

1927.
NEW ZEALAND

STATE FOREST SERVICE.

THE ANNUAL REPORT OF THE DIRECTOR OF FORESTRY FOR THE YEAR ENDED 31st MARCH, 1927.

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, 1st June, 1927.

I have the honour to submit herewith a report on the activities of the Forest Service for the year ended 31st March, 1927.

I have, &c.,

L. MACINTOSH ELLIS, B.Sc. (F.Tor.), C.S.F.E., S.A.F.,
Director of Forestry.

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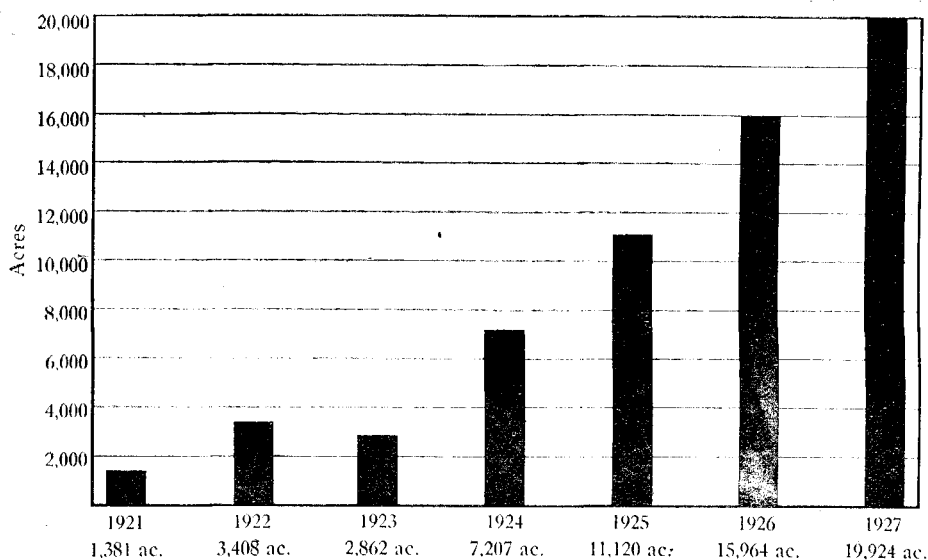
REPORT.

CHAPTER I.—GENERAL REVIEW.

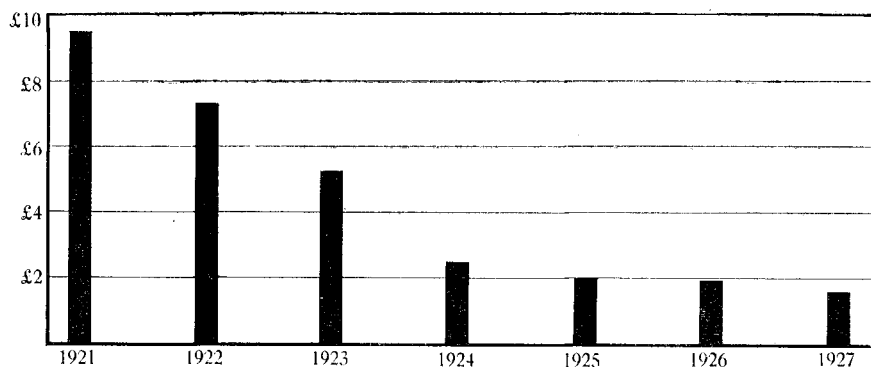
FORESTRY PROGRESS FOR THE YEAR ENDED 31ST MARCH, 1927.

General.

THE past year has been one of quiet, steady, and, in certain directions, again one of record progress. Towards the completion of our 1935 goal (300,000 acres) 19,924 acres of State commercial softwood plantations were formed, principally in the Auckland, Rotorua, and Canterbury-Otago conservation regions. A considerable area was also covered experimentally by direct-formation, mechanical-seeding operations in the Rotorua-Kaingaroa district, while experimental plantations to the extent of 613 acres were established in the North Auckland, Manawatu, Marlborough, and Westland districts. The total area of State-forest plantations is now 98,891 acres.



COMPARISON OF ANNUAL TREE-PLANTING OPERATIONS IN STATE FOREST PLANTATIONS FOR YEARS 1921-27.



GRAPH SHOWING COST OF ESTABLISHING ONE ACRE OF STATE FOREST PLANTATIONS FOR THE YEARS 1921-27.

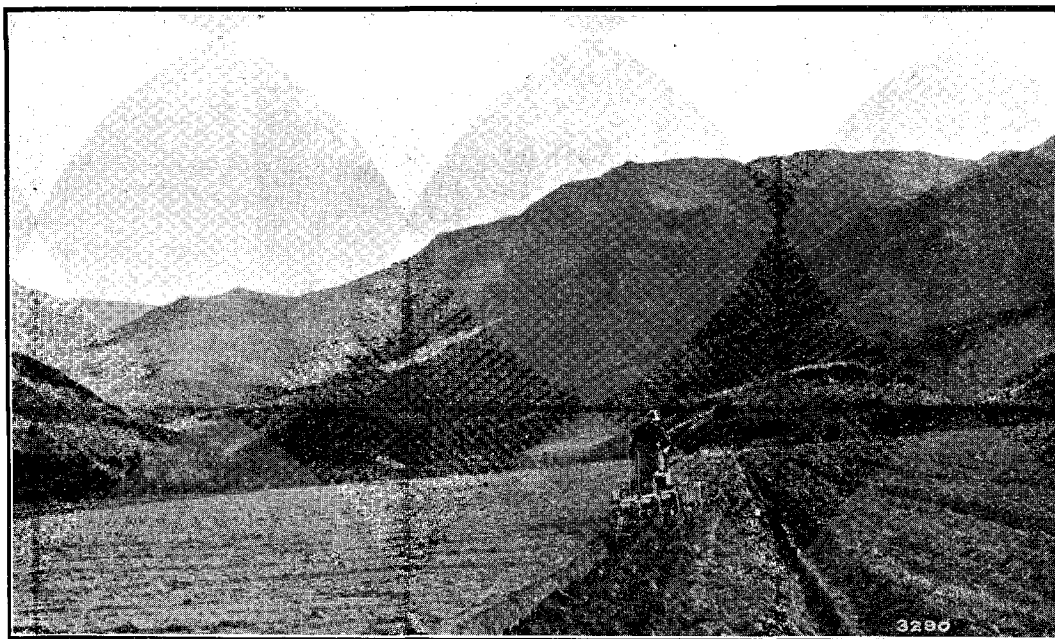
Other important indices of national forestry progress may be found in the nearly perfect forest-fire record for the 7,600,000-acre State-forest domains, where the total losses from fire amounted to only £12; in the sale of 4,760,000 trees (from State-forest nurseries) and 3,861 lb. of tree-seeds to farmers and other private planters; in a forest income of £128,000; in the operation of 858 school forest-nurseries. Outstanding records were effected in the formation of 52,834 acres of plantations by local-government bodies, afforestation companies, and others.

A sum of £236,275 was expended in forming plantations, constructing permanent improvements in the indigenous State forests, in forest-protection, salaries, forest research and investigations, in the purchase of forests and forestable lands, in subventions to County Councils for the construction and maintenance of back roads and bridges, in payments to the National Endowment Fund, and in interest charges.

State Forestation.

The Forest Service policy of establishing softwood-supply forest plantations in each province was steadily pursued, and in furtherance of that policy of localization substantial land acquisitions, totaling 135,791 acres, were made in the Provincial Districts of Auckland, Wellington, Nelson, Canterbury, and Otago. Major State plantation centres are now established at Waipoua, Puhipuhi, Riverhead, and Maramarua in the Auckland District; Rotorua, Waiotapu, and Kaingaroa in the pumice region of the same province; Rimu in Westland; Hanmer and Balmoral in Canterbury; and Naseby, Blue Mountains, Greenvale, and Tapanui in Otago. The total area of lands now planted and plantable, as aforementioned, is 269,694 acres, while further acquisitions are being secured as finance and opportunity permit.

After a generation of experimentation, trial, and selection, the Service is now concentrating on the planting of pondosa pine (*Pinus ponderosa*), Corsican pine (*Pinus laricio*), Douglas fir (*Pseudo-tsuga Douglasii*), macrocarpa (*Cupressus macrocarpa*), Lawson cypress (*Cupressus Lawsoniana*), western red-cedar (*Thuja plicata*), insignis pine (*Pinus radiata*), and, to a lesser extent, lodgepole pine (*Pinus Murrayana*), Canary Island pine (*Pinus canariensis*), long-leaf pine (*Pinus palustris*), eucalypts, and other trees. This range of trees is one of the highest economic value, and the crops therefrom will offer the widest diversification of use and permit of the application of modern silvicultural standards. The silvicultural standards of the Service, as regards collection of seed, plant-propagation, type of planting stock, planting technique, and area subdivision and planting are those which have universally proven most efficient and productive. The Service is in continual intimate touch with the forest authorities of the Empire and other countries of forestal importance, and is constantly testing and trying out the practices and methods of other lands. Where found applicable and economical, these are adapted to New Zealand needs. Substantial contributions have been made to the lessening of plantation costs through investigations made during the year by three officers of the Service, in the State of Victoria, Australia, and in British Columbia and the Pacific slope of the United States, while the evolution of new methods and tools by certain officers of the Service will result in the saving of thousands of pounds in forest-establishment. (See page 9 for details.)



MODERN NURSERY PRACTICE: LARGE-SCALE OPERATIONS AT HANMER.

A comparison of the State Forest Service forest-plantation practices and costs with those of other countries discloses that both in economy and results high standards prevail, and it does not appear possible that any further cost-reductions of a substantial nature can be made in the present system of tree-planting. This cost-of-establishment factor has an important relation to the problem of converting to productive use the Dominion's idle waste or deteriorated lands (estimated at approximately 5,000,000 acres) and to the State moneys available for this purpose. It would take two hundred years and an expenditure of over £10,000,000 (based upon present planting-costs) to establish continuous-crop-production forests on this largely man-made waste. Obviously this is not practical politics for even a country so richly endowed as New Zealand.

What, then, is the alternative? Must these wastes remain forever a liability, or can they be utilized to produce useful timber crops?

This national problem has had the continuous attention of the officers of the State Forest Service since 1920, and its solution appears to be in what may be termed "direct plantation-formation." While it is premature to dogmatize, it is expected that the application of direct-plantation-formation practices, now being perfected, will enable the forest authority to establish commercial forests—within

the present average budgeted appropriations—over the 5,000,000 acres of waste lands within twenty-five years, instead of in two hundred years. No more can be said concerning this important project, however, until a definite procedure has been perfected, which it is anticipated will be in two years' time. The operation of sustained forest-cropping on these lands, it may be noted, would make New Zealand the principal wood-goods supplier to the Empire.

Wider Use of our Indigenous Forests.

Forestry, in general, comprises not only the management of timber resources and the selected growing of future supplies, but also includes their conservation by wise use when the time of cutting arrives. A question of paramount importance, therefore, is, Can the waste material in the various phases of forest operations be economically utilized? The problem of maximum utilization is much more difficult to solve in New Zealand than in most countries, due to our small population, comparative lack of secondary industries, the growing inaccessibility of the native commercial forests, the small size of manufacturing units, and the relatively scattered consuming centres.



STAND OF MATAI ON AREA RECENTLY ACQUIRED BY FOREST SERVICE IN HAWKE'S BAY.

The Forest Service believes that the present wastage can be largely eliminated, and definite achievement has been made in forest-product researches and their application in industry and use. Results are recorded under the following headings:—

Timber Mechanics.—Determination of the mechanical and physical properties of five species of timber. Green tests conducted on redwood and black-beech, and air-dry tests on redwood, black-beech, Douglas fir, matai, and miro. Green tests on structural timbers of insignis pine completed, and air-dry tests commenced. Cross-arm tests of air-dry beech and hinau. Design of a new standard cheese-crate for export service. Further testing and extension of types of butter-boxes suitable for export service: routine tests and specifications for box-binding in connection therewith. Strength tests on standard-sized buggy-spokes of manuka, ironbark, and hickory. Complete strength and physical tests of New Zealand and foreign manufactured plywood.

Timber Physics.—Detailed microscopic investigation of heart-wood and sap-wood zones in rimu. Microscopic study of insignis pine commenced. Study of fibres of New Zealand native and exotic wood for suitability for paper-manufacture commenced.

Wood-preservation.—Open-tank treatments developed for all native and exotic timbers suitable for fence-posts. Installation of treated experimental fence-posts.

Derived Products.—Examination of New Zealand native and exotic woods suitable for paper-making commenced on a laboratory scale. Bleeding of kauri-trees and utilization of bled gum commenced.

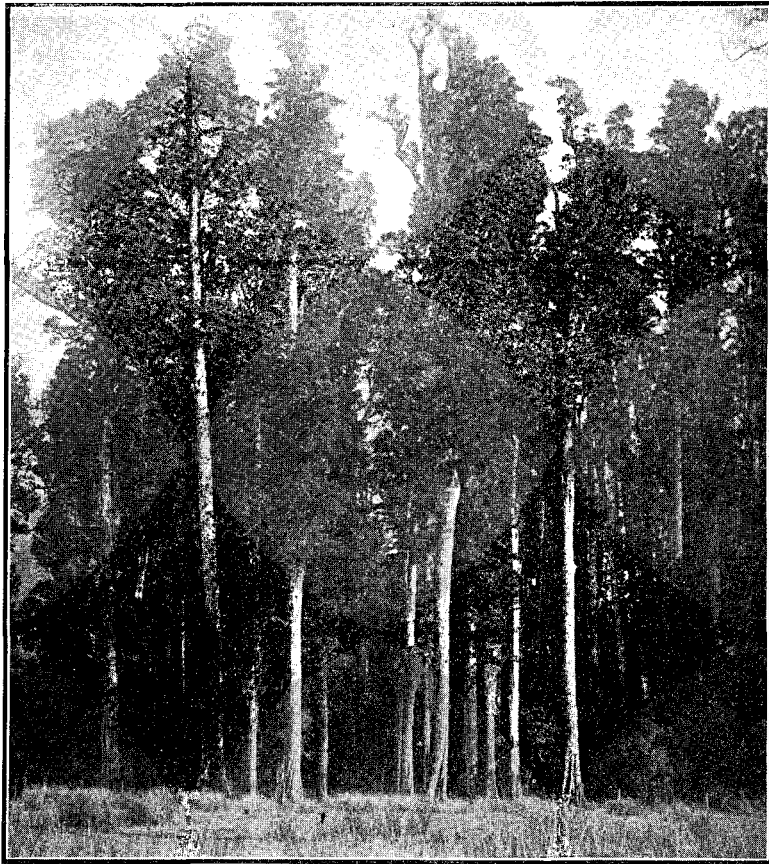
Industrial Investigations.—Statistical survey of timber and allied industries for past twenty years completed. Effect on butter of nails, wires, &c., exposed on inner surface of boxes. Suitability of sap rimu as a butter-box wood. Prevention of tainting of butter packed in wooden boxes. Studies of floating properties of New Zealand timbers commenced.

Section of Pathology.—Treatments for the prevention of sap-stain commenced on a commercial scale. Survey of insects introduced on imported forest products continued.

Silvicultural Research.

Indigenous Forests.—Up to the present the investigations of the Forest Service in indigenous forests have been carried on through the various steps of preliminary studies: inventories of native-forest resources, land-classification surveys, the ecology and growth of native trees, stand-tables for various forest types, volume-tables on which to base the mensuration of the various species of trees, together with studies in regard to the mill and forest utilization. In addition, regeneration studies have been carried out in various differing forest-types. By fusing the results obtained from these various studies and investigations, data for the foundations of forest-management and working-plans have been obtained.

Plantations.—A stocktaking and study of the growth of the exotic plantations has followed the completion of the preliminary forest inventory and growth studies of the indigenous forests. These investigations into the successes or failures of previous years in plantations supply reliable data for future operations, and only two of the minor plantations remain to be studied. The completion of this work will provide the State Forest Service with records concerning its exotic plantations unequalled, perhaps, in any other English-speaking country.



STAND OF KAHIKATEA, WESTLAND.

Plant-propagation.—Studies concerning the time of sowing (which yields the best results) have been continued, and will be carried on during the current fiscal period. Weed-eradication experiments to date have not yielded the desired results, and will also be continued. Increased efficiency and economy in wrenching have been obtained by the adoption of an improved root-pruner evolved by Ranger W. M. Menzies, Rotorua Nursery. Good results are recorded in the control of grass-grub (*Odontia*) experiments at Tapanui, and the effects of the preventive treatment during the next flight of the beetles are awaited with interest.

Seed of a number of species which have not been tried on a commercial scale in the Dominion have been received from overseas institutions, and experimental sowings made. These include *Rhamnus pursiana* (which produces the cascara of commerce), Indian teak, gold mohur, and various species of pines.

Sand-dunes.—Consolidation of the drifting sand on portion of the Rangitikei Sand-dune Experiment Station has been assured, and investigations into the possibilities of flax (phormium) planting on parts of the area deemed unsuitable for tree-growth have been commenced.

Destructive Forest Insects.—Much has already been accomplished by the Forest Entomologist in the study and control of the destructive insects already established in New Zealand. The position now demands not only the continuance of these activities, but also their extension,

embracing a complete forest-insect survey, the development of control, and the adoption of a practical quarantine system in order to prevent the entry of further insect pests.

So that the services of a full-time entomologist may be devoted to this important field of economic entomology, the State Forest Service is financially co-operating with the Department of Agriculture, and by this means the campaign against destructive forest insects will be materially strengthened.

Forest-protection.

Damage by Forest Vermin.—Reports of damage by deer to forests and farming-areas continue to be received. The only remedy appears to be in the complete removal of protection from these pests over a period of years, and the payment of a bounty on the deer killed during this period. During the year 2,946 deer-tails were collected by Forest officers for the payment of the bounty.

Experiments connected with the poisoning of wild pigs were undertaken in conjunction with the Department of Agriculture, but negative results were obtained. Further experiments will be undertaken, and it is hoped that an efficient and economical means will yet be evolved for the purpose of coping with this menace. A total of 27,848 wild-pig snouts were collected for the payment of the bounty of 1s. per snout, compared with 19,253 for the preceding period, an increase of 8,595.

The Forest Industry of New Zealand.

During the past two years the production of sawn timber in New Zealand has been in excess of that required to meet the normal demand. The years 1920-24 constituted a peak period for the sawmilling industry and its allied building trade, which annually absorbs from 40 to 45 per cent. of the total sawn timber consumed in the Dominion. Importations of building-timbers have so increased that a major consumptive displacement of our domestic woods occurred during the year, and as a result large stocks of timber are held by most sawmills.

The Auckland Province is the main sufferer in this respect. Though itself importing more timber than any of the other main centres, its production has increased considerably, with the result that many merchants still have two-year-old stocks on hand. Prices of timber have consequently fallen considerably, this being brought about by discounts off the list price. Owing to over-production, reduced buying-power, and slackened demand, the sawmilling industry appealed to the Government for an increased duty on imported timbers. The result has been an inquiry into the position of the industry by the Tariff Commission, and its findings will be awaited with interest.

In addition, the millers have decided, after a conference with the interested Government Departments, on certain improvements in their operations which will increase the use value of their product and allow it to compete on a more favourable basis with imported timbers for building purposes. These improvements include, *inter alia*,—(1) A revision of the present grading rules in operation throughout the Dominion, so as to form one universal grading system; (2) improved seasoning practices, involving longer seasoning periods and more efficiently constructed stacks; (3) improved manufacture of the product, involving docked ends, evenly-sawn boards, &c.

