,040,293	1,041,275	2,560	53,844 5 8
Greenvale	1917	..	..	..	..	1,600 0 2	4,562,770	550,880	3,704	84,848 2 8
Dusky Hills	1898	..	..	..	..	..	3,061,997	881,160	751	†
Conical Hills	1903	..	..	..	..	1,545 16 8	10,762,701	1,476,405	3,489	80,698 3 7
Pukerau	1915	..	..	..	..	..	906,685	86,688	600	..
Raincliff	1889*	..	..	..	..	5 0 0	..	..	159	540 15 0
Experimental Group.										
Tangimoana	1921	22,000	102,350	32	..	700 0 4	386,015	128,160	522	4,788 12 8
Waipoua	1924	10,460	8,019	16	..	170 15 2	109,989	9,305	157	625 0 7
Dumgree	1903	..	8,000	..	..	589 15 9	1,802,265	1,165,450	342	15,912 19 11
Westland	1922	135,920	203,985	200	32	2,364 12 1	989,394	311,460	1,488	15,586 5 0
Longwood	1927	97,500	..	164	..	632 9 1	166,405	..	288	1,267 17 9
Tasman West	1925	..	..	..	..	1 10 10	1,750	127	5	18 10 10
Gimmerburn	1903	..	..	..	..	..	936,235	783,339	93	6,909 0 6
Waitahuna	1906	..	..	..	..	..	42,025	11,500	11	330 7 9
Galloway	1915	..	..	..	..	..	6,930	3,050	2	84 19 10
Omarama	1915	..	..	..	..	..	4,390	..	2	92 18 9
Totals	..	34,279,028	1,886,918	57,406	3,599	166,820 17 3	200,876,168	24,139,305	190,080‡	1,138,954 11 4

* Established privately and purchased in 1901. † Expenditure included in Greenvale. ‡ Does not include 7,042 acres of direct formation.

APPENDIX III.

State Forests Account.

Comparative Analysis of Receipts and Payments from 1st April, 1919, to 31st March, 1929.

	1919–20.		1920–21.		1921–22.		1922–23.		1923–24.		1924–25.		1925–26.		1926–27.		1927–28.		1928–29.	
	Capital.	Operation.	Capital.	Operation.	Capital.	Operation.	Capital.	Operation.	Capital.	Operation.	Capital.	Operation.	Capital.	Operation.	Capital.	Operation.	Capital.	Operation.	Capital.	Operation.
Receipts—	£		£		£		£		£		£		£		£		£		£	
Forest income	8,514		19,518		30,784		63,372		93,480		161,469		152,550		128,566		115,398		90,114	
Loans raised	65,000		70,000		86,780		214,221		209		100,000		..		..		160,000		200,000	
Total receipts ..	73,514		89,518		117,564		277,593		93,689		261,469		152,550		128,566		275,398		290,114	
Payments—	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£
Salaries	7,111	1,937	10,823	6,772	10,400	20,794	8,626	21,475	9,272	21,414	9,035	22,394	11,103	25,912	17,075	22,783	16,476	27,194	23,184	21,364
Development and management of indigenous State forests	222	3,722	4,191	7,575	5,251	12,301	1,563	12,227	2,177	14,094	2,792	14,670	3,082	15,500	4,204	17,839	3,474	15,840	4,815	17,218
Forest-fire protection	..	..	..	..	72	963	95	1,712	81	1,896	125	1,405	38	1,553	73	1,524	182	3,166	287	1,967
Educational	..	188	..	..	369	479	191	383	119	463	100	819	213	1,164	107	1,094	180	472	140	758
Forest research	..	..	..	223	..	999	1,135	1,089	2,142	1,496	1,750	2,847	3,615	2,158	2,402	2,472	2,059	5,181	1,732	5,218
Afforestation and forest-extension	46,072	..	49,631	..	43,792	..	30,814	..	37,320	..	50,182	..	63,910	..	80,730	..	110,842	..	155,447	..
Lands purchased for afforestation	145	..	157	..	2,128	..	3,585	..	..	..	476	..	17,764	..	11,181	..	18,352	..	23,231	..
Forested lands purchased ..	7,294	..	..	..	7,173	..	1,064	..	4,474	..	105,993	..	16,161	..	18,639	..	830	..	..	..
Local-body allocations and grants, &c.	..	100	..	..	258	1,152	..	929	..	2,570	..	790	..	6,215	..	9,805	..	7,241	..	13,227
Advice, assistance, and preparation of planting-plans for local bodies and settlers	..	28	..	..	..	1,399	..	757	..	686	..	1,196	..	1,358	..	1,611	..	2,918	..	4,944
Net interest and loan charges ..	..	3,577	..	6,127	397	9,797	4,818	17,155	913	17,337	893	16,516	..	20,954	..	24,525	..	33,816	..	40,984
National Endowment Account, transfers to	..	..	..	..	..	..	..	..	..	..	..	12,612	..	9,741	..	15,659	..	13,885	..	7,469
Total payments ..	60,844	9,552	64,802	20,697	69,840	47,884	51,891	55,727	56,498	59,956	171,346	73,249	115,886	84,555	134,411	97,312	152,395	109,713	208,816	113,149
Grand total payments	70,396		85,499		117,724		107,618		116,454		244,595		200,441		231,723		262,108		321,965	

APPENDIX IV.

