1922.

NEW ZEALAND.

STATE FOREST SERVICE.

REPORT FOR THE YEAR ENDED 31ST MARCH, 1922.

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

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

SIR,— Wellington, 1st August, 1922.

I have the honour to submit herewith a report on the work of the State Forest Service for the year ended 31st March, 1922, and certain recommendations bearing on the progress of forestry in New Zealand.

1. *National Forest Lands suitable for Dedication to Forestry.*—You are advised, sir, that the Forest Service has defined 2,600,000 acres of forested Crown lands which have not been as yet dedicated as provisional State forests. These areas are highly desirable for proclamation and administration by your Service.

2. *Technical Training.*—Serious delay in the practical fulfilment of your forest policy and in the building of the State forests as permanent wood-producing properties is being caused by the lack of trained forest technicians and other properly instructed forest officers. It is to be sincerely hoped, sir, that financial conditions will permit of the creation of technical educational facilities within the next year.

3. *Organization.*—Two of the most important forest-conservation regions—namely, the Wellington Region, which embraces Hawke's Bay, Wellington, and Taranaki Provinces: and the Nelson-Marlborough Region, which includes these two provinces—are still without Conservators of Forests. The forest research and experimental programme is being sadly hampered through the lack of a trained forest investigator. The Conservators' offices at Auckland, Nelson, Hokitika, and Invercargill are without a single shorthand-typist, and yet the business of each office is running into five figures. You are advised, sir, to allow for the filling of these vacancies and posts at the earliest opportunity.

4. *Forest Experiment Station.*—In order that there may be evolved an adequate silvicultural policy and a workable system of natural and artificial regrowth in our forest-producing properties a long, careful, and comprehensive series of studies, tests, and investigations must be carried out in our indigenous and man-made forests. These important and vital works may only be executed in conjunction with a properly equipped forest experiment station. You are therefore earnestly advised, sir, to provide for the establishment of a forest experiment station in Westland (in the heart of the greatest New Zealand forest region).

5. *Forest Taxation.*—A most serious bar to the planting and operation of private forestry and tree farms is the incidence of taxation on forest lands and plantations. A scientific method of taxation whereby the major burden comes at the culmination of the crop will stimulate to fuller participation by the public in this profitable business of growing trees for profit, shelter, and domestic use. You are advised, sir, to authorize a thorough investigation of the matter with the presentation of a plan of equitable forest taxation.

I have, &c.,

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

The Hon. Sir R. Heaton Rhodes, K.B.E.

CONTENTS.

CHAPTER I.—PROGRESS OF NEW ZEALAND FORESTRY.

What progress has been made in the successful development of our national forest policy, the assurance of regularly sustained and ample timber-supplies, the efficient management of our forest resources, and the protection of forested areas essential to water-supply, stability of climate, and the public health? Definite progress is herein reported on all counts in this the first full year of the operation of the forest policy and the Forest Service.

The year will be known as the enactment year of a modern Forests Act, whereby the excellent forest policy inaugurated by the late Minister of Forestry was crystallized into law. This Act, known as the 1921–22 Forests Act, "makes provision for the management and protection of forests, and for other purposes in relation thereto"; and expresses the best of modern experience in the administration of national forests. Whilst the forest laws and codes of other British and English-speaking communities have been drawn upon, nevertheless this Act is essentially a forest law designed by New-Zealanders for New Zealand conditions. A clear line of authority and responsibility has been defined from the Legislative head downwards. Power has been taken to appoint a consultative Advisory Board in order that ideals may be allied with practical needs. The machinery of action—a State Forest Service—has been created. Ample power has been given for the dedication of permanent and provisional State forests, the creation of forest plantations, the formation and regulation of forest working-plans, and for the definition of fire districts. A special feature of the Act is the provision for the management of Maori forests by the Forest Service. By the operation of the power contained in this chapter the Native owners may secure a permanent and perpetual periodic revenue from any native bush which may be dedicated as "Maori forest."

The Act, which became law on the 1st April, 1922, assures a unity of control and administration of the national forest estate; it eliminates overlapping of services, ensures continuity of policy and a certain permanency of action which, unfortunately, has not heretofore characterized the national forestry effort.