Under the universal grading system it is anticipated that a more balanced sale of the product of the log will result, thus finding a use for all classes. (Though it is not generally realized by consumers, our native building-timbers have a greater all-round use value than any other timbers in the world.) It has been admitted that our manufacturing processes and technique have lagged behind those of other countries, but now these are being brought into line by the wider use of modern machinery and processes.

Exports of Forest-produce.

Exports of sawn timber during 1926 were the lowest experienced by the trade during the past twenty-six years. The white-pine trade was the main sufferer, and inquiries made on the Australian market, which absorbs most of the timber exported, indicate that considerable stocks have accumulated during the past two years. This is due, in the main, to abnormally low exports of dairy-produce from Australia, and to increased competition by North American and Baltic shelving and box timbers. Indeed, the trade is so overstocked that the white-pine export market is likely to remain dull for the current year.

Rimu, also, though to a less extent, experienced the competition of North American and Baltic timbers, especially for flooring and lining purposes.

Beech was the only timber which experienced an increased trade abroad during the year. Improved grading and seasoning has resulted in a firm market for this valuable hardwood in Australia. Importers, however, in most cases demand clean-grade timber only, and it is evident that further revision of the grading-system, a detailed study of the market requirements, and a more economical shipping-system would assist materially in securing a more balanced utilization of the products of the log, thus removing crippling stocks of other than clean timber and resulting in a decreased price of the clean grades.

The export regulations, more particularly in respect to rimu and the lower grades of kauri, were eased early in the year in response to repeated requests from many parts of the Dominion, and with a sincere desire to assist operators in securing overseas markets for such grades of timber as were represented to be unsaleable in New Zealand. It can scarcely be said, however, that the desired result was obtained, as, although the exports of rimu and beech showed a slight increase over the preceding year's figures, kauri and white-pine decreased very considerably, the former by more than 50 per cent. This falling-off, no doubt, was due to a set of abnormal circumstances, which are referred to in more detail in another part of this report.

Imports of Forest-produce.

Softwood timbers, following the trend of previous years, again increased in both quantity and value imported, and, despite a decrease in total importations of 15,000,000 ft. b.m., totalled 40,400,000 ft. b.m. for 1926, or approximately 7,000,000 ft. b.m. more than for the previous peak year, 1925.

The main species of softwoods imported were Douglas fir, white and red cedar, hemlock, spruce, redwood from the United States and Canada, and spruce from Baltic ports.

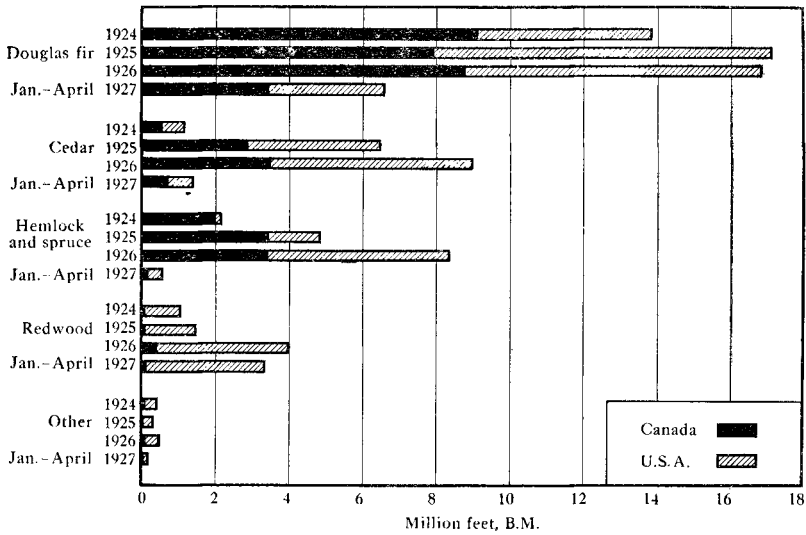
Imports of Softwoods into New Zealand from Canada and the United States of America for Calendar Years 1924-26.

(Expressed in terms of feet board measure.)

Species.	Canada.				United States America.			
	1924.	1925.	1926.	1st January to 30th April 1927.	1924.	1925.	1926.	1st January to 30th April 1927.
Douglas fir	9,133,000	7,940,000	8,787,000	3,474,000	4,696,000	9,167,000	8,034,000	3,121,000
Cedar	567,000	2,870,000	3,475,000	715,000	684,000	3,638,000	5,536,000	629,000
Hemlock and spruce ..	2,012,000	3,434,000	3,407,000	145,000	148,000	1,385,000	14,981,000	390,000
Redwood	40,000	60,000	400,000	106,000	1,000,000	1,400,000	3,600,000	3,244,000
Other	60,000	10,000	80,000	3,000	304,000	276,000	370,000	144,000
Totals	11,812,000	14,314,000	16,149,000	4,443,000	6,832,000	15,866,000	22,521,000	7,528,000

Grand total, Canada and United States: 1924, 18,644,000; 1925, 30,180,000; 1926, 36,648,000; January to April, 1927; 11,971,000.

Important changes, compared with previous years, are evident in the trade. Redwood, as well as cedar, is now in demand for the first time for weatherboarding, and this species, besides displacing our own excellent building-timbers, now seriously rivals cedar itself. Redwood was previously introduced mainly for joinery purposes, but a review of the local market by representatives of the redwood-producers led to material reductions in prices of the timber, with a corresponding extension in its trade. Hemlock, which has found considerable favour during the past two years as an interior finish and lining timber, has now gained in some quarters a reputation for borer attack, with the result that certain local bodies have placed it on a par in this respect with New Zealand white-pine, and have prohibited its use in building construction. Many merchants have also cleared their yards of this species, and a decrease in the trade can therefore be expected. Douglas fir still maintains a steady market.



GRAPH OF IMPORTATIONS OF SOFTWOOD LUMBER FROM CANADA AND UNITED STATES OF AMERICA FOR THE CALENDAR YEARS 1924-26.

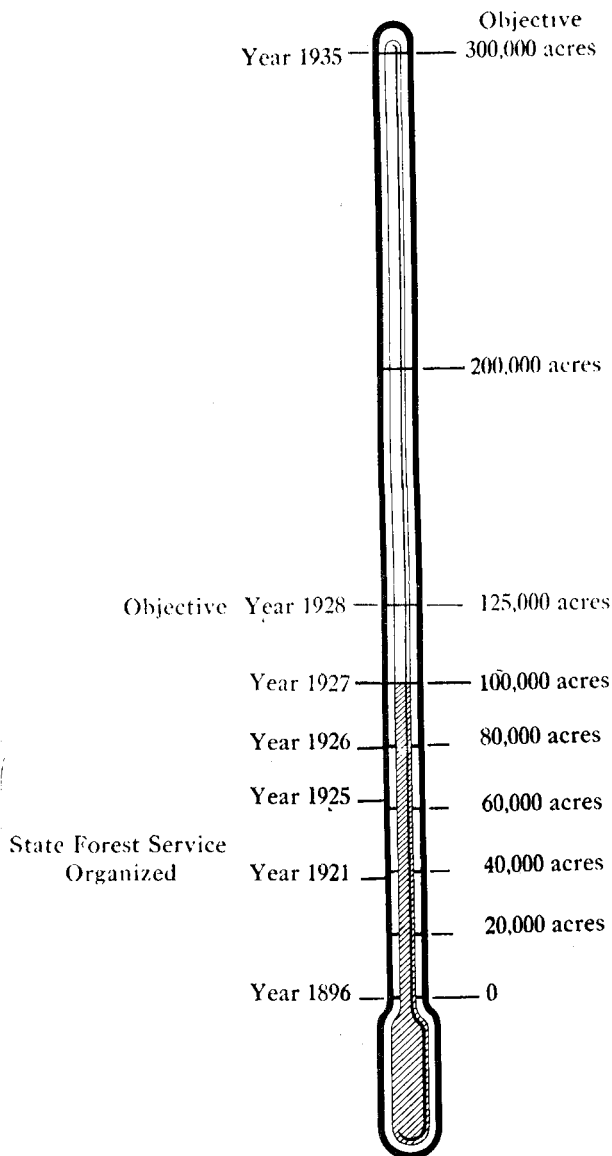
The Work Ahead.

The progress of planting in respect to our 1935 objective requires for the current year the formation of over 22,000 acres. The programme actually set is 25,000 acres, while several thousand acres of formation will be carried out experimentally by power drilling, spot-sowing, and broadcasting.

The progress of the Service silvical and silvicultural investigations in the indigenous forests and plantations will be proceeded with according to plan, and it is hoped that preliminary control management plans will be proclaimed for principal forest plantations during the year. A major investigation on a commercial scale will be concluded with reference to the papermaking value of our principal indigenous and naturalized trees. With favourable results, most significant forestal developments will follow.

In conclusion, if national forestry is to progress along with national development and to carry its full burden, the following lines of action are advised:—

- (1) The splendid results in forest conservation and culture that are being secured by several local bodies throughout the Dominion point the way to a wider interest in community forestry. The Forest Service is ready and willing to assist in the furtherance of this profitable and worth-while objective.
- (2) Early establishment of a forest-products laboratory adequate to New Zealand needs.
- (3) Unification of administration of all governmental forest and timber activities (including administration and management of rights, licenses, concessions, forest lands, and all other kindred reservations) in the Forest Service.
- (4) Centralization of the statutory administration of the Dominion's wild forest life in the Forest Service.



EXPOSE OF STATE PLANTATIONS ESTABLISHED FROM 1896 TO 1927
AND FOREST SERVICE TREE-PLANTING OBJECTIVE TO YEAR 1935.

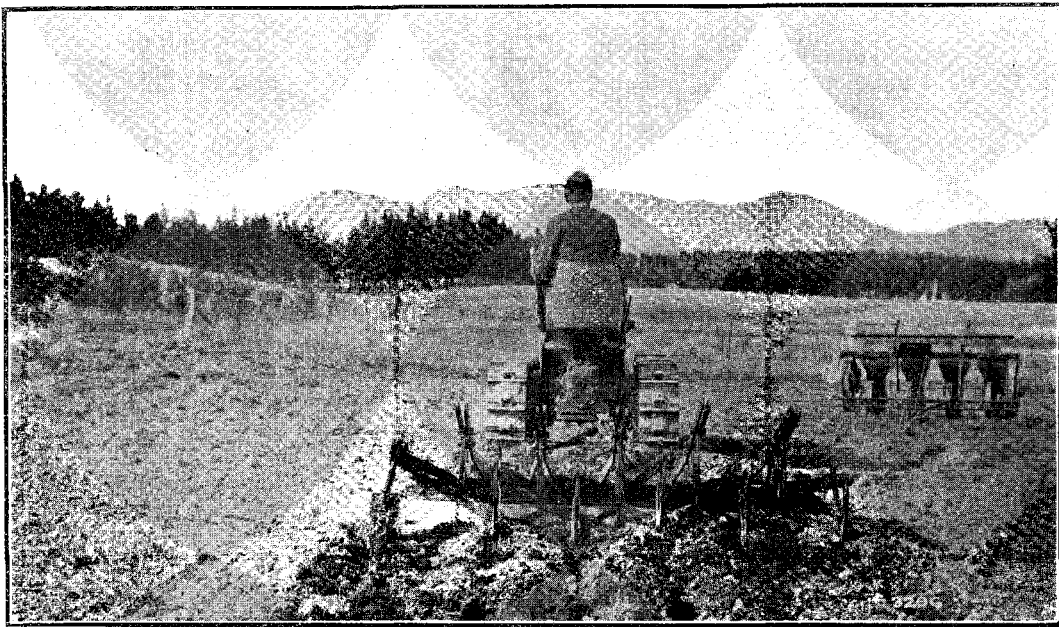
CHAPTER II.—THE STATE FOREST SERVICE.

At the 31st March, 1927, the total number of permanent Service staff officers was 111, as compared with 106 at the 31st March, 1926. During the year six permanent appointments were made, six officers resigned, and one was transferred; six permanent officers were added by transfers from other Departments.

The annual course of instruction for junior officers was held at Rotorua in July, and was attended by twelve forest rangers and guards who had not the opportunity of attending previous courses. The benefit of these short intensive courses is very noticeable in the increased efficiency of the field staff.

The policy of sending officers overseas to study forest problems in other lands was inaugurated during the year. One officer left in October and spent three months on the Pacific slopes of Canada and the United States. The main objective was to ascertain the best sources for the supply of the seed of the various species used in New Zealand and which are indigenous to the Pacific slopes. The chief timber species in the various forest types were studied, with a view to locating the areas wherein the optimum growth of the species occurred, and of arranging for the collection of seed in those areas. A study was also made of the methods adopted in the collection, extraction, and storage of tree-seed, in nursery practice, in fire protection, and in forestry matters generally. During the year the exchange of officers with the Forests Commission of Victoria for a period of six months was arranged, and in December two officers of the Service left for Victoria and two Victorian officers arrived in New Zealand. This exchange of officers should prove of great mutual benefit to both countries.

An officer of the Forest Products Branch of the Service spent six weeks in the eastern States of Australia investigating the experimental pulping-work being carried out there, and observing the results obtained with trial shipments of New Zealand timbers which were tested for this Service by the Commonwealth Council for Scientific and Industrial Research, Melbourne. During the coming year this officer will proceed to the Forest Products Laboratory at Madison, U.S.A., to observe the methods used in the treatment on a commercial scale of 34 tons of rimu, tawa, insignis pine, Corsican pine, Austrian pine, and European larch in the round which has been despatched from New Zealand. A study will also be made of the operations of commercial pulp and paper plants and forest-products problems generally in the United States and Canada. The information and data obtained will further forest-utilization in New Zealand.



MODERN MACHINERY USED IN NURSERY PRACTICE BY THE FOREST SERVICE.

State Forest Service Organization.—Distribution of Permanent Staff as at 31st March, 1927.

Forest-conservation Region.	Director.	Secretary.	Chief Inspector.	Conservators of Forests.	Special Officers.	Forest Assistants.	Clerical Staff.	Forest Rangers, A Class.	Forest Rangers, First Grade.	Forest Rangers, Second Grade.	Forest Guards.	Others.	Total Number as at 31st March, 1927.	Total Number as at 31st March, 1926.	Total Number as at 31st March, 1925.	Total Number as at 31st March, 1924.	Total Number as at 31st March, 1923.	Total Number as at 31st March, 1922.	Total Number as at 31st March, 1921.
Auckland ..	..	..	..	1	..	1	2	1	2	1	1	..	9	8	6	6	6	7	8
Rotorna ..	..	..	..	1	..	2	3	1	4	3	6	1	21	23	19	20	21	20	20
Wellington ..	..	..	..	1	..	..	3	2	1	1	1	..	9	10	8	7	7	6	6
Nelson ..	..	..	..	1	..	..	2	1	1	1	1	..	7	7	7	7	7	6	7
Westland ..	..	..	..	1	..	..	2	1	3	2	..	..	9	8	5	6	6	8	7
Canterbury-Otago ..	..	..	..	1	..	..	4	2	6	4	4	2	23	19	20	19	18	21	18
Southland ..	..	..	..	1	..	..	2	..	3	..	1	..	7	6	6	6	6	6	7
Central Office ..	1	1	1	..	2	3	17	..	..	..	1	..	26	25	24	25	24	25	24
Totals ..	1	1	1	7	2	6	35	8	20	1	15	3	11	106	95	96	95	99	97

CHAPTER III.—THE STATE FORESTS.

1. GENERAL.

Summary of Areas under Control.

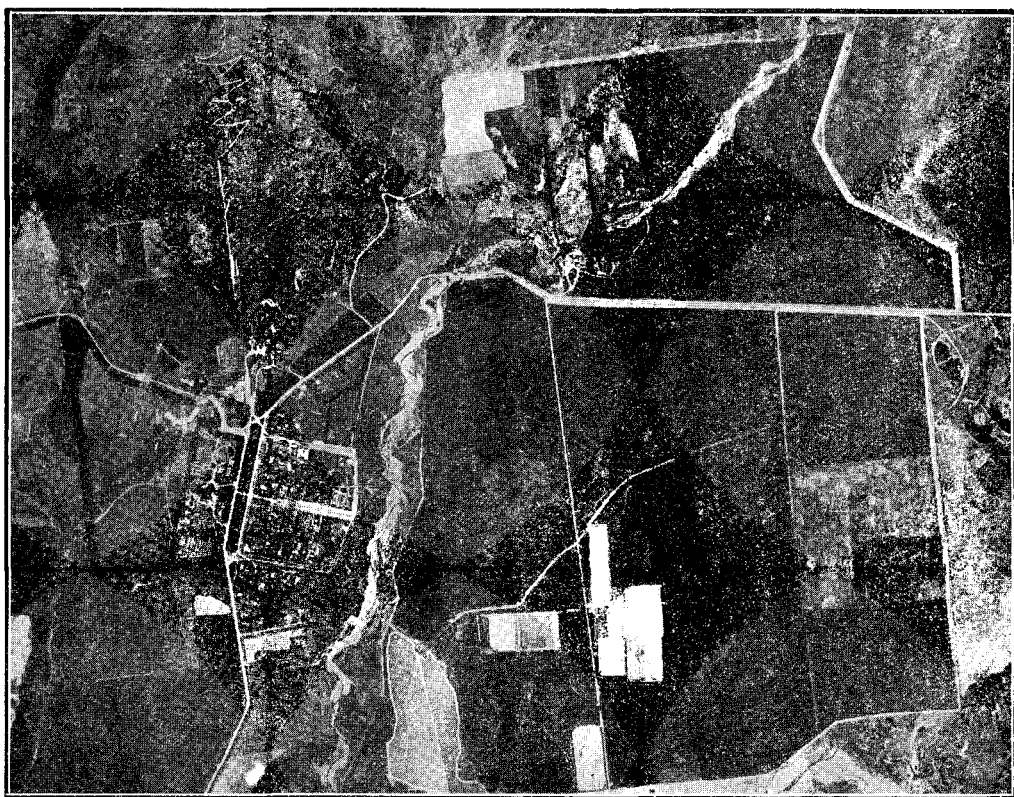
A perusal of the figures published in Appendix I of this report will show that under all headings a grand total of 7,656,844 acres are now under the control of the State Forest Service. In other words, 11.54 per cent. of the superficial area of the Dominion has been dedicated to the business of forestry.

Areas actually proclaimed since last report are State forests, 90,751 acres, and provisional State forests, 25,435 acres, while a total of 13,030 acres, comprising mostly portions of provisional State forests suitable for settlement, has been withdrawn and made available for that purpose.

At the close of the year negotiations were in progress for the acquisition of further extensive areas for forestation purposes, and it is anticipated that these will be successfully completed at an early date.

Legislation.

The Forests Amendment Act, 1926, was passed on the 11th September, 1926. This measure authorized the State Forest Service to sell, as agent, timber and other forest-produce for any State Department or local authority; provided for national-endowment land being set apart as State forest, and for the unimproved value of any national-endowment land so dealt with being paid to the National Endowment Account; fixed an additional penalty for unlawfully dealing with forest-produce;



PORTION OF AN AERIAL SURVEY OF HANMER PLANTATION.

made special provision for the granting of licenses to cut timber for mining or coal-mining; made provision whereby any lands in certain Greymouth and Westport harbour endowments could be administered by the Service; validated timber-cutting and tramway rights granted by Wardens in Westland and Karama Mining Districts which were found to be invalid; transferred to the Service the administration of those rights; and repealed sections 147 to 152 of the Mining Act, 1908, and section 8 of the Forests Amendment Act, 1925.

When the administration of the validated Wardens' grants was taken over many difficulties presented themselves, as the statutes and regulations under which they are administered are extremely complicated and difficult to construe. The difficulties are, however, gradually being surmounted, and the change of control will prove beneficial to the State, to holders of the timber-cutting and tramway rights, and to the local authorities.