STATE FORESTS ACCOUNT.

Receipts and Payments Account for the Year ended 31st March, 1929.

Receipts.	£ s. d.	£ s. d.	£ s. d.
To Cash in hand, 1st April, 1928—			
In Post Office		250 19 1	
In Public Account		16,829 17 3	
In Investment Account		20,000 0 0	
Imprests outstanding in London		412 9 10	
Imprests outstanding in the Dominion		541 15 1	
			38,035 1 3
Interest on securities held by Investment Account			3,204 18 11
Inscribed stock and debentures issued			200,000 0 0
Receipts—Indigenous forests—			
Timber-sales	49,008 18 8		
Timber royalties	7,818 7 7		
Timber trespass	136 9 6		
Leases—Grazing	2,332 5 1		
Leases—Sawmill-sites, &c.	778 12 4		
Leases—Industrial	560 11 0		
License and transfer fees	127 17 0		
Miscellaneous licenses	136 19 9		
Permits—Grazing	62 14 10		
Permits—Miscellaneous	191 18 6		
Kauri-gum	221 1 1		
Fees for inspections and reports	313 11 8		
Interest on overdue promissory notes	92 18 8		
Rental of houses	117 0 0		
Opossum revenue	4,740 19 7		
Akatarawa Reserve—Revenue	..		
Miscellaneous	2,797 19 11		
		69,438 5 2	
Receipts — National-endowment indigenous forests (allocation in terms of section 39, Forests Act, 1921–22)		8,249 6 3	
Carried forward		77,687 11 5	241,240 0 2

Payments.	£ s. d.	£ s. d.	£ s. d.
By Permanent charges—			
Recoupment of management charges of consolidated stock		31 17 4	
Recoupment of stamp duty on transfers on New Zealand consolidated stock, 1935–45		38 1 6	
Recoupment of charges and expenses of raising loans		558 9 6	
			628 8 4
Interest on advances from Consolidated Fund		2,666 5 0	
Interest on loans recouped to Consolidated Fund		40,894 13 2	
			43,560 18 2
Transfer to National Endowment Account		..	7,468 10 2
Capital charges—			
Sub. II.—General development of State forests—			
Buildings	275 13 2		
Motor-vehicles, field, and office equipment	2,101 11 10		
Forest Atlas	415 13 11		
Roads, tracks, and telephone-lines	417 2 11		
Demarcation	229 2 11		
Salaries (includes pay of non-permanents)	680 0 6		
Re-establishment of Longwood Forest	257 15 3		
Re-establishment of Erua Forest	1,278 12 7		
Re-establishment of Waikaia Forest	0 10 6		
		5,656 3 7	
Sub. III.—Forest-fire prevention—			
Equipment and improvements		286 15 10	
Sub. IV.—Educational—			
Reference library	126 15 7		
Photographic equipment	13 3 5		
		139 19 0	
Sub. V.—Forest research—			
Forest Experimental Station, Westland	1,549 18 2		
Timber-testing equipment, &c.	43 15 4		
Salaries	157 1 10		
Forest Experimental Station, Auckland	137 10 11		
Forest Experimental Station, Nelson	0 11 0		
		1,888 17 3	
Carried forward		7,971 15 8	51,657 16 8

APPENDIX IV—*continued.*

STATE FORESTS ACOUNT—*continued.*

Receipts and Payments Account for the Year ended 31st March, 1929—continued.

Receipts—continued.