The year has been noteworthy for the substantial area accession to the provisional State forest roll. During the year 272,351 acres of highly valuable commercial Crown forest have been dedicated as provisional State forest. This contribution stands as an earnest of the sincere spirit of co-operation and of helpfulness of the Department of Lands and Survey in its desire to further the national policy of forestry.

It is gratifying to note the substantial and increasing interest in the establishment and growing of tree plantations, shelter-belts, wood-lots, county and municipal forests, by the farmers, settlers, cities, towns, counties, other local bodies, and by corporations. From the two main sources of supply—*i.e.*, the Forest Service and the Dominion Federated Nurserymen—over four million trees (and more than 400 lb. of tree-seeds from the Forest Service) were disposed of to private planters during the year, as compared with a sale of probably a quarter of that amount for the previous year.

The Service, through its two tree-planting Inspectors, supported by the splendid tree-nursery facilities at Rotorua, Hanmer, and Tapanui, and the expert knowledge of its afforestation staff, was able to take a leading part in the stimulation of private tree-planting. Sixty-one tree-planting demonstration lectures were delivered by the two forest-extension officers to nearly two thousand interested planters, and nearly five thousand memoranda, letters, and reports giving advice and instruction were prepared for private planters. Surely that is a distinct community service! It is pleasant to record the planting by the Service of nearly five million trees in the various plantations: this is equivalent to the stocking on new ground of over 3,400 acres, the largest area ever planted by the State. It constitutes a record within the Empire. By the exercise of economies, by loyal co-operation, and by the use of more direct methods the capital cost of State-plantation establishment was lessened by £10,000. In reviewing the national and private forest-extension activities for the year it may truly be said that a high-water mark in afforestation has been set by the planting during the year in New Zealand of at least ten million trees, or 10,000 acres of new forest. The State plantations, now totalling 42,000 acres, may be conservatively valued at £2,000,000.

The forest revenue for the year was £31,000—the largest amount since the year 1912, and in the face of a steadily shrinking domestic and export timber market. This sale revenue, which is 263 per cent. greater than that of the year 1920, is largely due to the introduction of a progressive timber-sales policy, increased exploitation, supervision, and a closer control over royalties, returns, timber trespasses, and thefts.

In the prevention of forest-fires on and contiguous to the public forests definite results were obtained through the operation of fire patrolmen, educational propaganda, and by the development of settler and farmer co-operation. The forest-fire season—from October to April—was fortunately a wet one, and aided materially in the setting of a record for minimum damage and destruction. Our records show the actual destruction of 5,200 acres of woodland, valued at £4,010. It is hoped that the creation of certain fire districts this year, and the improvement in the technique of detection and suppression of fires, will ensure the continuance of the splendid 1921–22 record.

The forest inventory and stock-taking of the Dominion's forest resources were begun during the year, and 50 per cent. completed. This economic survey embraces an investigation of all commercial and protective forests, their ownership, the quantity and quality of timber, distribution, accessibility, and value. This national inventory will serve as a starting-point from which to build specific working-plans so necessary to the adequate production of perpetual and sustained wood crops. The findings of the inventory make possible a very close prediction as to the life of our virgin supplies, and this data, combined with rate of growth and yield statistics, will determine the effectiveness of the indigenous-forest asset in a scheme of permanent national forestry.

The silvical research programme of our kauri, rimu, totara, and miro forests and trees was continued during the year with satisfactory progress results. Further investigations bearing on forest problems have been undertaken by Canterbury, Victoria, and Auckland Colleges. During the year it was possible, in co-operation with Auckland University College, to begin a technological testing programme of considerable magnitude of all our important indigenous timber-trees. A series

of tests were partially completed for tawa and silver-beech, and will be continued during the current year. This branch of research is a most important one in New Zealand, for the annual timber-wastage bill amounts to 8,000,000 tons. It is obvious that a fuller economic use of our timber resources should prolong our valuable supplies by at least a generation.