By section 6 of the Finance Act, 1926, the Minister of Finance was authorized to borrow an additional £500,000 for the purposes of the Forests Act, 1921-22.

Sections 5, 6, and 7 of the Reserves and other Lands Disposal Act, 1926, cancelled the reservation for scenic purposes over two scenic reserves containing 1,970 acres and 62 acres 2 roods respectively, and for a public-pound site over a pound reserve containing 1 acre, and set aside the three areas as permanent State forest. The areas are all situated in Paeroa Survey District, and had already been included in or used in conjunction with Waiotapu Plantation.

Forest Reconnaissance, Demarcation, and Survey.

A detailed reconnaissance of 11,000 acres of forest tributary to existing milling operations was made during the year to ascertain the prospective life of those operations. In addition, a general reconnaissance survey of 45,000 acres of forested land was carried out for the purpose of classification into commercial and protection forest.

In the Auckland region the possibility of obtaining access to the timbered lands in East Taupo County from the Main Trunk line was investigated. In the Nelson-Marlborough region a forest reconnaissance made towards the head of the Wakamarina River established the fact that the present milling operations in that valley have almost reached the limit of milling-timber, and that the forest around the higher waters is pure protection beech forest. A reconnaissance was commenced in the Southland region to ascertain the timber types and commercial value of the forests in the Martin's Bay locality. In connection with milling operations 16,544 acres of forest were topographically surveyed and the timber appraised, and 264 miles of tramway were traversed and plotted.

Special attention has been given to the topographic survey of the various plantations and of the land to be planted within the next two years, and 72,000 acres were mapped during the year. This enables the demarcation of the fire-breaks and of the plantation blocks and compartments to be completed well ahead of the planting programme. In the North Island the detailed mapping of 35,000 acres at Karioi was completed, and at Kaingaroa 17,000 acres were dealt with. In the South Island the principal areas dealt with were 9,000 acres at the Blue Mountains, 5,500 acres at Hanmer, and 2,000 acres at Balmoral.

During the year the first forest air survey in New Zealand was completed by the Air Service for the State Forest Service. The survey which was carried out at the Hanmer Springs plantation covers about twenty-five square miles, and takes in all the country from the Township of Hanmer to the summits of the ranges encircling the areas held by the Forest Service at Hanmer.

As an inventory and intensive ground survey of the same areas have recently been completed, the combination of the various data gives an exceptional opportunity to check and compare the various methods of work. The most conspicuous feature about the air maps is the detail, which a ground surveyor could not hope to note or mark on his plan.

Co-operation in Timber-stumpage Examinations and Reports for other Departments.

The Service has assisted other Government Departments, Native Land Boards, and local bodies in assessing the value of standing timber and in reporting on forestation matters generally. The standing timber on areas covering 3,586 acres was appraised, and, in addition, reports were furnished on 3,377 acres of forested land.

2. FINANCE.

Receipts.

The forest receipts for the past financial year from all sources were £128,566, details of which, together with comparisons over a period of three years, are enumerated hereunder. :—

Item.						1926-27.		1925-26.		1924-25.	
						£	£	£	£	£	£
Forest receipts—											
Timber-sales	..	..	..	..	..	85,542		107,122		124,918	
Timber royalties	..	..	..	..	..	3,816		6,464		5,427	
Timber trespass	..	..	..	..	..	71		83		239	
Leases—											
Grazing	..	..	..	..	..	2,806		2,527		2,252	
Sawmill-sites, industrial, &c.	..	..	..	..	..	1,225		1,646		1,252	
License and transfer fees	..	..	..	..	..	117		113		170	
Miscellaneous licenses	..	..	..	..	..	280		167		107	
Permits—Grazing and miscellaneous	..	..	..	..	..	456		564		825	
Kauri-gum	..	..	..	..	..	238		627		764	
Fees for inspections and reports	..	..	..	..	..	620		318		324	
Interest on overdue promissory notes	..	..	..	..	..	213		149		120	
Rental of houses	..	..	..	..	..	92		77		43	
Opossum revenue	..	..	..	..	..	4,680		4,074		2,785	
Miscellaneous	..	..	..	..	..	544		..		..
National Endowment Account allocation	..	..	..	..	..	14,114		17,044		11,247	
						114,814		140,975		150,473	
Less adjustments	..	..	..	..	..	749		1,969		296	
							114,065		139,006		150,177
Nurseries and plantations—											
Trees	..	..	..	..	..	10,229		10,281		8,704	
Seeds	..	..	..	..	..	1,934		1,510		970	
Firewood and poles	..	..	..	..	..	178		115		150	
Grazing	..	..	..	..	..	854		565		511	
Rental of houses	..	..	..	..	..	763		672		656	
Miscellaneous	..	..	..	..	..	543		401		301	
							14,501		13,544		11,292
Totals							128,566		152,550		161,469

Payments.

The net expenditure from the State Forests Account for the past financial year was £236,275, a detailed analysis of which is set out hereunder; also comparisons with the years 1925-26 and 1924-25.

Item.	1926-27.		1925-26.		1924-25.	
	£	£	£	£	£	£
Fixed charges and staff salaries—						
Interest and loan expenses	29,077		28,132		24,136	
Allocation of revenue—						
National Endowment Account	15,659		9,741		12,612	
Local-body payments	9,061		6,141		257	
	24,720		15,882		12,869	
Staff salaries—						
Capital	17,075		11,103		9,035	
Operational	22,783		25,912		22,394	
	39,858		37,015		31,429	
Management, establishment, and development—						
Capital charges—						
Indigenous State forests—Buildings, equipment, &c. ..	4,204		3,082		2,792	
Fire-fighting equipment, &c.	73		38		125	
Educational—Reference library, &c.	107		213		100	
Research and experimental equipment	2,402		3,615		1,750	
Afforestation—Nurseries and plantations	78,418		61,315		47,864	
Sand-dune reclamation	2,312		2,595		2,318	
	87,516		70,858		54,949	
Operational expenses—						
Indigenous State forests and general	17,839		15,500		14,670	
Fire-prevention	1,524		1,553		1,405	
Educational—Publications, &c.	1,094		1,164		819	
Utilization and silvicultural research	2,472		2,158		2,847	
Preparation of planting plans, &c.	1,611		1,358		1,196	
Miscellaneous	744		74		533	
	25,284		21,807		21,470	
Land-purchases						
Indigenous forest areas	18,639		16,161		105,993	
Plantation-extension	11,181		17,764		476	
	29,820		33,925		106,469	
Totals	236,275		207,619		251,322	

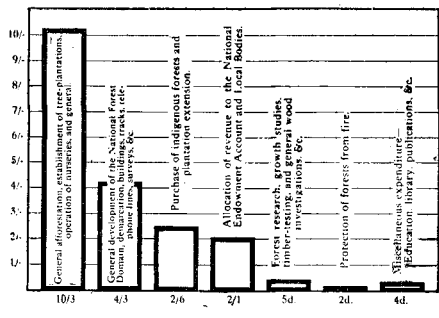
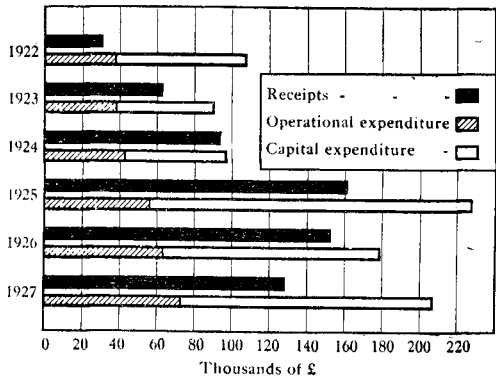


DIAGRAM SHOWING THE APPORTIONMENT OF EACH £1 OF THE SERVICE EXPENDITURE FOR THE FISCAL YEAR ENDED 31ST MARCH, 1927.



COMPARISON OF THE FOREST INCOME AND EXPENDITURES FOR THE PERIOD 1922-27.

Counties' Share in State Forest Timber-sale Receipts.

Section 17 of the Finance Act, 1924, provides that out of moneys received into the State Forests Account from royalties on or net proceeds of sales of native timber growing on Crown lands set apart by Proclamation as State forests or as provisional State forests one-fifth part shall be payable to local authorities. A total sum of £9,061 6s. was therefore paid out of the State Forests Account to thirty-eight local authorities during the period under review.

These counties have expended their subventions principally upon metalling and maintenance of roads contiguous to forests from which the timber has been milled. The State forests have thus provided sums of money for improvements to backblock settlers' roads which, from their remote situation and consequent unimportance when compared with many other county roads, would have received only a small proportion of the funds at the disposal of the local authorities concerned.

National Endowment Account's Share in State Forest Timber-sale Receipts.

From the forested national-endowment land under the forest-management of this Service the National Endowment Account benefited by the receipt of the sum of £15,658 15s. 4d., being the amount due at the 31st March, 1926, under section 39 of the Forests Act, 1921-22, which provides for the payment to the National Endowment Account of one-half of the revenue derived from any national-endowment land comprised in a State forest remaining after the deduction of the expenses of the administration of that land as a State forest.

3. OPERATION.

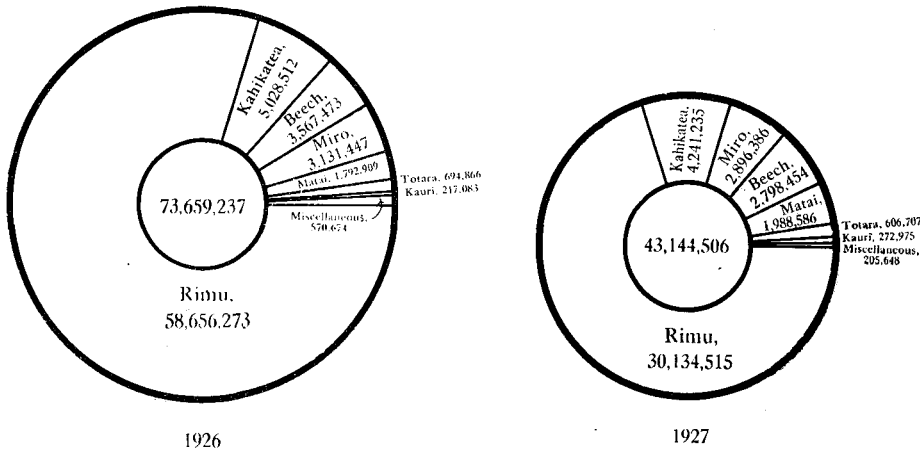
Timber-sales.

During the period under review 64,639,000 ft. b.m. were produced by mills cutting State-forest timber, and the sum of £103,524 was received from all timber licenses in force. The receipts for the sale of timber show a decrease of £26,608 on the figures for 1925-26.

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.	Quantity cut from State Forests during the Year.
		£	Feet, B.M.	£	Feet, B.M.
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.

Reference to the attached graphs shows the quantities of the various species comprised in Forest Service timber-sales for the last two years.



STATISTICS OF THE SERVICE TIMBER-SALES FOR YEARS ENDED 31ST MARCH, 1926-27. QUANTITIES SHOWN IN FEET BOARD MEASURE.

Log-scale Tables.

During the past fiscal year the State Forest Service has introduced the system of selling State timber on the cubic-foot measurement. In all timber-sales the equivalent cubic-feet measurements are given as well as per board-foot measurement.

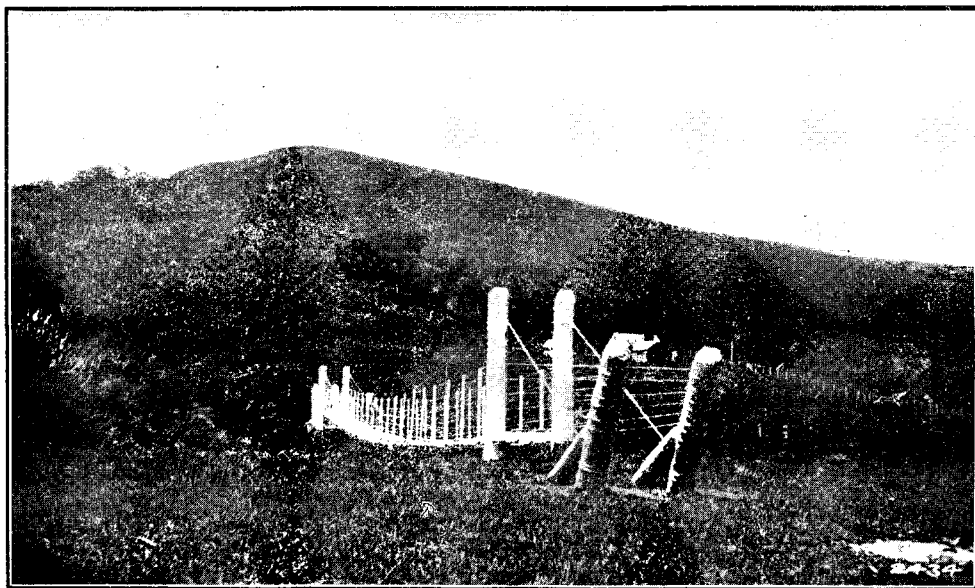
Timber-export Regulations.

Permits issued for the export of timber for the year ending the 31st March, 1927, totalled 250, as compared with 263 for the previous year, and, although the maximum quantity was granted in respect to each species, the permits were not utilized to their fullest extent. Moreover, as stated in a subsequent portion of this report, the total exports were the lowest for many years (see Chapter V and Appendix IV).

Forest-improvements.

The access to the State forests is being steadily improved, and during the year forty-five miles of new track were formed. At Puketi Forest, North Auckland, a bridge was built and five miles of road opened to improve the communication between the officers stationed there. The expansion of the afforestation acreage necessitated the formation of fifty-nine miles of new roads, eighty-seven miles of fire-breaks, and the erection of seven miles of telephone-line.

The accommodation of the field staff in the most important forested areas is often a matter of great difficulty. This necessitated the erection of a cottage at Mamaku, an office with ranger's living-room and garage at Ohakune, and the purchase of a cottage in the Catlin's district.



FOREST IMPROVEMENTS.—COMMUNICATION BRIDGE ERECTED IN WAIPOUA STATE FOREST.

Recreational Use of the Forests.

Forests are essential not only for the production of timber crops, but also for their æsthetic and recreational values to the community. The unsurpassed beauty of New Zealand's native bush, coupled with the facilities afforded by the motor-car for transportation, has resulted in a more extended use and appreciation of the forests for recreational purposes. In the Auckland conservation region the new road through Waipoua Forest has enabled many visitors to visit this extensive kauri forest, while the more accessible Trounson's Park has continued to attract tourists and the public. The Forest Service policy of conservation and reasoned use of the forest domain under its administration assures for future generations the beauties of the native bush, which is such an attraction for and so greatly admired by tourists.

Honorary Forest Rangers.

Since last report nineteen new appointments have been made under section 10 of the Forests Act, 1921-22, which brings the total of the honorary ranger staff up to ninety-six. It is again pleasing to record the valuable assistance received from these volunteer workers, who without fee or reward, and frequently at considerable inconvenience to themselves, have rendered such loyal and efficient co-operation. As many of the State forests are situated in remote parts of the Dominion, it would be quite impossible for the Service to exercise adequate supervision over such areas without such help.

4. FOREST-PROTECTION.

Fire Districts.

The constitution of fire districts has been attended by such good results that five new districts were made during the period under review, and the boundary of an existing one extended to include an additional area which has been acquired for forestation. Farmers and the public generally are rapidly beginning to realize the value of the fire-district principle in safeguarding our indigenous and exotic forests, and consequently few landowners whose properties are included in these districts attempt to burn off without first securing the necessary permit to do so. The provisions of the Forests Amendment Act, 1925, referred to in last year's report have been availed of by the local authority controlling Rabbit Island, Nelson, and the Christchurch City Council in respect to Bottle Lake Plantation, and fire districts were duly constituted in accordance therewith. Doubtless, as this amending legislation becomes more generally known, other local bodies and owners of plantations, &c., will follow suit. The total number of these districts constituted to date is twenty-nine, of which twenty-seven cover State-owned indigenous and exotic forests. The districts cover an approximate area, in round figures, of 1,500,000 acres.

Spark-nullifiers.

The passing of regulations by the Government at the instigation of the State Forest Service, making the use of an approved spark-nullifier compulsory, has had very definite results. During the year, one hundred Cheney spark-nullifiers have been installed by sawmillers, and, judging by the encomiums that have been received of the results achieved in the prevention of flying sparks without interference with steaming capabilities, the millers themselves appreciate this effort of fire control.

Fire-pumps and Fire-break Burners.

Two Pacific motor fire-pumps were added to the fire-fighting equipment. The motor-pump again demonstrated that under certain conditions it is most efficient, and, as it can be carried easily by one man, it adds considerably to the efficiency of the Forest Service fire-protection organization. The Hauck burners again proved their value by reducing the cost of fire-break maintenance.



MODERN FIRE-FIGHTING EQUIPMENT : PORTABLE MOTOR-PUMP.

Forest-fires.

The fire season was one of low hazard, except in the Wellington and Westland regions, and no material damage through fires was sustained by forests under the control of the Forest Service. Although thirteen fires were detected on State forests, they were confined to 72 acres of cut-over forest and scrub land, the monetary loss being estimated at £12.

No damage was caused by fire to any of the State plantations, but 30 acres of privately-owned plantations were destroyed. The losses of private plantations during the last two years have been due solely to the lack of effective fire-protection measures. Owners of plantations must realize that fire is a real danger to exotic plantations unless adequate measures are taken for their protection. It is pleasing to note that during the past year some owners have formed and maintained effective fire-breaks, and arranged for the patrol of their plantations during the dry summer months.

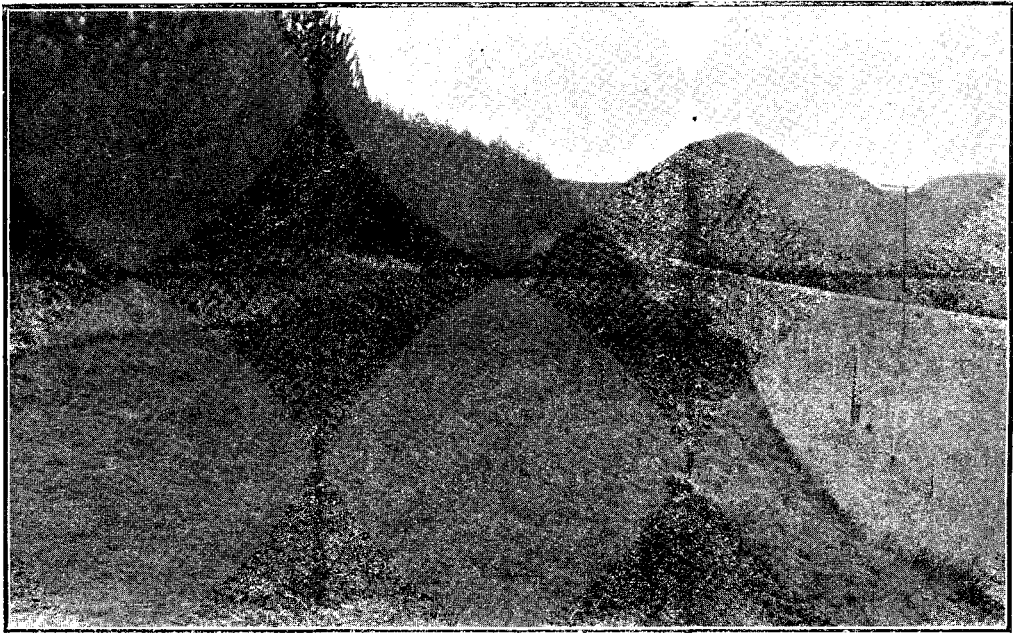
The psychrometer readings taken showed that the relative humidity was seldom below 40 per cent. throughout the Dominion; Hanmer recorded 32 per cent. for one day in November, and Nelson 30 per cent. for one day in March.