	£ s. d.	£ s. d.	£ s. d.
Brought forward	..	77,687 11 5	241,240 0 2
To Receipts—Nurseries and plantations—			
Trees	8,571 15 3		
Seeds	977 8 4		
Firewood and poles	1,013 12 10		
Grazing	639 6 0		
Rental of houses	885 7 9		
Miscellaneous	338 8 10		
		12,425 19 0	
			90,113 10 5
Recoveries of expenditure and credits-in-aid—			
Sub. I.—Salaries	..	42 0 6	
Sub. II.—General development of State forests—			
Capital charges—			
Sales of motor-vehicles, equipment, &c.	160 19 2		
Maintenance charges—			
Destruction of wild pigs, &c. ..	171 0 0		
Timber-cruising, &c.	141 4 9		
Travelling-expenses	70 11 0		
Sundries	29 10 8		
		573 5 7	
Sub. III.—Maintenance charges—			
Sundries	..	52 2 9	
Sub. IV.—Educational—			
Maintenance charges—			
Department bulletins	103 10 8		
Sundries	14 3 3		
		117 13 11	
Sub. V.—Forest research—			
Maintenance charges—			
Timber-products testing, and travelling-expenses	..	17 12 10	
Sub. VI.—General afforestation—			
Capital charges—			
Nurseries and plantations	889 3 9		
Maintenance charges—			
Tree-seed operations, &c.	426 18 8		
		1,316 2 5	
Sub. VII.—Acquisition of indigenous forests	..	273 18 0	
			2,392 16 0
Carried forward	..	..	333,746 6 7

Payments—continued.

	£ s. d.	£ s. d.	£ s. d.
Brought forward	..	7,971 15 8	51,657 16 8
By Capital charges—*continued.*			
Sub. VI.—General afforestation—			
Nurseries and plantation, planting, &c. ..	154,691 14 0		
Salaries—Afforestation (includes pay of non-permanents)	22,347 7 0		
Land for extension of nurseries and plantations	23,484 16 1		
Sand-dune reclamation	1,643 3 6		
		202,167 0 7	
Operation and Maintenance charges—			
Salaries	21,406 1 0		
Contribution to Public Service Superannuation Fund	704 18 4		
		22,110 19 4	
Sub. II.—General development of State forests—			
Postages, cables, &c., printing and stationery	2,001 0 7		
Payments to other Departments for services rendered	266 11 6		
Forest and grazing reconnaissance, timber cruising and appraisal, policing patrol, and maintenance permanent equipment	4,437 7 4		
Destruction of wild pigs, &c.	1,104 6 7		
Legal expenses, contingencies, &c. ..	169 11 0		
Office rent, heating, and lighting ..	3,041 16 9		
Transportation expenses and upkeep of motor-vehicles	1,593 0 5		
Travelling-expenses and transfer of officers	3,992 8 6		
Wild-life control	319 8 2		
		16,925 10 10	
Sub. III.—Forest-fire prevention—			
Communication and locomotion expenses, &c.	365 13 8		
Wages	1,653 19 2		
		2,019 12 10	
Carried forward	..	251,194 19 3	51,657 16 8

APPENDIX IV—*continued.*

STATE FORESTS ACCOUNT—*continued.*

Receipts and Payments Account for the Year ended 31st March, 1929—continued.

Receipts—continued.

	£ s. d.	£ s. d.	£ s. d.
Brought forward	..	..	333,746 6 7
To Contributions received from local authorities in respect of the administration expenses of the Akatarawa Reserve—Upper Hutt Borough Council	..	..	0 3 3
Equality of Exchange (Forest Amendment Act, 1925, section 4)	..	320 0 0	
Reimbursement purchase-price of Hukinga and Forest No. 26 (Appropriation Act, 1928, section 14)	..	12,034 12 0	
			12,354 12 0
			£346,101 1 10

Payments—continued.

	£ s. d.	£ s. d.	£ s. d.
Brought forward	..	251,194 19 3	51,657 16 8
By Capital charges—*continued.*			
Sub. IV.—Educational—			
Forest exhibits	13 17 10		
Photographic records, &c.	353 0 8		
Departmental bulletins and professional publications	504 10 5		
Travelling-expenses	4 9 10		
		875 18 9	
Sub. V.—Forest Research—			
Forest ecology	423 8 6		
Silvicultural management studies ..	665 0 6		
Utilization and timber-testing and travelling-expenses	3,884 2 0		
Forest entomology	263 10 10		
		5,236 1 10	
Sub. VI.—General afforestation—			
Preparation of planting-plans and forest-extension	331 5 3		
Experimental machinery	325 14 2		
Tree-seed collection	2,938 0 0		
Travelling allowances and expenses ..	1,549 19 7		
Work for other Departments	225 9 0		
		5,370 8 0	
Sub. VII.—Acquisition of indigenous forests—			
Yearly rent, Otanewainuku S.D. ..	..	74 0 0	
Sub. VIII.—Grants and subsidies—			
Payments to local authorities, &c. ..	7,284 7 3		
Expenses of Forest Officers going overseas, &c.	1,143 11 4		
Empire Forestry Conference	4,003 1 9		
Miscellaneous	722 18 0		
		13,153 18 4	
			275,905 6 2
Cash balances at 31st March, 1928—			
In Post Office		1,290 13 8	
In Public Account		16,314 4 5	
Imprests outstanding in the Dominion		933 0 11	
			18,537 19 0
			£346,101 1 10

NOTE.—The receipts include amounts received by the Post Office before the close of the financial year, but not paid into the Public Account until after the 31st March, 1929.