An outstanding result of the operation of the Forest Service was the success attained in the reorganization of the system of State timber-sales. All timber is now disposed of openly and competitively. At first deliberate opposition was met with in some quarters, but when it was seen that open public competition was fair to all the method has been generally accepted. A feature has been made of offerings to the small operator, and due regard is now being paid to the economic needs of local sawmill industries in each forested locality. The Service has steadily laboured to bring home to every man, woman, and child in the Dominion a realization and appreciation of forestry and its value.

CHAPTER II.—THE STATE FOREST SERVICE.

The period under review should be considered as the first year of operation of the State Forest Service, for it was only late in March, 1921, that the organization was assembled and assigned to duty. The successful assumption of new responsibilities and forestry duties by the staff has been really remarkable, and the personnel has quickly measured up to the serious obligations involved in timber administration and technical duties.

A barrier to serious advance has been the lack of trained technicians. Every month of delay in the formation of academic forestry instruction, of course, means the loss of years in the preparation of permanent forest plans, and the loss of millions of tons of valuable timber through the inability of the executing personnel to cope with the solution of technical problems. During the year the regional forest clerical staff, who might be termed the Conservators' business assistants, at Auckland, Palmerston North, Nelson, Hokitika, and Invercargill, has carried the entire responsibility for clerical and accounting detail, routine correspondence, forest registers, and typing. Relief from the mechanical detail of typing is now essential in the interest of efficiency.

It is satisfactory to know that most cordial and harmonious co-operative relations are being evidenced in every region between the field staff and the public. This was particularly noticeable during the forest-fire season, at which time public co-operation is essential to effective fire-control. It is the desire of the Service to assiduously cultivate this aspect of mutual respect: every officer of the State Forest Service has by virtue of his respective post a high position of trust and stewardship with regard to the public property under his control. Five withdrawals and resignations were recorded during the year.

FOREST SERVICE ORGANIZATION.—DISTRIBUTION OF TOTAL FORCE, NEW ZEALAND STATE FOREST SERVICE, AT 31ST MARCH, 1922.

Forest-conservation Region.	Director.	Secretary.	Chief Inspector.	Conservators of Forests.	Special Officers.	Forest Assistants.	Surveyors.	Clerical Staff.	Draftsmen.	Senior Forest Rangers.	Forest Rangers.	Forest Guards.	Nurserymen.	Timber-measurers.	Others.	Total Force as at 31st March, 1922.
Auckland	..	..	..	1	..	..	..	1	..	1	3	..	..	1	..	7
Rotorua	..	..	..	1	..	..	1	3	..	1	6	4	3	..	1	20
Wellington	..	..	..	..	..	..	..	1	..	2	3	..	..	..	..	6
Nelson	..	..	..	..	..	..	..	1	..	1	4	..	..	..	..	6
Westland	..	..	..	1	..	..	..	1	..	1	5	..	..	..	..	8
Canterbury-Otago	..	..	..	1	..	..	..	4	..	2	6	5	3	..	..	21*
Southland	..	..	..	1	..	..	..	1	..	1	3	..	..	..	..	6
Central Office	..	1	1	1	..	2	1	1	13	5	..	..	..	..	..	..	25
Totals	..	1	1	1	5	2	1	2	25	5	9	30	9	6	1	1	99

* Three officers under notice of retirement.

CHAPTER III.—THE STATE FORESTS.

1. CONSTITUTION OF STATE FORESTS.

"Forestry aims at continuously productive State-forest lands, and the propagation, growth, and exploitation of the ripe timber crops in perpetuity."

It is only by the application of silviculture to the national forest lands that the ever-increasing needs of the country may be met. The public safety demands the extension of forest-management to all the Crown woodlands, and the control by one authority of these properties and all other public lands chiefly valuable for forestry.

State Forest Areas.

The grand total area of Crown forests provisionally and permanently gazetted as State forests and other forest lands administered by the Forest Service as at the 31st March, 1922, was 7,181,975 acres (1,689,511 acres permanent State forests, 5,404,806 acres provisional State forests, and 87,658 acres forest reserves and miscellaneous).