ANALYSIS OF ALL REPORTED FOREST-FIRES IN STATE FORESTS.

Forest-conservation Region.	Forest-fires: Number, Character, and Area.					Money Value of Forest-wealth destroyed.		
	Number detected.	Timber Land burned. (Acres.)	Cut-over Land burned. (Acres.)	Scrub Land burned. (Acres.)	Total Area burned over. (Acres.)	Merchantable Timber.	Valuable Regrowth.	Total Value.
Auckland ..	4	Nil	Nil	21	21	£ ..	£ 2	£ 2
Rotorua ..	Nil	Nil	Nil	Nil	Nil	..	..	..
Wellington	3	1	20	..	21	..	10	10
Nelson-Marlborough	2	Nil	Nil	24	24	..	..	..
Westland ..	Nil	Nil	Nil	Nil	Nil	..	..	..
Canterbury-Otago	1	Nil	Nil	Nil	Nil	..	..	..
Southland	3	Nil	4	2	6	..	..	..
Totals	13	1	24	47	72	..	12	12

ANALYSIS OF ALL REPORTED FOREST-FIRES IN STATE FORESTS—continued.

Forest-conservation Region.	Cost of Protection, Prevention, Detection, and Control of State Forests.					Origin of Forest-fires.			
	Fire-patrol Force. (Number of Men.)	Wages Cost.	Fire-equipment Cost.	Locomotion Cost.	Total Cost.	Sawmilling Operators.	Travellers, Trappers, Sportsmen.	Land-clearing Operators.	Unknown Agencies.
Auckland	9	£ 742 0 0	£ ..	£ 48 0 0	£ 790 0 0	..	..	2	2
Rotorua ..	9	726 11 6	..	24 13 6	751 5 0	..	..	..	..
Wellington	2	129 8 9	0 1 3	29 12 4	159 2 4	..	..	1	2
Nelson-Marlborough	2	256 15 8	32 0 0	29 15 10	318 11 6	..	..	1	1
Westland ..	5	62 0 0	..	..	62 0 0	..	..	..	..
Canterbury-Otago	17	641 7 9	..	56 19 0	698 6 9	..	..	..	1
Southland ..	4	146 3 6	..	44 18 2	191 1 8	..	..	..	3
Totals	46	2,704 7 2	32 1 3	233 18 10	2,970 7 3	..	..	4	9



FIRE PROTECTION : EFFICIENT FIRE-BREAK. ROTORUA PLANTATION.

5. FOREST WILD LIFE.

Deer.

All conservation regions report an increase in these vermin, and this Service again places on record its opinion that protection on all species of deer (except moose and wapiti) should be removed for a period of at least three years, and that payment of a bounty on killed deer should be continued during that time.

Protection has been removed from this pest on the State plantations throughout New Zealand, and during the latter part of the period under review the Service inaugurated a campaign for the destruction of deer on these areas. This included the payment of a bounty of 2s. per tail on all deer killed in plantations, the carrying-out of poisoning experiments, and the establishment of salt-licks for the purpose of attracting deer to places where they might be easily shot.

Forest Service officers acting as receivers of deer-tails for the payment of bounty report the collection of 2,946 tails, of which 2,001 tails were received at Tapanui from the vicinity of the Blue Mountains, Otago.

Opossums.

The returns for the 1926 opossum-trapping season disclose an increase in both the number of trappers' licenses issued and the number of skins upon which royalty was paid. The share of license fees, royalties, &c., credited to the State Forests Account was £4,679 13s., an increase of £605 17s. 11d. over that of the previous year.

Year.				Number of Permits issued.	Number of Skins taken.
1922	..	..	..	381	54,357
1923	..	..	..	679	109,905
1924	..	..	..	462	95,639
1925	..	..	..	720	145,778
1926	..	..	..	1,051	157,480

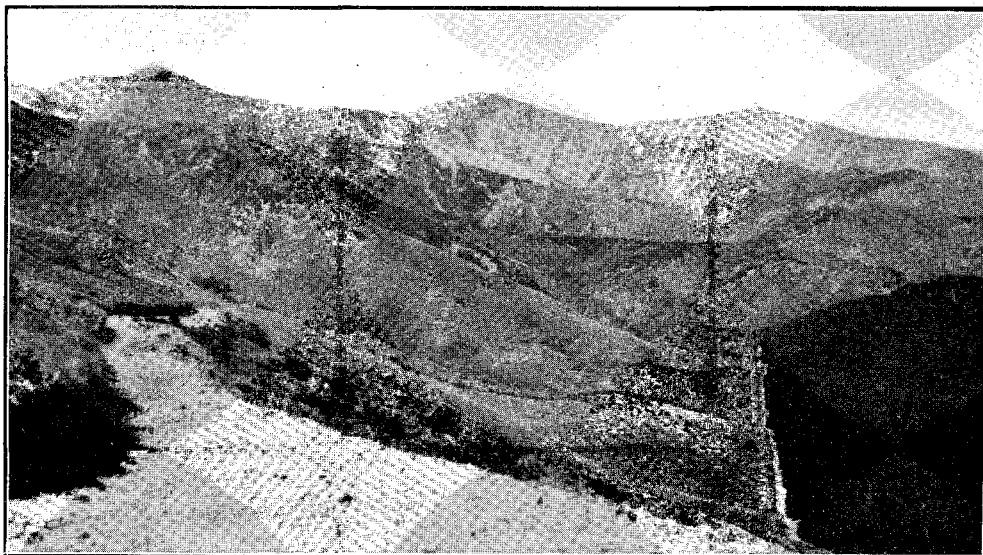
From the grand total of 157,480 skins approximately 50 per cent. were taken in the Wellington conservation region, where 478 licenses were issued. The Conservator of Forests, Palmerston North, reports that 420 applications for permits to trap in State forests were received and 264 permits issued. Three convictions for illegal trapping were obtained in this region, with fines amounting to £20, plus costs, £10 3s. Prior to the commencement of the 1926 trapping season instructions were issued to each Conservator of Forests to keep a close watch over trapping operations, with a view to safeguarding this promising industry from the danger of overtrapping. The consensus of opinion within this Service at the close of the season was that at least one close season should be observed in order to permit the opossums to multiply, and a recommendation upon these lines was made to the authority concerned.

It is generally recognized that the opossum does little or no damage to the forests, and this opinion is supported by the investigations recently made on beech forests by the Honorary Botanist to the Service, Dr. L. Cockayne, F.R.S., who has a comprehensive knowledge of the forests before and after the introduction of the opossum.

Native Birds.

Bird-life must have breeding-places, shelter, and food, and the forest furnishes this admirably. The fire-protection policy of the Forest Service, together with loyal public co-operation, has accomplished much in safeguarding the remaining refuges of New Zealand native birds.

The Forest Service has co-operated with the New Zealand Native Birds Protection Society in its work in connection with the preservation of our avifauna, and it is gratifying to record that Conservators report an increase in native birds. In the Wellington conservation region two cases of destruction of native pigeons were investigated, the offenders being fined £20 and costs in each case, and their firearms confiscated.



TYPE OF COUNTRY BEING PLANTED BY FOREST SERVICE IN HANMER SPRINGS DISTRICT.

Wild Pigs.

Funds for the purpose of carrying out poisoning experiments and payment of a bounty upon wild pigs killed in certain parts of the North Island were again provided by the Departments of Agriculture, Lands, and the State Forest Service.

In conjunction with the Department of Agriculture, a small experiment with poison was undertaken by this Service in the Waipapa Valley, north Wellington. Unpoisoned and poisoned pollard baits with a small quantity of oil of aniseed were laid, but no evidence was obtained that these had been eaten, although laid in places infested with wild pigs. At a later date a more extensive experiment was undertaken inland from the Wanganui River by the Inspector of Stock, Wanganui, in conjunction with a representative of the Wanganui River Trust. Carrots, potatoes, artichokes, and apples poisoned with phosphorized pollard, strychnine, or arsenic, and untreated baits, were laid, but again no indications were recorded that the baits had been eaten by the pigs. Experiments will be continued at seasonal intervals, and it is hoped that an efficient and economical means will yet be found to cope with this pest.

The State Forest Service in its capacity of organizing and controlling agent collected and paid out the bonus of 1s. per snout on 4,566 snouts in the Rotorua conservation region, and on 23,282 snouts in the Wellington region—a total of 27,848, compared with 2,026, 17,227, and 19,253 respectively during the previous year. A total of £1,432 9s. 2d., was expended in the payments of bounty and on poisoning experiments, while provision has been made for further expenditure on wild-pig control during the current fiscal year.

6. ESTABLISHMENT OF MAN-RAISED FORESTS.

State Forestation.

The State's contribution for the year to the Dominion's artificial-forest reserve has again exceeded that of previous years. 19,924 acres of new State-forest plantations were formed, and the total area planted in trees from the commencement of operations in 1896 up to the 31st March, 1927, aggregates 98,891 acres.

The areas planted during the year comprised poor land of little value for farming purposes; hence the State-forestation operations have put to profitable use another 20,000 acres of the waste lands of the Dominion. At Riverhead the forestation of a large area of poor gum land close to and accessible by water, rail, and main highways to the City of Auckland was commenced. Following successful experimental planting, a start was made to afforest the waste land surrounding the Waipoua Kauri Forest. The remainder of the planting for the year was connected with the extension of the State plantations, more particularly described in the following summary:—

Summary of Operations on State Plantations during the Year ended 31st March, 1927, and Total Area planted.

Forest Plantation.	Number of Trees planted.	New Area planted.	Total Area planted in Trees, 1896-1927.
		Acres.	Acres.
Riverhead	42,500	53	53
Kaingaroa	7,647,100	12,729	52,735
Hanmer Springs	921,150	1,530	7,121
Balmoral	1,956,050	2,991	7,658
Blue Mountains	1,057,075	1,288	2,268
Greenvale	520,325	720	3,646
Experimental group	438,515	613	1,739
Plantations on maintenance basis	152,050	..	23,671
Totals	12,734,765	19,924	98,891

Local-government Forest Activities.

Local-government bodies continued the formation of commercial forests, and established 1,462 acres of new plantations during the year. In the North Island twenty local bodies planted 255 acres in areas ranging from 1 acre to 53 acres, and twenty-one obtained trees from the Service for planting for shelter or beautification purposes. In the South Island twenty-five local bodies planted areas ranging from 2 acres to 500 acres, making a total area for the year of 1,207 acres. The Dunedin City Council again headed the list with 500 acres, followed by the Selwyn Plantation Board (325 acres) and the Christchurch City Council (76 acres). The area of Crown land set aside for tree-planting purposes by local bodies was further increased by 144 acres during the year.

Industrial Companies.

Five industrial companies established 130 acres of plantations during the year. Of these, four were coal-mining companies who realize that it is wise to make provision for their future requirements of mining-props.

Tree-planting Companies and Syndicates.

The boom in the formation of private and public tree-planting companies and syndicates, which commenced definitely in 1923, reached its climax in 1925, and only three new companies were formed during 1926. Of the thirty-six private and public companies registered in New Zealand, eighteen continued or commenced planting operations during the year, and established 51,242 acres of new plantations. Of this area, 50,937 acres were planted in the North Island and 305 acres in the South Island, bringing the total area planted to date to approximately 70,000 acres.

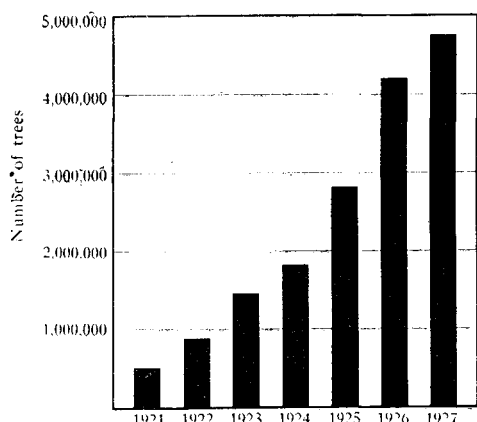
Forest-extension.

The interest of the people of the Dominion in tree-growing is well maintained. The numerous applications for advice from intending planters, and the increased sales of tree-seeds and nursery stock, show that during the past year this interest was more real and active than ever before. Forest Service sales of young forest-trees to farmers, proprietary companies, local bodies, and others reached the new high level of 4,760,490, exceeding the previous highest recorded sales by 534,316; while domestic and overseas sales of tree-seeds rose to 3,861 lb., an increase of 1,169 lb. on the record total for the preceding year. In addition to the sales, 24,590 trees and 190 lb. of tree-seed were distributed to schools free of charge. If planted 8 ft. apart the trees disposed of by the Service would be sufficient for the establishment of 7,040 acres of artificial forest.

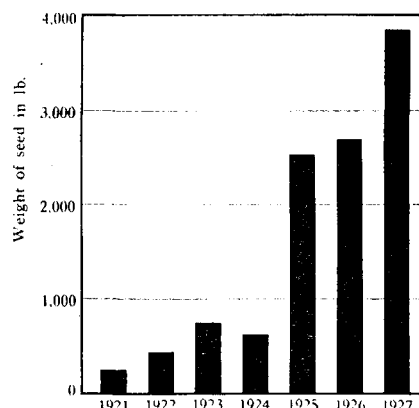
Tree and tree-seed sales from the State nurseries from 1919 to 1927 are presented as follows:—

Year.	Trees for planting. (Number.)	Forest-tree Seeds. (Weight in Pounds.)	Year.	Trees for planting. (Number.)	Forest-tree Seeds. (Weight in Pounds.)
1927	4,760,490	3,861*	1922	897,552	436
1926	4,226,174	2,692*	1921	520,702	240
1925	2,831,932	2,529*	1920	277,235	130
1924	1,839,512	618	1919	420,412	132
1923	1,475,581	746			

* Includes domestic and overseas sales.



COMPARISON OF FOREST SERVICE SALES OF YOUNG FOREST TREES FROM 1921 TO 1927.



COMPARISON OF FOREST SERVICE SALES OF FOREST TREE-SEEDS FROM 1921 TO 1927.

7. PUBLIC RELATIONS.

Forestry in Schools.

The forestry-in-schools movement has made steady progress during the year, and there is no doubt that elementary forestry, which includes the sowing of seed, the raising, planting, and caring for trees, the study and protection of our native flora and fauna, and the lessons correlated with these, has now a definite place in the curriculum of many schools. This success is due to the interest taken in this aspect of forest education by teachers, agricultural instructors, Education Boards, and School Committees, with the helpful co-operation of the Education Department.

Tree-nurseries have been established to date at 858 schools—401 in the North Island, 445 in the South Island, and 12 in Niue Island. The tree-seed, amounting to 190 lb., supplied free to these schools, resulted in the raising of fair crops of seedlings at many schools. Free trees to the number of 11,590 were supplied to schools throughout New Zealand, and in addition 13,000 small seedlings raised in the forestry plot at the Dunedin Exhibition were distributed for lining-out to 137 schools in Otago and Southland. As many schools are now raising sufficient trees for planting in the school-grounds, the demand for free trees is gradually being reduced. Ten schools commenced the formation of school-endowment plantations. The extension of this scheme is handicapped by the fact that many School Committees have insufficient funds to enable them to fence and clear available planting-areas.

A "School Forestry" section was included in the classes for competition at five winter shows. The Matangi School was again successful in winning the Ellis and Burnand Forestry Shield at the Waikato Winter Show, and the Ohangai School now has the honour of holding the G. Symes and Co., Ltd. Forestry Shield competed for at the Hawera Winter Show. The shields presented by the Wellington Timber-merchants' Association for competition at the Wellington Winter Show, and by the Otago Brush Co. for the Dunedin Winter Show, were not competed for at the 1926 shows.

During Easter, 1926, conferences were held at Rotorua and at Hanmer between officers of the Education Department and officers of the Forest Service. Thirty-one Inspectors and agricultural instructors attended these conferences and the short courses of instruction in elementary forestry which were held at the same time. The conferences proved a great help in demonstrating the educational value of forestry work, and enabled the Inspectors and instructors to gain a knowledge of nursery and plantation work.

CHAPTER IV.—RESEARCH AND EXPERIMENTS.

1. FOREST-MANAGEMENT.

The collection of data concerning the growth and yield of exotic species growing on different soils and under different climatic conditions throughout New Zealand has made steady progress during the period under review, and forty-six tables for ten species were compiled. With the completion of the detailed inventory of 12,000 acres of State plantations in the South Island, yield tables, and total volumes of timber compiled by species, diameter, and age classes, are now available for all but the minor plantations. Hence it will be possible to formulate more complete working-plans than those hitherto in force.

Planting plans were inaugurated for Riverhead, Kaingaroa, North Canterbury, and the Blue Mountains, after the areas had been topographically mapped and the planting compartments, blocks, roads, and fire-breaks demarcated. The topographic survey preliminary to the layout of the newly-acquired area of 33,000 acres at Karioi, was completed.



STAND OF SILVER-PINE (*Dacrydium Colensoi*), WESTLAND.

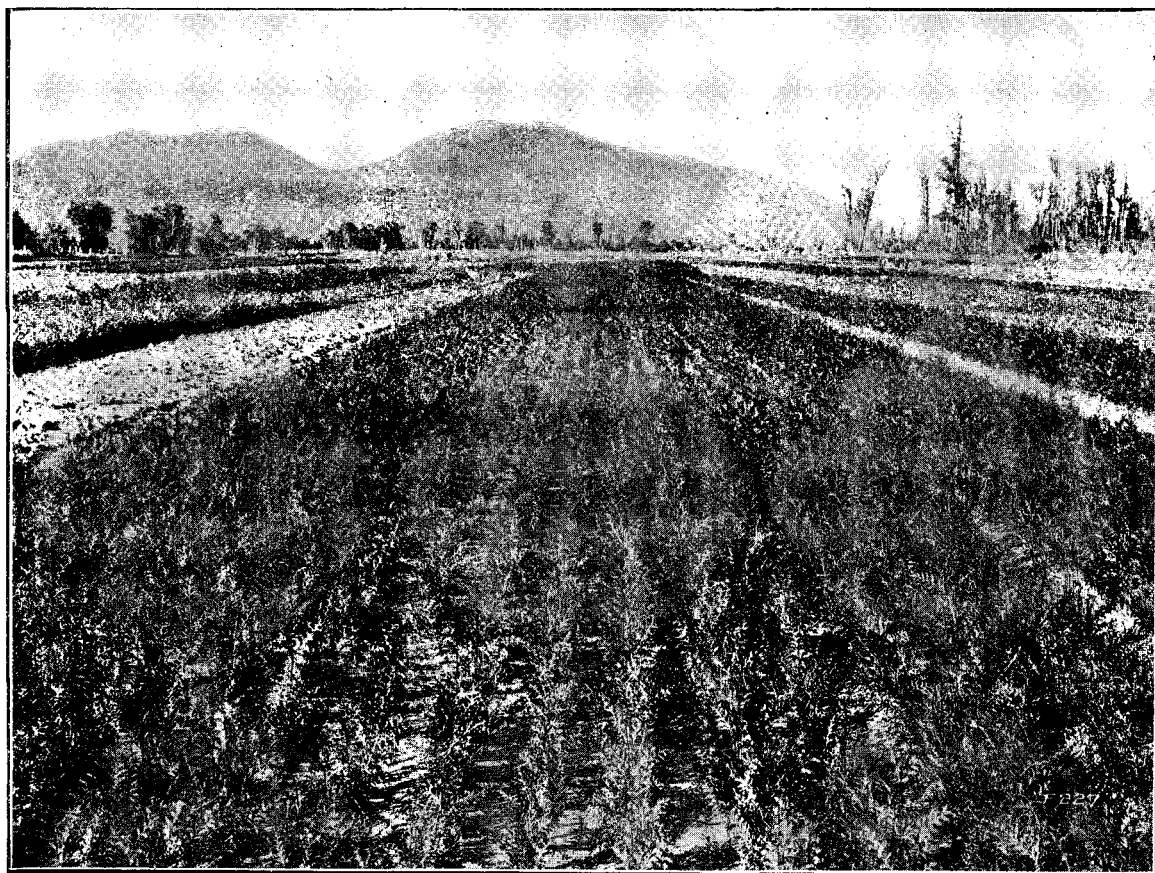
2. FOREST ECOLOGY.