E. PHILLIPS TURNER, Director of Forestry.
W. RIACH, A.R.A.N.Z., Accountant.

I hereby certify that the statement of receipts and payments has been duly examined and compared with the relative books and documents submitted for audit, and correctly states the position as disclosed thereby.—G. F. C. CAMPBELL, Controller and Auditor-General.

APPENDIX V.

Loan Account as at 31st March, 1929.

To Loan authority—	£	s.	d.	By Debentures issued—	£	s.	d.
Section 40, Forests Act, 1921–22*	500,000	0	0	Finance Act, 1919 (section 50), at 4½ per cent.	50,000	0	0
Section 40, Forests Act, 1921–22, and section 16, Finance Act, 1924	100,000	0	0	Finance Act, 1918 (No. 2), (section 32), at 4 per cent.	171,000	0	0
Section 8, New Zealand Loans Act, 1908 (charges and expenses of raising New Zealand Consolidated Stock, 1936–45)	4,396	13	5	Finance Act, 1918 (No. 2), (section 32), at 4½ per cent.	29,000	0	0
Section 40, Forests Act, 1921–22, and section 6, Finance Act, 1926	500,000	0	0	Finance Act, 1920 (section 16), at 4 per cent.	27,000	0	0
				Finance Act, 1920 (section 16), at 4½ per cent.	8,000	0	0
				Forests Act, 1921–22, at 4½ per cent.	10,000	0	0
				Forests Act, 1921–22, and Finance Act, 1924, at 5 per cent.	100,000	0	0
				Forests Act, 1921–22, and Finance Act, 1926 (section 6)	80,400	0	0
				Stock issued—			
				New Zealand Consolidated Stock, 1936–51, at 6 per cent.	1,774	12	10
				New Zealand Consolidated Stock, 1936–45, at 5 per cent.	204,396	13	5
				New Zealand Inscribed Stock, at 5¼ per cent.	234,600	0	0
				Balance of authority	188,225	7	2
	£1,104,396	13	5		£1,104,396	13	5

* Section 40, Forests Act, 1921–22, confirmed the authorities previously issued under the Finance Acts, 1916, 1918, and 1920, and repealed all the authorities outstanding thereunder.

Note.—Under Section 21, Finance Act, 1926, certain appropriations out of the Consolidated Fund for afforestation purposes, totalling £59,250, become repayable to the Consolidated Fund, and bear interest at 4½ per cent. from 1st April, 1926, until repayment. This does not include £45,000 advanced from Consolidated Fund in terms of section 7 (1) of the Finance Act, 1927.

APPENDIX VI.

State Forests Account, 1917–29.

Fiscal Year.	Receipts.				Payments.			
	Forest Income.	Loans raised.	Interest on Investments.	Total.	Capital.	Operation.	Interest on Loans.	Total.
	£	£	£	£	£	£	£	£
Balance, 31st March, 1917	..	..	..	2,530	..	..	..	..
1917–18	13,299	28,100	..	41,399	40,865	988	902	42,755
1918–19	7,529	36,900*	..	44,429	39,162	2,182	1,861	43,205
1919–20	8,514	65,000	..	73,514	60,844	5,975	3,577	70,396
1920–21	19,518	70,000	..	89,518	64,802	14,570	6,127	85,499
1921–22	30,784	86,780	..	117,564	69,840	38,087	9,797	117,724
1922–23	63,372	214,221	2,935	280,528	51,823	38,591	19,701	110,115
1923–24	93,480	209	6,013	99,702	54,323	43,077	23,172	120,572
1924–25	161,469	100,000	6,727	268,196	171,920†	56,245	23,157	251,322
1925–26	152,550	..	7,178	159,728	115,886	63,729	28,004	207,619
1926–27	128,566	..	4,552	133,118	134,411	72,787	29,077	236,275
1927–28	115,398	160,000	1,224	276,622	152,395	75,896	35,040	263,331
1928–29	102,468‡	200,000	3,205	305,673	208,816	72,165	44,189	325,170
					Balance, 31st March, 1929 ..			18,538
				1,892,521				1,892,521

* Includes £10,000 from Consolidated Fund. † Includes £100,000 purchase of Selwyn Settlement forest.
‡ Includes £12,034 reimbursement purchase-price Hukinga, &c.

Note.—Credits-in-aid and recoveries have been deducted from expenditure.

Approximate Cost of Paper.—Preparation, not given; printing (2,500 copies, including graphs and illustrations), £92 10s.

By Authority: W. A. G. Skinner, Government Printer, Wellington.—1929.

Price 1s. 3d.]