Forest ecology deals with the study in the forest of the trees, shrubs, and plants comprising it. An exact knowledge of the development, succession, and association of species is an essential preliminary to forest-management. During the year Dr. L. Cockayne, Honorary Botanist, continued his investigations in the beech forests, and studied the regeneration on the outskirts of the forest. Here the value of the protection afforded the beech seedlings from browsing animals by the spiny wild-irishman scrub (*Discaria toumatou*) was specially noticeable. Observations in the cut-over stands of silver-pine in Westland indicated that this species when given abundance of light grows faster than is generally supposed, and that it will possibly form a useful second crop on poor boggy land.

The Service was pleased to be of assistance to the distinguished Swedish botanist, Dr. G. E. du Rietz, of the Swedish-Australasian Botanical Expedition and Upsala University. Dr. du Rietz, accompanied by his wife, a botanist of repute, spent six months in New Zealand studying the ecology of the natural forests, and more particularly the various lichens. His observations will shed light on the origin and history of the indigenous species, and show how these are connected with those of other countries.

3. FOREST ENTOMOLOGY.

The investigation of the insects injurious to indigenous and exotic forest-trees and to their timbers was continued by Mr. D. Miller, M.Sc., Entomologist, Department of Agriculture. The year's operations further emphasized the increasing number of forest-insect problems, many of which are of major importance. The number of insects constantly reaching New Zealand in imported timber is very noticeable, and several new species from Australia, North America, Europe, and Africa were found during the year. The Australian insects are mostly those imported in hardwood poles. It is not necessary to stress the danger of white ants to the numerous wooden structures in New Zealand, and the urgency of adopting adequate control measures before this pest becomes widely established. None of the other Australian insects recently imported show signs as yet of becoming established, but a close watch is being kept. Living insects have been found in oak, ash, and redwood timber, and in two parcels of seed imported from North America. From Europe the following insects were intercepted: Longhorn larvæ in beech; steel-blue saw-fly in piano woodwork; bark-beetles in pine slats; weevils in acorns. All these are of considerable importance, but the bark-beetles are especially so, since that type of insect does considerable damage to conifers. Attention has also been paid to the borers usually found in seasoned timber, and to insects attacking growing native or exotic trees or their seed.



WESTLAND FOREST EXPERIMENT STATION NURSERY: *Thuja plicata* IN FOREGROUND.

The main problems in connection with forest entomology are therefore, firstly, the protection of the indigenous and exotic forests from insects reaching New Zealand from outside sources, involving an efficient system of inspection and quarantine; and, secondly, the control of destructive insects already in the country, involving a biological survey of the major pests and natural controlling factors, together with ascertaining the extent to which the present system of forest-management is adequate for insect-control.

4. FOREST ECONOMICS.

The economic problems bearing on the management and utilization of the indigenous and man-made forests were further investigated during the year. Dr. L. Cockayne completed the preparation of Part II of his "Monograph on the New Zealand Beech Forests." This part deals with the various species from the economic side.

The Canterbury School of Forestry continued its investigations on behalf of the Forest Service, and Mr. F. E. Hutchinson, B.Sc.F. completed the "Economic Forest Survey of Canterbury." The second part of this work deals in a very comprehensive manner with the future timber requirements, and formulates a forest policy for Canterbury.

5. SILVICULTURAL INVESTIGATIONS.

Westland Forest Experiment Station.

The experimental work in connection with restocking the cutover lands near Hokitika with exotic species was further advanced by the planting of 222,310 trees on 368 acres. The total area restocked now stands at 850 acres. The principal species planted were insignis pine (*P. radiata*), *Pinus muricata*, *Cupressus macrocarpa*, *Cupressus Lawsoniana*, *Thuja plicata*, and various eucalypts. Small numbers of six other species were also planted.

The nursery in connection with the experimental station supplied 190,000 trees for the 1926 planting; 1,250,000 trees remain in stock for use in 1927 and 1928.

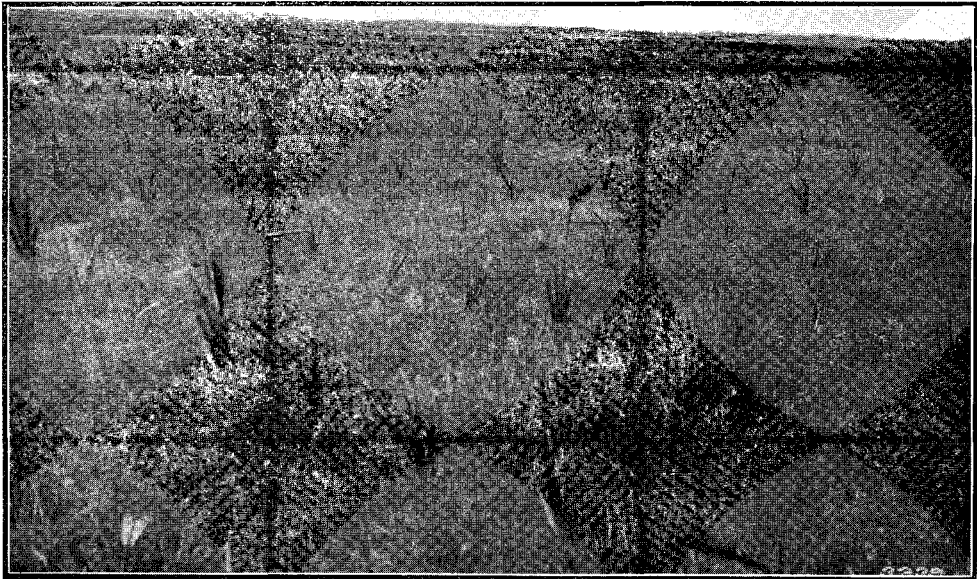
Experimental Planting on Dredge Tailings.

The experimental planting of exotic trees on the dredge tailings at Rimu was continued, and 22,450 trees were planted on 38 acres, bringing the total area planted to 50 acres.

The species used this year were Corsican pine, pondosa pine, Douglas fir, and Norway spruce, and the percentage survival averaged 82 per cent. The mortality was chiefly caused by heavy rains washing the trees out of the tailings. The whole of the available tailings at Rimu have now been planted, and the results to date are most encouraging.

Rangitikei Sand-dune Experimental Station.

The knowledge and experience gained from the experimental work which has been carried out at this station since May, 1921, has enabled larger areas to be treated during the year with better results and at a lower cost per acre. Marram-grass was planted on 372 acres, and, although winds of high velocity were frequent and the rainfall low during the planting season, a very successful establishment was obtained. The area of sand-dunes now planted with marram-grass is 1,045 acres.



EXPERIMENTAL PLANTING OF FLAX, RANGITIKEI SAND-DUNE EXPERIMENTAL STATION.

The planting of exotic pines on the stabilized marram-covered dunes was continued, and 88,650 trees were planted on 130 acres, bringing the total area planted to 315 acres. Between the dunes there is a large area of low-lying rush country which cannot be drained sufficiently for tree-growing owing to the lack of fall. As it is desirable to put this land to profitable use, two experimental plots of flax (*Phormium tenax*) were formed. The result to date is most promising, but it is yet too early to decide whether it will be a profitable undertaking to plant the whole of the wet area, which amounts to over 1,000 acres.

Experimental plots of flax and toetoe were also established immediately to the rear of the fore-dune, to ascertain if these species will afford the shelter necessary before trees can be planted successfully in such an exposed position. An experimental planting of kikuyu-grass was also made, and where the sand is less than 1 ft. deep it is growing well and is forming a dense mat. Elsewhere it failed to strike.

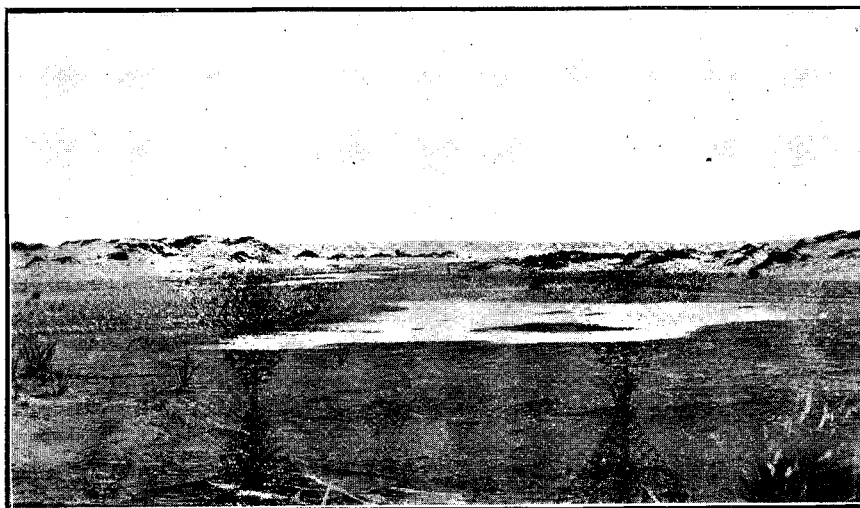
The tree nursery at Tangimoana supplied 100,300 transplants, which were used in the 1926 planting and to fill the blanks in the work of previous years. Seedlings to the number of 140,000 were transplanted for use in the 1927 planting season.

Statistical Growth Studies of Exotic Trees.

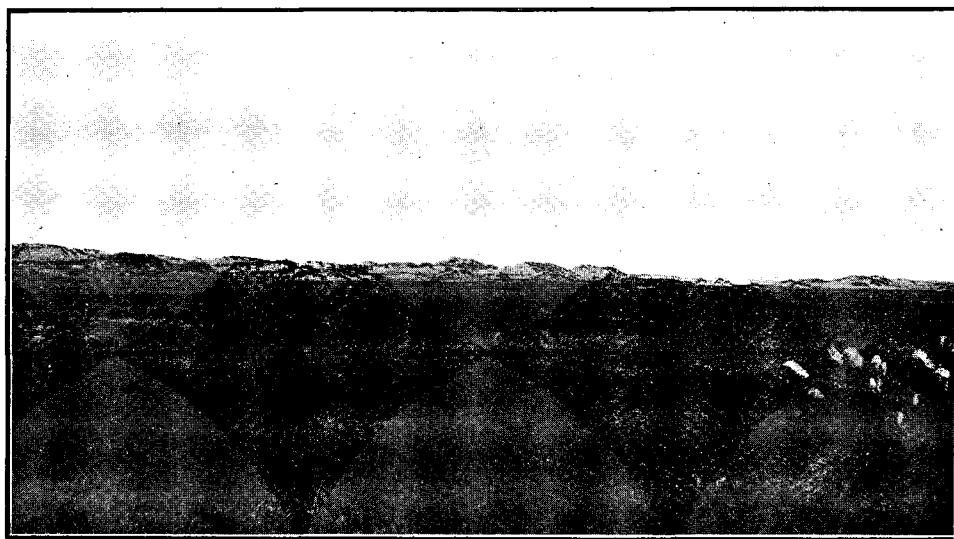
Growth studies of the various exotic species in the State plantations were continued, and forty-six sample plots were measured in the South Island plantations. Yield tables were prepared for ten

species: *Pinus laricio* (12), *Larix europea* (10), *Pinus austriaca* (9), *P. ponderosa* (5), *P. radiata* (4), *Pseudo-tsuga Douglasii* (2), *Picea excelsa* (1), *Larix leptolepis* (1), *Pinus pinaster* (1), *P. contorta* (1). (The number of sample plots for each species is shown in brackets.) Eighty-nine yield tables for twenty-five species have now been completed.

The field-work of a complete inventory of the plantations at Conical Hills, Naseby, Dusky Hill, Hanmer, and Pukerau was carried out. This work is now almost completed for the whole of the State plantations, and the total volume for each species is being calculated.



SAND-DUNE RECLAMATION: AREA BEFORE TREATMENT (RANGITIKEI).



SAME AREA AS ABOVE AFTER FIXATION WITH MARRAM-GRASS.

Underplanting of Exotic Trees in the Indigenous Forests.

The experimental plots established in Taranaki to study the growth of certain exotics when underplanted in tawa-hinau forest were recounted and remeasured for the second time. The most successful species, in order of maximum growth, are *Cryptomeria japonica*, *Thuya plicata*, *Pseudo-tsuga Douglasii*, *Cupressus Lawsoniana*, *Pinus strobus*, *Sequoia sempervirens*. While the first species had completed successfully with the undergrowth, the remaining ones were still struggling against competition. To relieve the struggle the ground-cover on half the area occupied by these species was cleared, the remainder being left as control. A recount was made in two sample plots established in 1922 in the same district for the purpose of observing the progress of natural regeneration of the indigenous species present.

In the Nelson-Marlborough region the spot-sowing of exotics in the cut-over forest on the banks of the Pelorus River was experimented with.

Tapping of Kauri for Resin.

The experiments commenced in 1925 have been continued and extended, and the plan of operation now covers the bleeding on barrel and limbs of thirty kauri-trees above pole size, and the barrel only near the ground of forty trees. Preliminary results will be available in 1928.

Mill Conversion Studies.

The results of investigations into the degree of conversion of kauri at two mills (based on five months and twelve months cutting respectively) were averaged, and an all-round factor was thus obtained for application in timber-cruising. To meet the case of stands of kauri of small average dimension, with a consequently low degree of conversion, four graded conversion factors were devised. Log-conversion studies, when completed, will furnish a set of graded factors for permanent use in connection with kauri.

The taper of kauri was also investigated, and eighty-seven merchantable trees in the Coromandel district were measured. This study will be continued in North Auckland, and the data obtained will be applied in kauri-cruising practice.

6. FORESTATION STUDIES.

As a result of experimental trials and small-scale operations carried out in past years, the large-scale nursery and plantation operations have again shown definite advances in procedure. Experimental work under way in March, 1926, has been continued or finalized and further investigations have been undertaken.

Weed-eradication Experiments.

Trials in connection with the eradication of weeds by the application of zinc sulphate have yielded negative results, and have been discontinued. Other methods of eradication will be investigated.

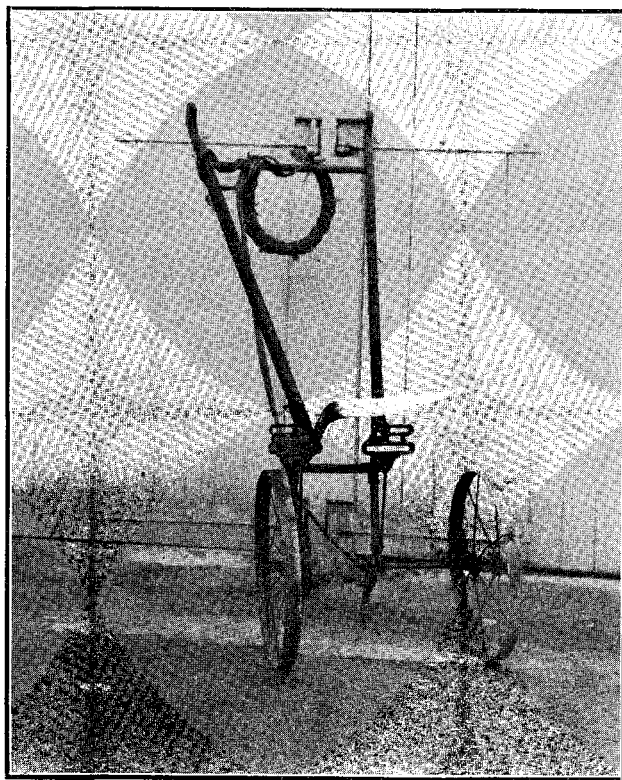
Nursery-line Method of Propagation.

The importance of soil conditions in connection with mass production of crops was demonstrated this year at Rotorua and at Tapanui nurseries, where line crops sown on virgin, newly broken land have produced a much better and heavier crop than those grown on nursery ground which has been for some time in use.

At Rotorua a trial was made of sowing a line of oats between lines of *P. radiata* seed, with the object of (1) preventing the light pumice sand from blowing off the lines, thus exposing the germinating seed, and (2) providing a natural shelter from wind and sun to determine the effect on prevention of damping-off in lines. Owing to there being very little wind and plenty of rain during this season, there was no movement of soil and no sign of damping-off either in experimental or control lines. A slight advance in growth is shown in the lines between oats: these latter were hoed out in February, an experimental plot being left to determine any influence on root or height growth over the whole growing period.

Wrenching.

A wrenching-machine has been developed for use in Rotorua Nursery which has reduced the cost of this operation to approximately one-quarter of the previous cost. This consists of an L-shaped knife attached to a Planet hand wheel hoe, which can be worked by two boys, and operates equally well in seed-beds, seed-lines, and lined-out trees, producing a well-wrenched plant by its operation.



WRENCHING-MACHINE DEVELOPED BY THE FOREST SERVICE.

Nursery Growth and Season of Sowing Trials.

The standardized trials started last year with the object of building up average data on this subject for various species were continued during the year under review, and will be carried on over a series of years.

Artificial-manuring Trials.

(1) Experiments in seed-beds were carried out on three equal plots of land which had been cropped with blue lupin previously treated in August, as follows: No. 1, dressed with superphosphate at the rate of $2\frac{1}{2}$ cwt. per acre; No. 2, dressed with basic slag at the rate of $2\frac{1}{2}$ cwt. per acre; No. 3, dressed with kainit at the rate of $2\frac{1}{2}$ cwt. per acre. In September these areas were sown down with *P. radiata* in beds. To date the only apparent difference is in plot No. 2, where stock treated with basic slag showed a greater prevalence of damping-off fungus.

(2) Virgin land which had been cultivated the previous season and had lain fallow till August, when it was dressed with superphosphate at the rate of 2 cwt. per acre, was divided into seeding blocks which were top-dressed, prior to sowing in October, as follows: Nos. 1 and 2, superphosphate at 2 cwt. per acre; No. 3, kainit at 2 cwt. per acre; No. 4, basic slag at 2 cwt. per acre. One season's results gave very good growth with superphosphate and kainit, but poor growth on basic-slag areas.

Experiments in Storage of Redwood-seed.

Two series of samples of tested redwood-seed were placed in glass containers in store—(1) under ordinary room-temperature, in the dark; (2) in cold storage, in the dark. Samples were tested at the end of three, six, nine, and fifteen months. The trial is still uncompleted, but it will be carried on with tests made at longer intervals during the coming year.

Grass-grub Control.

Further attempts were made during the past sowing season to control the ravages of grass-grub (*Odontria zealandica*) at Tapanui Nursery. The smoke-screening of the sown areas by means of braziers of sulphur was tried. The braziers were placed between the adjoining tussock paddocks and the sown nursery areas, and were lit towards evening, when the beetle flights take place. Although flights were prevalent, practically no damage was manifested in the protected crops. This method will be given further trials next season.

Establishment of Plantations by Direct Formation.

Large-scale trials of direct-sowing methods were made during the year at Riverhead (Auckland region) and on the Kaingaroa Plains (Rotorua region).

On the clay soil at Riverhead spot-sowing was carried out by first breaking up the surface layer and sowing seed (approximately twelve seeds per spot, according to germinative capacity) in the fine earth thus produced, covering each spot with a manuka branch for shelter from drying up, as operations were carried out late in the season. The results of the trial in this difficult type of land are shown below:—

Species.	Date Sown.	Percentage of Successful Spots at April, 1927.	Average Height in Inches at Six Months.	Average Number of Plants in Successful Spots.
<i>Pinus canariensis</i>	Early Oct., 1926	23	$1\frac{1}{2}$	1.5
<i>P. radiata</i>	"	28	$1\frac{1}{2}$	2.6
<i>P. pinaster</i>	"	48	$2\frac{1}{2}$	2.2
<i>Cupressus macrocarpa</i> ..	"	34	$\frac{3}{4}$	4.3

Seeding at Kaingaroa was carried out with a Duncan seeder drawn by a tractor, the disk feed of the drill being adjusted to sow in spots at 8 ft. distance. This sowing, using 2 oz. *P. radiata* seed per acre, has proved too light, and quantities will be increased in further trials.

Experimental Treatment of Fire-breaks.

At the suggestion of the Cawthron Institute, 3 acres of grassed fire-break in Whakarewarewa Plantation were top-dressed with varieties of phosphatic manures—basic superphosphate, superphosphate, and Nauru phosphate—with the object of producing a superior grazing-growth with consequent close cropping by the stock running on plantation roads, and reduction of labour in fire-break upkeep. The dressings evidently attracted the stock to the treated area, but no noticeable closeness in grazing has been observed on any of the treatments. The experiment put in hand last year on Kaingaroa Plains, of removing the top soil with the grader for a width of about 6 ft. on fire-breaks, thus leaving the unweathered pumice exposed, has proved a success in eliminating cultivating operations on the breaks, and will be carried out on a more extensive scale this year, with improved traction.

Trials and Experiments under Way.

These comprise investigations into season of collection and age of parent trees for redwood-seed collected in New Zealand. Storage-tests of redwood-seed; investigations into season and frequency of wrenching of nursery stock; the use of shelter in North Auckland for raising species of nursery stock; soil-cropping trials and manurial experiments in nurseries; correlation of germination tests with pot tests and nursery production; seasonal tests of direct seeding of plantations; season-of-planting trials; scrub-cutting experiments; trials in pruning of young plantations.

Recognition of Suggested Improvements in Methods.

Funds were set aside during the period under review for the purpose of providing monetary recognition for improvements suggested by officers and employees in practice, technique, methods, &c.—either in the office or field—which have resulted, or will result, in economies and greater efficiency in State Forest Service operations; and also for improvements in machinery or equipment of any kind which has resulted, or will result, in monetary savings or increased efficiency. Nineteen applications were considered by the departmental committee appointed for this purpose, and the following improvements were considered worthy of recognition:—

- (1) Tables to facilitate topographical-survey work in indigenous forests and plantations: Ranger J. B. Watt, Rotorua.
- (2) Improved wrenching-machine: Ranger W. M. Menzies, Rotorua.
- (3) (a) Improved seed-sowing adze, (b) reinforcement of disk harrows: Blacksmith Alex. Munro, Rotorua.

7. FOREST ECONOMY.

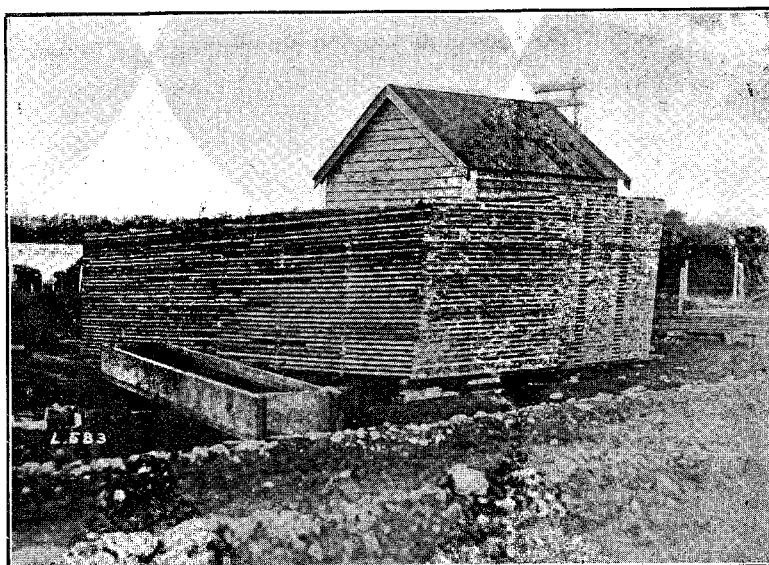
Forest-products Investigation.

The wide range of forest-product studies can be gauged by the mention of a few typical results. The completion of the strength tests on green and air-dry material of four species of native and exotic woods, including matai, black-beech, Douglas fir, and redwood, has advanced the testing programme of the Forest Service to such a point that a manual of mechanical and physical properties of New-Zealand-grown woods will be printed during the current year. The adoption of international testing methods for this work makes the manual a companion volume to similar publications issued by the United States of America, Canada, and India, thus enabling accurate comparisons to be made between the timbers of these four countries. It is further possible, as a result of the work, to predict within close limits the mechanical and physical properties of woods, based upon determinations of specific gravity and of structural composition. Strength tests, also made on manuka, ironbark, and hickory demonstrated the superiority of the native manuka for spokes. The butter-box tests initiated in 1925 were continued, and a new type of box, economizing the supplies of non-tainting timbers, was passed as suitable for the export trade. The export cheese-crate was also redesigned as a result of further study in the Forest Service box laboratory.

Further data on improved air-seasoning practices were published during the year, and experimental stacks, using more efficient methods of construction, were established in various parts of the country. The installation of the proposed experimental dry kiln awaits the return of the Engineer in Forest Products, who is studying abroad the types most suitable for New Zealand use. The study of shrinkage in wood and of microscopic structure is fundamental to all wood-drying practices, and continued progress in both studies is recorded. A study to determine the possibilities of conditioning and floating logs of various native species has also been commenced.

Suitable open-tank preservative treatments with creosote for twenty-eight species of native and exotic timbers were developed. Prevention of sap-stain in kahikatea, also, is being studied under commercial conditions. The results to date are encouraging, the treatment being inexpensive and its efficiency promising. The annual saving possible by the successful completion of this study alone amounts to over £10,000.

Further progress is recorded in insect and decay problems, valuable assistance being given by the Government Entomologist, whose surveys enable the Forest Service to adequately control any dangerous timber and forest insects. A survey of the timber and allied industries was completed during the year, and a statistical and economic survey of the use of sap and O.B. grades commenced.



SAP-STAIN INVESTIGATIONS: METHOD OF STACKING TIMBER AFTER TREATMENT.

Studies under Way and Investigations.

Altogether over thirty major investigations are in progress. These include: Sawmills and wood-waste survey; introduction of shop grades into New Zealand grading rules; wood requirements of wood-using secondary industries; statistical survey of sawmilling industry; woods for butter-boxes; uses for short lengths of timber; standardization of sizes, grades, and nomenclature for yard timber; utilization of little-used species; study of floating properties of New Zealand woods; physical properties of wood; air-seasoning of wood; basic mechanical properties of woods grown in New Zealand; grading rules and working-stresses for structural timbers; cross-arm tests; routine strength tests of plywood; test of box-bindings; study of nail-holding power of New Zealand woods; treatment of wood by non-pressure process; treatment of wood by pressure process; service-test records; routine examinations of wood-preserved; the pulping of thinnings from Rotorua plantations; suitability of New Zealand woods for pulp; microscopic structure of woods; kauri-bleeding; relation between durability and the chemical composition of woods; destructive distillation of native and exotic woods; prevention of sap-stains and moulds on timber; relative resistance of untreated woods to borer-attack; relative resistance of untreated woods to decay; introduction of forest and timber insects and fungi in imported forest products.

CHAPTER V.—GENERAL.

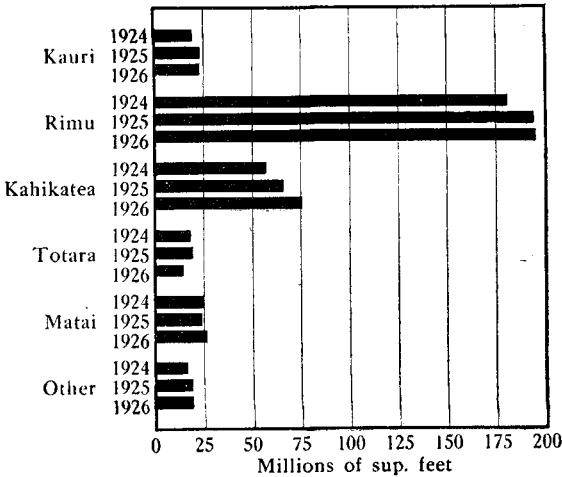
1. REPORT ON THE TIMBER TRADE.

Production.

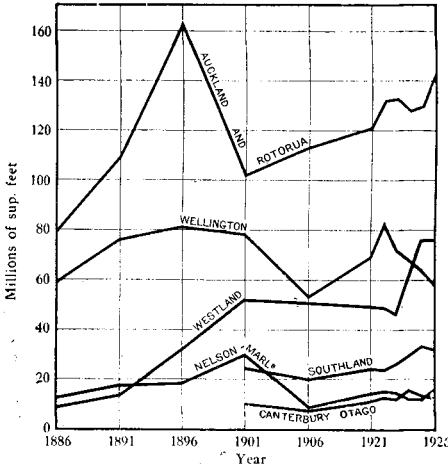
The following tables, showing the reported output in feet board measure of the various species of timber from New Zealand sawmills during the years ended 31st March, 1924, 1925, and 1926, have been compiled from figures supplied by the Government Statistician.

Reported Production of Sawn Timber by Species.

Species.	1924.		1925.		1926.	
	Feet, B.M.	Per cent.	Feet, B.M.	Per cent.	Feet, B.M.	Per cent.
Totals, all species ..	317,068,000	100·00	344,095,000	100·00	353,225,000	100·00
Kauri	19,743,000	6·23	22,892,000	6·66	22,766,000	6·44
Rimu	181,094,000	57·12	194,565,000	56·52	195,452,000	55·35
White-pine ..	55,699,000	17·88	66,539,000	19·38	75,635,000	21·40
Totara	18,904,000	5·96	18,507,000	5·38	14,110,000	4·00
Matai	24,326,000	7·67	23,392,000	6·79	26,141,000	7·40
Beech	6,529,000	2·06	7,439,000	2·16	8,701,000	2·46
Insignis pine ..	7,386,000	2·33	7,706,000	2·24	7,072,000	2·00
Other	2,387,000	0·75	3,055,000	0·87	3,348,000	0·95



GRAPH SHOWING PRODUCTION OF ROUGH-SAWN TIMBER FOR YEARS ENDED 31ST MARCH, 1924, 1925, 1926.



GRAPH SHOWING TREND OF SAWN-TIMBER PRODUCTION BY FOREST CONSERVATION REGIONS FOR THE PERIOD 1886 TO 31ST MARCH, 1926.

The sawmill production as reported to the Government Statistician was approximately 353 million feet b.m. for the year ended 31st March, 1926. This represents an increase of 2·7 per cent. over the reported production for the previous year, and constitutes the highest reported annual cut by the industry since 1908. The production for the year ended 31st March, 1927, is estimated at 340 million feet b.m.

The trend of regional timber-production for the period 1886 to 1926 is shown in the accompanying graph. The statistics were compiled for provincial districts, which correspond closely to forest-conservation regions. Auckland and Rotorua regions combined, together with Gisborne (*i.e.*, Auckland Province), not only maintained the premier position, but increased their cut over that for the previous reporting period (*i.e.*, the year ended 31st March, 1925). Westland, as in the previous year, holds second place, and is assured of this position for some time to come, now that rail connection is available between the east and west coasts of the South Island. The Wellington District again showed an appreciable decrease, as in previous years, indicating the depletion of the easily accessible Main Trunk line forests.

With the exception of kauri, totara, and insignis pine, the production of all species during the year ended 31st March, 1926, was greater than for the preceding period. The decreased production of totara is especially noticeable, the output amounting to only 14 million feet b.m., compared with 18½ million feet b.m. cut in the year ended 31st March, 1925, equivalent to a reduction of 24 per cent. The principal increases included 9,000,000 ft. b.m. of white-pine and 4,000,000 ft. b.m. of matai. Hardwoods still supply less than 3 per cent. of the annual cut.

The average f.o.r. mill value per 100 ft. b.m. (all species) for the year ended 31st March, 1925, was 19s. 8d., compared to 20s. 1d. for the preceding year.

Manufacturing Technique.

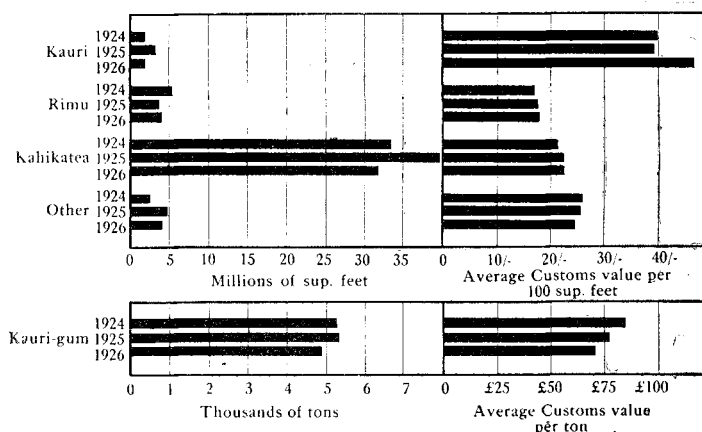
Manufacturing technique has improved little during the year under review. With mills working at a lower percentage of their capacity than ever before, this is not unexpected. Nevertheless, there is a tendency for new operators to invest in a better type of equipment than formerly. The Canadian type of log-carriage, for instance, is coming into wider favour, while other labour-saving devices are gradually being installed. Portable rigs, too, for the exploitation of plantation timbers are rapidly being modernized.

Operators continue to show an increasing appreciation of proper drying methods, improvements in air-seasoning technique being clearly evident in every section of the country. More and better grade fillets are used than formerly, vertical air-spaces through piles have become common practice, and box-stacks are replacing the old one-end stacks. Low pile foundations (often they are only 6 in. off the ground) remain the most serious defect in present-day piling practice. In the dry-kiln field little progress has been recorded, but arrangements have now been completed by one of the most progressive South Island timber-merchants for the installation of a modern scientifically controllable kiln. This marks an important step forward in dry-kiln progress in New Zealand.

Competition with imported softwoods has also served to stimulate interest in grading and marketing methods, and there is every indication that the official organizations of the industry will review their policies in these fields of effort within the near future.

Exports.

The year ended 31st December, 1926, was the poorest experienced by the export trade for over twenty-six years, and contrasted strongly with the heavy exportation reported for 1925. The actual quantities exported for the two years were 41,953,879 ft. b.m., valued at £490,247, in 1926, and 51,549,439 ft. b.m., valued at £605,187, in 1925. Thus, while the quantity fell away by approximately 10,000,000 ft. b.m., the average f.o.b. value for all species maintained the high level experienced in 1925, the figure for the latter year being 23s. 6d., and for 1926 23s. 4d. per 100 ft. b.m.



GRAPH SHOWING ROUGH-SAWN TIMBER AND KAURI-GUM EXPORTS FOR YEARS ENDED 31ST DECEMBER, 1924-26.

The white-pine trade, with an exportation of 31,767,504 ft. b.m. and a unit value of 22s. 6d. per 100 ft. b.m. during 1926, compared with 39,748,206 ft. b.m. and a unit value of 22s. 5d. during 1925, received the severest setback it has experienced in the history of the trade. It alone accounted for almost the whole decrease in the year's export trade. Inquiries made on the Australian market, which absorbs most of this timber, indicate that considerable stocks have accumulated during the past two years, due largely to the abnormally low exports of dairy-produce and to increased competition by North American and Baltic shelving and box timbers. Indeed, the trade is so overstocked that the white-pine export market is likely to remain dull for the greater part of 1927.

During 1926 rimu exports totalled 4,000,370 ft. b.m., valued at 18s. per 100 ft. b.m., compared to 3,709,934 ft. b.m., valued at 17s. 8d. per 100 ft. b.m., exported in 1925. Rimu continues to move slowly in the Australian market, which has been captured largely by North American and Baltic timbers, especially for flooring and lining purposes. To compete with these timbers on a price basis the f.o.b. price of rimu in New Zealand would require to be from 14s. 6d. to 15s. 6d. per 100 ft. b.m.

The exports of kauri during 1926, amounting to 1,987,046 ft. b.m., with a f.o.b. value of 46s. 8d. per 100 ft. b.m., correspond closely to the averages of recent years. The 1925 exports, totalling 3,238,693 ft. b.m., with value of 39s. 3d. per 100 ft. b.m., were abnormal, owing to the shipment of a quantity of sap-grade timber, which was moving very slowly on the domestic market.

Beech, as predicted in previous years, continues to find favour abroad, 2,392,734 ft. b.m., valued at 25s. 7d. per 100 ft. b.m., being exported during the year. It appears, however, that a revision of the New Zealand grading system and a detailed study of the export-market requirements would assist materially in securing a more balanced utilization of the products of the log and in widening the avenues of utilization for this valuable hardwood.

The re-export of foreign timbers to the Pacific islands, &c., also increased during the year, reflecting the increased use of these timbers by importers of dairy-produce, and fruit-containers for their export trade.

Kauri-gum exports fell considerably below the 1925 figures, only 4,877 tons, of an average value of £61 6s. per ton, being exported during 1926. The 1925 exports totalled 5,370 tons, valued at £77 6s. per ton.

Imports.

During 1926 only 66,505,092 ft. b.m., valued at £827,422, were imported, compared with 81,923,784 ft. b.m., valued at £1,178,982, imported during 1925.

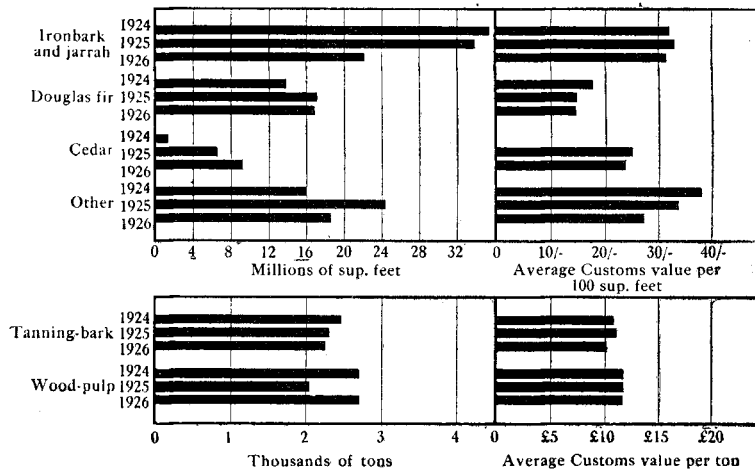
Of the various groups, hardwoods, with an importation of approximately 26,000,000 ft. b.m., or over 21,000,000 ft. b.m. less than the previous year, accounted for more than the total decrease of all groups combined—an indication of the decreased activities of the Government Departments, Electric-power Boards, and local bodies during the year.

Softwoods, following the general trend of the past five years, again showed an appreciable increase, the importations for the year being approximately 40,400,000 ft. b.m., or over 6,000,000 ft. b.m. more than the preceding year, thereby setting a new peak in softwood-importation.

As in former years, Douglas fir again figured as the most important softwood imported. Unit values, also following a general trend, fell slightly. Thus, for 1926, 16,821,000 ft. b.m., valued at 14s. 3d. per 100 ft. b.m., were imported, compared with 17,116,000 ft. b.m., valued at 14s. 8d. per 100 ft. b.m. in 1925. Indications gauged on figures so far available this year point to a further increase being experienced in the 1927 importations.

Western red-cedar continued to find favour with local builders, and the importation of 9,021,300 ft. b.m., valued at 32s. 10d. per 100 ft. b.m., reached a new trade peak for this timber. It is not likely, however, to be exceeded in 1927—in fact, it is probable that during this year the trade will suffer in competition with redwood.

Formerly redwood has been restricted by price consideration to exterior joinery, and similar high-grade uses, but, following the visit to New Zealand of representatives of redwood-producers, the prices have been materially reduced to allow of competition with western red-cedar for weather-boards. The result has been a jump in importations from about 1,500,000 ft. b.m. in 1925 to 4,000,000 ft. b.m. in 1926.



GRAPH SHOWING TIMBER AND TANNING-BARK IMPORTS FOR YEARS ENDED 31ST DECEMBER, 1924, TO 1926.

Hemlock still finds favour in many districts as an interior lining and finish timber, 4,410,000 ft. b.m. have been imported during the year, at the low average price of 18s. 10d. per 100 ft. b.m. This total includes approximately 750,000 hemlock fruit-cases, containing approximately 2,000,000 ft. b.m. of timber, imported during the year. Over 80 per cent. of this timber is imported dressed. Wrongly or rightly, it has in certain districts a bad reputation for borer-attack, and the fact that in this connection some timber-merchants have already cleared their yards of stocks indicates that a considerable decrease in the quantities imported during the current year may be expected. 511,000 spruce butter-boxes and 137,000 spruce and hemlock cheese-crates entered New Zealand during 1926. Petrol-cases containing 3,000,000 ft. b.m. of hemlock and spruce were also imported. These figures represent a considerable decrease in butter-boxes imported as compared with the previous year, but an increase in both cheese-crates and fruit-cases.

Markets.

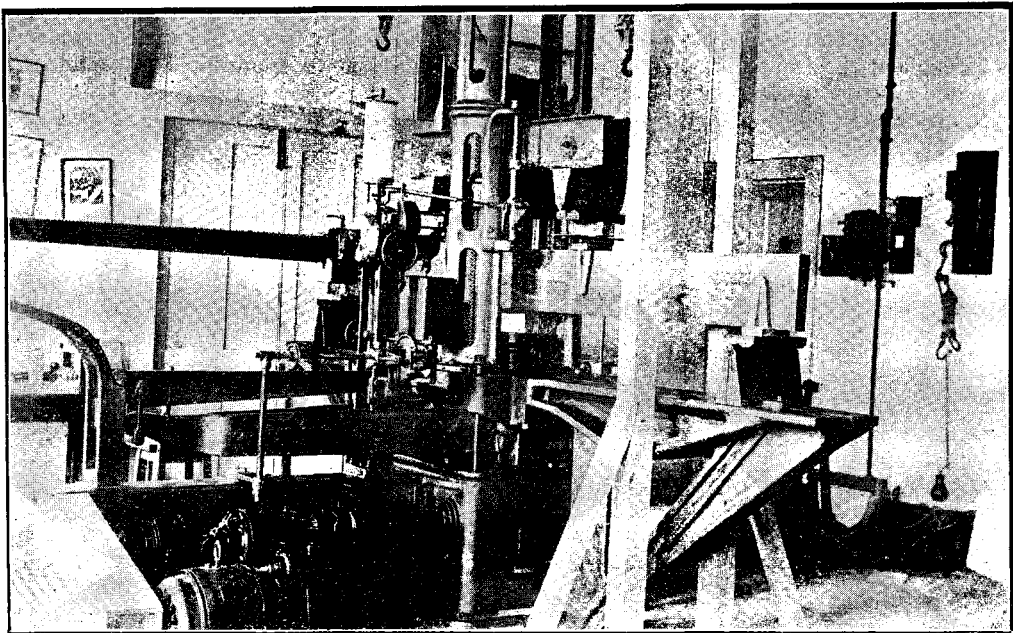
Following the usual business cycle, the boom years of 1919-25 are being succeeded by a depression in the timber trade. Surface indications point to increased importations as the responsible factor. They have, it is true, aggravated the position, but to arrive at a satisfactory explanation it is necessary to make an analysis of the underlying trend.

Since building operations absorb from 50 to 45 per cent. of all softwoods consumed, the building ratio (*i.e.*, the number of persons per dwelling) is one of the best barometers of business for the timber trades. An examination of Government statistics bearing upon this question indicates that, except for a few exceptional localities such as Wellington, the housing ratio is lower than it has ever been previously in the history of the country. In other words, the house-shortage has, generally speaking, been overcome—a fact which is confirmed by the increasing number of houses to let, &c.

The keen demand for timber experienced in the early post-war period has, therefore, receded, and a period of readjustment has been forced upon the industry. Attracted by the prices, good demand, and quick sales of the post-war period, many new operators entered into the business, and the trade of old-established millers rapidly extended. Withal, this expansion was naturally accompanied by co-operative marketing and price-fixing agreements. The question of immediate importance is, How can the industry be best established? The solution of the problem is already apparent. Price-cutting is in vogue on the timber-markets, and this ultimately will serve to eliminate the more inefficient operators and enable the industry to reorient itself to meet the changing demands of the market, especially in competing with imported softwoods.

The decline in demand has to some extent been of indirect benefit to both the industry and to the consumer. Hitherto a large amount of timber has been sold green off the saw to go immediately into use. To-day mills are carrying stocks previously unthought-of, and, with ample supplies of seasoned timber to draw upon, users are accepting sap grades which would otherwise be unacceptable. Recognizing this new outlet for their sap grades, operators are endeavouring to establish a permanent trade in seasoned timber.

It is to be noted that the enormous increase in the number of ferro-concrete buildings that are being erected, especially in the larger centres, cannot, as is popularly supposed, be regarded as a detriment to the timber trade as it applies to the use of New Zealand timbers. As a matter of fact, there is more O.B. and inferior timber used in the construction of a ferro-concrete building than could possibly be used in a wooden building of the same dimensions, because in the latter, under the existing by-laws, a very large proportion would be heart-wood. It is therefore submitted that the modern practice of concrete building is an advantage to the utilization of our forests.



AUCKLAND TESTING STATION : BEAM UNDERGOING TEST.

2. THE FOREST ATLAS.

Three atlas maps were compiled during the year, making a total number of 57 maps recorded under the permanent Forest Atlas. Four atlas sheets were printed, making a total of 97 sheets printed up to date, while 102 still remain to be dealt with. 1,150 miscellaneous lithographs were printed, and 1,828 compiled plans, atlas sheets, tracings, graphs, &c., prepared. Topographical maps and plans showing the schemes of layout of planting-blocks and fire-breaks have been prepared in connection with the following State plantations: Hanmer, Balmoral, Blue Mountains, Greenvale, Kaingaroa, Karioi, and Riverhead. In addition, plans showing the species planted have been prepared for Dusky and Naseby State plantations.

Public Inspection of Maps.

During the year a keener interest was noticeable in the increased number of callers to obtain information regarding State forests, and to inspect the Forest Atlas maps. The facilities offered are keenly appreciated by opossum-trappers who desire to ascertain the location of their allotted blocks in State forests.

3. PHOTOGRAPHIC RECORDS.

The total number of negatives now on record is 4,485, and 5,356 prints, 112 lantern-slides, 10 enlargements, and 8 transparencies were made during the period under review.

4. EDUCATIONAL PUBLICATIONS AND OTHER LITERATURE PRINTED DURING THE YEAR.

- 2,000 copies Bulletin No. 5 : " Properties and Uses of Insignis Pine."
- 1,000 copies Circular No. 8 : " Forest Fire Districts."
- 2,000 copies Circular No. 20 : " Eucalypts in New Zealand."
- 1,500 copies Circular No. 21 : " The Drying of Timber."
- 3,000 copies Circular No. 23 : " Butter-box Tests."
- 2,000 copies Circular No. 24 : " Cheese-crate tests."
- 1,000 copies Leaflet No. 1 : " Properties and Uses of Pukatea."
- 1,000 copies Leaflet No. 2 : " Properties and Uses of Kohekohe."
- 500 copies Leaflet No. 3 : " Acacia Gall-fungus."
- 1,000 copies Leaflet No. 4 : " Properties and Uses of Kawaka."
- 1,000 copies Leaflet No. 5 : " Preservative Treatment of Fence-posts."
- 1,000 copies Leaflet No. 6 : " Butter-box Tests."
- 26,000 copies " North Island Price List of Trees and Seed, 1927."

5. REFERENCE LIBRARY.

The central library is now equipped with modern steel shelving, which enables books and other publications to be shown to more advantage than has hitherto been possible. New works issued from time to time have been procured, and by the system of exchange with Forest Services throughout the world numerous pamphlets and reports are obtained, so that it may now be confidently asserted that as a source of reference on forestry and tree-planting technique, utilization of timber, and all the various matters pertaining thereto, the library is unsurpassed in the Southern Hemisphere.

Additional standard works have also been secured for the libraries in the various conservation regions throughout the Dominion, and these reference books are much appreciated and referred to by officers whose location in the field prevents their making full use of the central library.

Since last report 432 new books and pamphlets and reports have been added, making a grand total of 3,767.

APPENDICES.

APPENDIX I.

STATE AND PROVISIONAL STATE FOREST AND FOREST RESERVES.

Areas in Acres at End of Fiscal Year, 1927.

Land District.	Area in Acres at End of Fiscal Year 1926.			Changes in Area during the Fiscal Year 1926-27: Net Increase in Acres.			Area in Acres at End of Fiscal Year 1926-27.			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	105,701	59,242	..	10,768	465*	..	116,469	58,777	..	3.9
Auckland ..	235,904	470,504	2,316	69,622	18,204	..	305,526	488,708	2,316	9.7
Gisborne ..	87,696	208,609	11,160	..	915	..	87,696	209,524	11,160	8.79
Hawke's Bay	113,128	1,500	5,254	509	..	..	113,637	1,500	5,254	4.14
Taranaki ..	69,496	46,388	40,594	261	210*	139*	69,757	46,178	40,455	6.51
Wellington ..	456,668	143,106	14,007	424	1,796	..	457,092	114,902	14,007	8.75
Nelson ..	19,196	1,984,684	8,470	5	9,767*	..	19,201	1,974,917	8,470	42.5
Marlborough	89,497	120,625	12,062	..	..	..	89,497	120,625	12,062	8.04
Westland ..	2,190	1,711,543	119	..	2,111	..	2,190	1,713,654	119	44.5
Canterbury ..	320,021	..	319	9,038	..	..	329,059	..	319	3.48
Otago ..	133,657	335,123	2,108	5	77	..	133,662	335,200	2,108	5.24
Southland ..	137,427	605,376	..	..	..	..	137,427	605,376	..	9.44
Totals ..	1,770,581	5,686,700	96,409	90,632	12,661	139*	1,861,213	5,699,361	96,270	..
(7,656,844)										

* Net decrease.

APPENDIX II.

SUMMARIZED REPORT UPON STATE FORESTATION IN THE FOREST CONSERVATION REGIONS OF NEW ZEALAND.

AUCKLAND FOREST CONSERVATION REGION.

Plantations and Nurseries.

Riverhead.—During the year the formation of an extensive plantation was commenced at Riverhead, at the head of Auckland Harbour. An area of 8,765 acres of Crown land was gazetted State forest, and steps are being taken to increase this area to 12,450 acres by the inclusion of other available lands adjoining. The accessibility of this area to Auckland by water, by rail, and by main highway, and its suitability for plantation purposes, makes it an ideal forestation project. The initial planting consisted of 42,500 trees on 53 acres, though, in addition, 32 lb. of seed were spot-sown on 29 acres. The trees made a good strike, but as yet only 33 per cent. of the sown spots carry seedlings. Further experiments with spot-sowing will be carried out, the seed being sown in May and June, instead of in October, and more attention paid to the covering of the seed.

An area of 40 acres near the Riverhead township and wharf was acquired for a nursery-site in connection with the plantation, and the nursery, with the necessary buildings and equipment, is now well established. The estimated tree-stock at the end of the year was 1,892,000 seedlings.

Pukipuhi.—The restocking of the partially unsuccessful eucalypt plantation established in 1904 was continued, and 39,250 trees of insignis pine were planted. It is proposed to plant up most of the remaining area with pondosa pine. The small plantation nursery carries a stock of 70,000 seedlings.

Waipoua.—The experimental planting commenced in 1924 on the open land on the edges of the Waipoua Kauri Forest is showing such promise that the vacant land between the experimental plots is being planted up to consolidate the plantation. During the year 77 acres were planted with 53,030 trees. The small nursery at the Ranger station carries a stock of 37,000 seedlings.

Buildings.

A cottage was built at Riverhead Nursery to accommodate trainees and workmen; also a large shed to serve as stable, workshop, and implement-shed.

Proposals for 1927-28.

1. Establishment of 3,500 acres of plantation.
2. Raising of 3,090,000 trees.
3. Topographic survey and layout of 3,000 acres at Riverhead, and 2,800 acres at the proposed new planting project at Maramarua.

ROTORUA FOREST CONSERVATION REGION.

Planting and Direct Seeding.

This region is still the main centre of the State's nursery and plantation operations. During the year 7,649,050 trees were planted on 12,729 acres at Kaingaroa. Planting operations commenced in April and were completed in November, and, as the season was favourable, a good strike was obtained, approximately 85 per cent. over all species surviving.

Experimental direct sowing was carried out on 2,408 acres, and it was noticed that the best results were obtained in land where there was a fair amount of low vegetation. Where the ground was too bare, damping-off occurred. The sowing was done with a Duncan seed-drill drawn by a tractor, the disk feed being adjusted to sow in spots at approximately 8 ft. spacing. The results to date disclose that too sparse a sowing was made; therefore the amount of seed will be increased in future to about 1 lb. of seed to 2 acres.

The total cost of tree-planting amounted to £1 2s. 2d. per acre.

Tree-raising.

Tree-raising operations at Rotorua Nursery and at the branch nursery at Kaingaroa gave excellent results. The total amount of seed sown was 3,005 lb., and the resulting crop is estimated at 22,500,000 seedlings. Of the stated amount of seed, 1,557 lb. was sown in open drills and 1,448 lb. in protected seed-beds. With insignis pine the average germination for line sowing was 8,740 per pound, and for protected seed-beds 8,540 per pound. The traying of eucalypts and *Cupressus macrocarpa* has given excellent results: 825,000 sturdy plants of the former and 112,000 of the latter will be available for disposal.

Thinning.

The total area thinned to date amounts to 979 acres comprised as follows: Waiotapu Plantation—Larch, 448 acres; pines, 223 acres. Whakarewarewa Plantation—Larch, 216 acres; pines, 18 acres; eucalypts, 74 acres. Total, 979 acres.

During the year 90 acres of Corsican pine, insignis pine, and larch were thinned at Waiotapu Plantation, and a further 94 acres was underscrubbed. The labour cost for underscrubbing Austrian pine was £1 6s. per acre, and for mixed Austrian pine and *Pinus strobus* £2 per acre. For thinning the labour cost was £2 13s. per acre.

Fire Protection and Maintenance.

The well-distributed rainfall during the summer months reduced the fire hazard to a minimum. The maintenance and establishment of fire-breaks was attended to, and patrol men and lookout men engaged. General maintenance of plantations and repairs to fences and buildings were carried out. The cost per acre for these operations is shown in the following table:—

Plantation.	Area.	Fire Protection.	Maintenance.	Total.
	Acres.	s. d.	s. d.	s. d.
Whakarewarewa	8,037	7 7	2 6	10 1
Waiotapu	7,010	4 8	4 11	9 7
Kaingaroa	55,143	0 11	1 10	2 9

Equipment.

Two Fordson tractors were added to the equipment at Kaingaroa, and a small Beeman tractor at Rotorua Nursery. The latter so far has not proved a success, owing mainly to difficulty in control.

Aboretum.

The aboretum area was ploughed, and a portion fenced in, cultivated, levelled, and used for line-sown nursery stock.

Proposals for 1927-28.

1. Establishment of 15,000 acres of new plantations at Kaingaroa.
2. Direct formation of 3,600 acres by power drilling and spot-sowing.
3. Topographic survey and layout of planting areas for 1928.
4. Raising of 20,000,000 trees.
5. Development of improved methods in nursery and plantation practice, and fire protection measures.
6. Experimental planting—(a) with mixtures of conifers and broad-leaved species; (b) at various spacings.
7. Installation of small steam sterilizing plant at Rotorua Nursery to control damping-off and other diseases in trayed trees.
8. Removal of central camp at Kaingaroa to Wairapakau; establishment of new plantation nursery there to provide planting stock for Run 58.

WELLINGTON FOREST CONSERVATION REGION.

Karioi Plantation.

The acquisition of 33,000 acres of poor tussock-covered country at Karioi inaugurated the first State forestation project, other than experimental plantings, in this region. The favourable soil and climatic conditions, the easy nature of the country, and the accessibility of all portions to the Main Trunk Railway, which traverses the western corner, make the area well suited for a large scale commercial plantation. The topographic survey, preliminary to the layout of planting-blocks, compartments, fire-breaks, and roads was completed during the year.

Sand-dune Reclamation.

The experimental work in connection with the reclamation of the sand-dunes at the mouth of the Rangitikei River was continued. A total length of 117 chains of sand-arresting fences, constructed of manuka, was erected in wind-channels at an average cost of 18s. 6½d. per chain. The upright, non-recoverable manuka-scrub fence has proved to be the most suitable for this work, as it is cheap and easy to construct, is flexible, and becomes crowned quickly. Marram was planted on 372 acres, trees on 130 acres of fixed dunes, and flax and toetoe on 9 acres. The cost of the marram-planting, including cutting, carting, and planting, was £2 9s. 6d. per acre. The further draining of parts of the area necessitated the construction of 230 chains of new drains and the clearing of 135 chains of the main Puki drain.

The small nursery at Tangimoana supplied 91,300 transplants for the planting operations. Seedlings to the number of 140,000 were lined out for the 1927 planting, and 20 lb. of insignis pine and 151 lb. of *P. muricata* were sown to supply stock for 1928.

Proposals for 1927-28.

1. Establishment of 1,300 acres of plantation at Karioi.
2. Establishment of a plantation nursery at Karioi, and sowing of 320 lb. of seed.
3. Continuation of sand-dune reclamation work, including the planting of 400 acres of marram, 220 acres of trees, and 100 acres of flax (phormium).

NELSON-MARLBOROUGH FOREST CONSERVATION REGION.

Golden Downs Plantation.

The acquisition of 8,500 acres in the upper Motueka district inaugurated the first State forestation project in the Nelson Province. The land acquired has proved of little value for agricultural purposes, being "deteriorated land" from a settlement point of view, so the commencement of forestation on this area is a step towards the solution of an urgent national problem. The area is handy of access to the Nelson-Buller railway. The climatic and soil conditions and the nature of the country make it well suited for the growing of selected timber-trees. During the year a topographic survey was made of 1,000 acres, and the formation of a local nursery was commenced.

Dungree Plantation.

This plantation was established on the banks of the Awatere River, Marlborough, in 1903, for experimental purposes, but operations were discontinued in 1908. An endeavour is being made to fill up blanks and consolidate the plantation. During the year 40,525 trees were planted to replace failures on 59 acres previously planted. Half a million seedlings were raised in the plantation nursery.

Tasman West Plantation.

The experimental plantation which was established in 1925 on the Moutere Hills on 5 acres donated by Mr. A. McKee was demarcated during the year and transferred to the Service.

Proposals for 1927-28.

1. Establishment of 280 acres of plantation at Golden Downs.
2. Topographic survey of 10,000 acres.
3. Erection of necessary buildings and fences, and provision of implements for the above plantation.
4. Raising of 1,500,000 trees.
5. Thinning of 30 acres at Dungree Plantation, and filling in of blanks.

CANTERBURY-OTAGO FOREST CONSERVATION REGION.

Nurseries.

Tree stocks at the four nurseries in this region number 18,824,170 trees. The amount of seed sown was 3,156 lb., an increase of 1,659 lb. on the previous year. The bulk of the seed was sown in open lines and germinated well. A total of 831,050 trees were lined out, with very satisfactory results. Trees sent out from various nurseries numbered 5,088,631, an increase of 687,033 on the previous year. The increased output went to the plantations; sales to farmers, local bodies and companies showed a slight decrease for the year.

A nursery in connection with the Balmoral Plantation was established during the year.

Plantations.

An area of 6,529 acres was planted during the past season, an increase of 1,668 acres on the previous year's operations for the region. A comparison of establishment costs shows a considerable variation between the different stations, and is of interest in comparing conditions of soil, &c., and the method used.

Plantation.	Area in Acres.	Cost per Acre. £ s. d.
Hanmer	1,530	2 17 7
Balmoral	2,991	1 16 10
Greenvale	720	3 7 6
Blue Mountains	1,288	3 14 9

The results of the year's planting were good at Hanmer, Blue Mountains, and Greenvale; but at Balmoral the losses were in some cases severe, owing to a long spell of dry weather. The greater portions of the plantings at the Blue Mountains and Greenvale showed 91 per cent. survival. The country planted up at Hanmer was very rough, steep, and broken, which made planting rather a slow process. The use of the carpenter's adze in place of the iron spear was a great improvement in this class of country. Established plantations are growing steadily, though the thinning of the older plantations is very necessary.

Proposals for 1927-28.

1. Establishment of 7,000 acres of new plantation.
2. Direct sowing of 100 acres.
3. Development of improved methods in nursery and plantation practice.
4. Topographic survey and layout of 8,000 acres for year 1928 operations.

WESTLAND FOREST CONSERVATION REGION.

Experimental Station.

The State-forestation activities in this region are at present confined to experimental plantings of various exotic species on the cut-over forest lands near Hokitika and on the tailing-heaps at Rimu. During the year 368 acres were planted at the experiment station and 38 acres on the dredge tailings, giving a total of 406 acres for the region. The trees in the plantation made much better growth than during the previous year, due to brighter and drier weather during the summer months.

The species planted at the Experimental Station were as follows:—

Species.	Area. Acres.	Percentage Survival. Per Cent.
Pinus radiata	250	87
Pinus muricata	19.5	75
Eucalypts	45	29
Cupressus macrocarpa	25	26
Pinus canariensis	2	69
Cupressus Lawsoniana	15	87
Thuya plicata	10	91
Cryptomeria japonica	2	99
Sequoia sempervirens	1.5	98
Pinus caribaea	0.2	..
Alnus glutinosa		
Acacia decurrens		

Excellent results, as shown by the above percentages, were at first obtained, with the exception of *C. macrocarpa* and eucalypts; but later many trees died off through an attack of black-rot, probably due to excessive dampness of the soil. The cost of planting averages £2 9s. per thousand for all species.

Nursery.

The year, on the whole, was a good one for the nursery, being much drier than the previous one. Heavy rains just after seed-growing washed much of the seed out of the ground and caused some to rot in the ground. From 298 lb. of seed sown 605,460 seedlings were obtained. All trees in the nursery have made excellent growth during the year, but the cost of production is still high, due mainly to the weeding-costs. The tree stock amounts to 1,250,000 trees. Of these 645,000 are two- to three-year-old trees, most of which will be fit to transfer to the plantation during the 1927 planting season.

Buildings.

A three-roomed cottage, an implement-shed with office and storeroom attached, and a stable were erected during the year. A substantial bridge was also erected to give access to the nursery, and the formation of a good gravel road overcomes the previous difficulty of transport.

Proposals for 1927-28.

- 1. Planting of 400 acres of new plantation and filling up the blanks on 200 acres.
- 2. Improving the drainage of the area by cleaning out the creeks filled with rubbish during previous sawmilling operations.
- 3. Continuing experimental work in the nursery and plantations, and developing improved methods.

SOUTHLAND FOREST CONSERVATION REGION.

As yet no State forestation project has been established in this region, owing to the difficulty of securing suitable land at a reasonable price. Seed has been collected locally to enable experimental spot-sowing in cut-over and burnt State-forest areas during 1927.

Ranger Nurseries.

In order to provide small supplies of trees for planting in indigenous forests, a small nursery was established at the Tahakopa Ranger Station. The initial sowing gave satisfactory results. The nursery-work was carried out by the ranger in conjunction with the other work in this district.

Proposals for 1927-28.

- 1. Planting of 100 acres of open land in the Longwood State Forest.
- 2. Experimental spot-sowing of exotic-tree seeds in cut-over indigenous forests.
- 3. Planting on State-forest areas of trees raised in Ranger nursery.

APPENDIX III.
SUMMARY OF OPERATIONS IN NURSERIES.

Name of Nursery.	Type of Nursery.	Year of Establishment.	During Year ended 31st March, 1927.										From 1896 to 1927.								
			Total Expenditure.					Trees in Nurseries.					Trees in Nurseries.								
			Tree-growing.	Maintenance.	Buildings, &c.	Total.	Estimated number of Trees raised during Year.	Number of Trees sent to Plantation during Year.	Number of Trees sent to Outside Places during Year.	Number of Trees estimated in Nursery at 31st March, 1927.	Estimated Number of Trees raised during Period.	Number to Plantations.	Number to Outside Places.								
			£	s.	d.	£	s.	d.	£	s.	d.										
Rotorua	Distributing	1898	8,890	4	5	2,057	7	11	369	12	11	11,317	5	3	20,869,599	7,918,450	4,258,165	24,165,704	134,898,444	93,060,654	15,848,650
Hamner Springs	"	1902	4,181	13	4	1,696	15	7	247	5	5	6,125	14	4	6,845,900	2,366,050	271,775	11,474,370	32,324,828	18,697,815	2,152,643
Tapanui	"	1897	2,604	7	8	1,752	0	11	932	19	0	5,289	7	7	4,700,300	1,680,950	295,993	5,373,300	29,518,707	21,009,568	3,135,839
Naseby	"	1921	455	14	9	395	5	6	..	..	..	851	0	3	1,365,000	420,275	53,588	1,976,500	3,064,206	884,490	203,216
Riverhead	Forest and Ranger	1926	909	7	8	182	3	6	2,488	2	1	3,579	13	3	1,891,900	..	..	1,891,900	1,891,900	..	..
Tangimoana	"	1921	575	17	8	81	15	3	257	3	0	914	15	11	136,000	100,000	..	276,000	472,765	196,765	..
Westland	"	1922	1,108	16	2	817	7	1	683	0	10	2,609	4	1	605,500	189,670	..	1,251,835	1,541,324	289,489	..
Waipoua	"	1925	Cost of tree raising charged to plantations												37,000	53,030	..	37,000	95,689	58,689	..
Puhipuhi	"	1925	"			"			"			"			50,000	39,250	..	70,000	109,250	39,250	..
Dungree	"	1924	"			"			"			"			500,000	17,200	..	507,500	641,000	110,000	..
Ranfurly	"	1924	"			"			"			"			..	..	..	..	6,975,451	6,465,593	509,858
Starborough	"	1908	"			"			"			"			..	..	..	..	3,059,610	1,965,095	1,094,515
Kurow	"	1906	"			"			"			"			..	..	..	..	172,460	..	172,460
Totals	..	..	18,726	1	8	6,982	15	9	4,978	3	3	30,687	0	8	37,001,199	12,784,875	4,879,521	47,024,109	214,765,634	142,777,408	23,117,131

SUMMARY OF OPERATIONS IN PLANTATIONS.

During the Year ended 31st March, 1927.			From Year of Establishment to 1927.							
Name of Plantation: (a) Under formation, (b) On Maintenance Basis.	Year of Establish- ment.	Number of Trees planted on New Area.	Number of Trees used to replace Losses.	New Areas Planted.	Total Expenditure for the Year, in- cluding Cost of Trees from Nurseries.	Number of Trees raised from Seed <i>sown in situ</i> .	Number of Trees received from Nursery.	Number of Trees used to replace Losses.	Total Area Planted.	Total Establishment Cost to date, in- cluding Cost of Trees from Nursery, but not Cost of Land.
				Acres.	£ s. d.				Acres.	£ s. d.
(a) Riverhead ..	1926 ..	42,500	..	53	1,275 17 3	..	47,282,815	3,245,785	53	1,275 17 3
(a) Kaingaroa ..	1913 ..	7,645,150	1,950	12,729	26,389 19 9	124,600	12,354,553	1,920,699	52,735	195,203 2 9
(a) Hanmer Springs ..	1901 ..	921,150	..	1,630	11,255 6 10	..	6,934,262	782,560	7,121	78,399 8 1
(a) Balmoral ..	1916 ..	1,938,050	18,000	2,991	11,899 17 3	..	1,748,400	131,500	7,658	62,661 7 5
(a) Blue Mountains ..	1925 ..	925,575	131,500	1,288	8,600 16 1	..	4,500,570	488,680	2,268	14,093 17 7
(a) Greenvale ..	1917 ..	497,000	23,325	720	4,505 2 0	..	1,501,700	501,700	3,646	54,945 0 11
(b) Puhipuhi ..	1904 ..	..	39,250	..	574 15 5	..	20,626,050	3,999,464	1,200	13,948 5 5
(b) Whakarewarewa ..	1898 ..	..	..	..	4,103 2 0	109,725	23,629,152	4,883,134	8,037	130,313 0 2
(b) Waioapu ..	1901 ..	..	..	..	3,468 3 0	83,121	6,036,048	1,037,030	7,010	107,642 15 8
(b) Naseby ..	1900 ..	..	109,450	..	1,730 9 11	..	10,762,701	1,476,405	2,366	50,514 16 3
(b) Conical Hills ..	1903 ..	..	1,750	..	1,233 2 6	..	906,685	86,688	3,533	66,683 3 9
(b) Pukerua ..	1915 ..	..	1,600	..	401 19 6	..	3,061,997	881,160	573	10,832 19 11
(b) Dusky Hill ..	1898 ..	..	..	..	345 5 8	..	..	..	746	25,270 1 6
(b) Ranchiff ..	1889* ..	..	..	..	65 3 5	..	..	..	206	469 0 7
<i>Experimental Group.</i>										
(a) Waipoua ..	1924 ..	53,030	..	77	165 3 10	..	58,689	..	86	165 3 10
(a) Tangimoana ..	1921 ..	88,500	11,500	130	1,188 3 10	..	196,765	11,500	315	1,772 9 3
(a) Dumfries ..	1903 ..	..	40,525	..	555 2 10	..	1,787,465	1,150,650	342	14,979 5 2
(a) Westland ..	1922 ..	239,667	5,000	406	3,044 10 10	..	576,917	5,000	888	10,927 8 6
(b) Tasman West ..	1925 ..	..	127	..	7 12 6	..	1,750	127	5	17 0 0
(b) Gimberburn ..	1903 ..	..	..	..	..	..	936,235	783,339	88	6,907 0 1
(b) Waitahuna ..	1906 ..	..	..	..	..	..	42,025	11,500	11	330 7 9
(b) Galloway ..	1915 ..	..	..	..	..	..	6,930	3,050	2	84 19 10
(b) Omarama ..	1915 ..	..	..	..	..	..	4,390	..	2	80 12 9
Totals ..	..	12,350,622	383,977	19,924	80,800 14 5	317,446	142,856,099	21,399,971	98,891	847,517 5 2

* Established privately and purchased in 1901.

APPENDIX IV.

EXPORTS AND IMPORTS OF SAWN TIMBER AND OTHER FOREST PRODUCTS.

Exports.

(From information supplied by the Comptroller of Customs. All figures refer to the years ended 31st December, 1924-26.)

Item	1924.		1925.		1926.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
	Ft. b.m.	£	Ft. b.m.	£	Ft. b.m.	£
Totals	43,323,049	477,944	51,549,439	605,187	41,953,879	490,247
Kauri	1,946,489	38,620	3,238,693	63,624	1,987,046	46,320
Rimu	5,451,106	45,953	3,709,934	32,757	4,008,370	35,839
White-pine	33,375,876	360,196	39,748,206	446,298	31,767,504	356,856
Beech	1,328,683	17,522	2,221,293	28,474	2,392,734	33,098
Others (New Zealand)	826,572	9,822	1,318,060	16,698	309,557	3,514
Others (foreign)	394,323	5,831	1,313,253	17,336	1,488,668	14,620
	Tons.	£	Tons.	£	Tons.	£
Tanning-bark	25	250	59	978	99	1,129
Kauri-gum	5,261	443,576	5,370	414,901	4,877	332,765
Fungus	85	9,165	93	10,547	87	11,246

Imports.

(From information supplied by the Comptroller of Customs. All figures refer to the years ended 31st December, 1924-26.)

Item.	1924.		1925.		1926.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
	Ft. b.m.	£	Ft. b.m.	£	Ft. b.m.	£
Ironbark, &c.	24,416,247	397,900	16,207,338	278,897	22,139,979	349,008
Jarrab, &c.	11,081,776	170,176	17,757,960	282,101		
Douglas fir	13,835,742	122,332	17,115,606	125,710		
Cedar	{ 1,300,000 15,951,286 }	328,880	{ 6,525,681 24,317,199 }	81,476 410,788	16,821,122	119,717
					9,021,300	107,222
					18,521,471	250,475
Totals	66,585,051	1,019,288	81,923,784	1,178,982	66,503,872	826,422
	Number.		Number.		Number.	
Laths, rails, palings, &c. ..	10,573,693	24,967	9,937,671	15,962	14,279,895	26,689
	Tons.		Tons.		Tons.	
Tanning-bark	2,469	29,347	2,310	28,229	2,250	23,240
Wood-pulp	2,700	36,393	2,035	27,754	2,710	35,883

Value equals domestic value in country of origin plus 10 per cent.

APPENDIX V.

STATE FORESTS ACCOUNT.

COMPARATIVE ANALYSIS OF RECEIPTS AND PAYMENTS FROM 1ST APRIL, 1919, TO 31ST MARCH, 1927.

	1919-20.		1920-21.		1921-22.		1922-23.		1923-24.		1924-25.		1925-26.		1926-27.		Total.	Grand Total.
	Capital.	Operation.	Capital.	Operation.	Capital.	Operation.	Capital.	Operation.	Capital.	Operation.	Capital.	Operation.	Capital.	Operation.	Capital.	Operation.		
<i>Receipts—</i>																		
Forest income ..	£ 8,514	£ 19,518	£ 30,784	£ 63,372	£ 93,480	£ 161,469	£ 152,550	£ 128,566	£ 658,253	£ ..	£ 128,566	£ ..	£ 536,210	£ ..	£ ..	£ ..	£ ..	£ ..
Loans raised ..	65,000	70,000	86,780	214,221	209	100,000	..	..	536,210	..	..	..	..	..	..	..	..	..
Total receipts ..	73,514	89,518	117,564	277,593	93,689	261,469	152,550	128,566	1,194,463	..	128,566	..	1,194,463	..	..	..	..	..
<i>Payments—</i>																		
Salaries ..	£ 7,111	£ 10,823	£ 20,794	£ 8,626	£ 21,414	£ 9,035	£ 11,103	£ 17,075	£ 83,445	£ 226,926	£ 17,075	£ 22,783	£ 83,445	£ 143,481	£ 226,926	£ 121,410	£ ..	£ ..
Development and management of indigenous State forests ..	222	4,191	12,301	1,563	14,094	2,792	3,082	4,204	23,482	97,928	4,204	17,839	23,482	97,928	121,410	121,410	..	..
Forest-fire protection ..	..	..	72	95	81	125	38	73	510	9,563	1,405	1,553	510	9,563	9,563	9,563	..	..
Educational ..	..	..	369	191	119	100	213	107	1,073	4,590	819	1,164	1,073	4,590	5,963	5,963	..	..
Forest research ..	..	..	..	..	2,142	1,750	3,615	2,402	11,044	11,284	2,847	2,158	11,044	11,284	22,328	22,328	..	..
Afforestation and forest-extension ..	46,072	49,631	43,792	30,814	37,320	50,182	63,910	80,730	402,451	402,451	..	..	402,451	..	402,451	402,451	..	..
Lands purchased for afforestation ..	145	157	2,128	3,585	..	476	17,764	..	35,436	..	..	..	35,436	..	35,436	35,436	..	..
Forested lands purchased ..	7,294	..	7,173	1,064	4,474	105,993	16,161	18,639	160,798	160,798	..	..	160,798	..	160,798	160,798	..	..
Local-body allocations and grants, &c. ..	..	..	258	..	..	..	..	790	..	..	..	6,215	..	258	21,561	21,561	..	..
Advice, assistance, and preparation of planting-plans for local bodies and settlers ..	..	..	..	..	..	..	..	686	..	..	1,196	1,358	..	..	7,035	7,035	..	..
Net interest and loan charges ..	..	..	397	4,818	913	893	..	17,337	..	..	16,516	20,954	..	7,021	115,988	123,009	..	..
National Endowment Account, transfers to ..	..	..	..	..	..	..	..	..	..	..	12,612	9,741	..	..	38,012	38,012	..	..
Total payments ..	60,844	64,802	69,840	51,891	56,498	171,346	115,886	134,411	725,518	448,932	134,411	97,312	725,518	448,932	1,174,450	1,174,450	..	..
Grand total payments ..	70,396	85,499	117,724	107,618	116,454	244,595	200,441	231,723	1,174,450	..	244,595	231,723	1,174,450	..	1,174,450	1,174,450	..	..

APPENDIX VI.

STATE FORESTS ACCOUNT.

Receipts and Payments Account for the Year ended 31st March, 1927.

[illegible]

STATE FORESTS ACCOUNT—continued.

Receipts and Payments Account for the Year ended 31st March, 1927—continued.

[illegible]

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, 1927.

L. MACINTOSH ELLIS, Director of Forestry.
W. TAYLOR, 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 VII.

LOAN ACCOUNT AS AT 31st MARCH, 1927.

To Loan authority—	£	s.	d.	By Debentures issued—	£	s.	d.
Section 40, Forests Act, 1921–22*	500,000	0	0	Finance Act, 1916 (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 5 per cent.	10,000	0	0
				Forests Act, 1921–22, and Finance Act, 1924, at 5 per cent.	100,000	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
				Balance of authority	503,225	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.

APPENDIX VIII.

STATE FORESTS ACCOUNT, 1917–27.

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
					Balance, 31st March, 1927 ..			24,744
				1,310,226				1,310,226

* Includes £10,000 from Consolidated Fund. † Includes £100,000 purchase of Selwyn Settlement forest.

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

Approximate Cost of Paper.—Preparation, not given; printing (2,550 copies, including graphs and illustrations), £102 10s.

By Authority: W. A. G. SKINNER, Government Printer, Wellington.—1927.

Price 1s. 3d.]