During the year 379,023 acres of forest lands were placed under the jurisdiction of the forest authority. As a result of certain forest exploratory reconnaissances made during the year an area of Crown forests (classified as commercial and protection) amounting to 2,614,000 acres has been located which is suitable for forestry management. These areas are situated in the Rotorua region, Urewera district, throughout the central Wellington massif, in the Nelson Province, the Waiau-Canterbury drainage territory, and throughout mountainous Southland. Proposals regarding their dedication as State forests in certain cases are under consideration by the present administering agency, the Lands and Survey Department.

The National Inventory of Timber Resources.

Facts, not opinions, regarding the extent, area, and distribution of the Dominion's timber and wood resources are necessary upon which to base a permanent programme of timber supply and conservation. Recognizing the need of an authentic inventory or stock-survey of the available supply of timber, the Service, through its forest-rangers staff, began simultaneously last year in all forest regions the systematic record of all standing timber, bushes, plantation forests, and plantations, whether owned by the State, Natives, or private individuals. This most important project has already revealed the existence of large masses of merchantable timber bodies in out-of-the-way corners. One definite forecast already clearly indicated is the widespread distribution and exceptional yield of the beech group. The forest-inventory work is bringing clearly to light the intimate relation between agricultural settlement, water-conservation, and stream-flow. In the Rotorua region, for example, it has been found that 95 per cent. of the forest-bearing land is unfitted for settlement, and a very large proportion of these forest lands may be regarded as absolutely necessary for soil-protective purposes. Successful settlement on the Mamaku plateau and in the Waioeka watershed has been found impossible, and many deserted and abandoned homesteads stand to-day as mute evidence. The Urewera region, belonging as it does to the mother backbone of the North Island, stands as guard and protector over the fertility of the rich, black Rangitaiki lands. The Urewera country is the last stronghold—the source of life and the heart of our North Island forests. It should be conserved and managed in perpetuity as a great timber-producing centre.

Forest Demarcation, Boundary Surveys, &c.

The pressure of more urgent technical work, such as forest reconnaissance, forest surveys, cruises, and protection, has not permitted of the attention to permanent forest-boundary demarcation that this work deserves. During the year forty-four miles of permanent forest boundaries were surveyed, redefined, and marked; sixteen miles of surveyed base-lines were established; forty miles of track were constructed; and several miles of fire-break were cleared in the kauri forest and plantations. A total of over two hundred surveys, land examinations, and reconnaissances was performed during the year.

Trounson Kauri Park.

The ceremony of title-transfer from Mr. Trounson to the Crown, as represented by His Excellency the Governor-General, Lord Jellicoe, was fulfilled during the year. A programme of park-improvement, efficient forest-fire prevention, and administration was formulated and put into operation by the managing authority. Improved forest sanitary conditions are being effected by the removal of menacing dead tree-stubs, the clearing of a considerable zoneage of fire-belt, &c. A resident forest guard has been appointed to police and patrol the area. The permanent improvements, such as ranger stations, telephone-line, protective tree-belt, &c., now under way will in a few years make this wonderful monument one of the most interesting of the natural scenic beauties of New Zealand.

2. FINANCE.

From all sources of revenue the receipt of moneys paid into the State Forests Account during the year amounted to £30,836 7s. 5d., of which amount the nurseries and plantations contributed £4,073 13s. 9d. The total receipts show a very satisfactory increase over the previous year of £11,139 2s. 5d., or 56·5 per cent., and this in spite of the timber-market collapse both in New Zealand and in Australia.

State Forest Service expenditure for the fiscal year ended 31st March, 1922, was as follows:—

Annual State Forest Service Expenditures.

(See Annexure for details.)

Item.	Fiscal Year ended 31st March, 1922.	Fiscal Year ended 31st March, 1921.
	£	£
A. Salaries	31,194	17,286
B. Management and development of the 7,181,000 acres of State forests ..	17,552	11,104
C. Forest-fire prevention and patrol (indigenous)	1,035	..
D. Education: Reference library, publications, &c.	848	853
E. Forest research	999	323
F. Afforestation, plantations, nurseries, and general	47,371	49,903
G. Acquisition of indigenous forests	7,173	82
H. Grants and miscellaneous	1,410	..
Totals	107,582	79,551

Explanatory Notes on Expenditure for Fiscal Year ended 31st March, 1922.

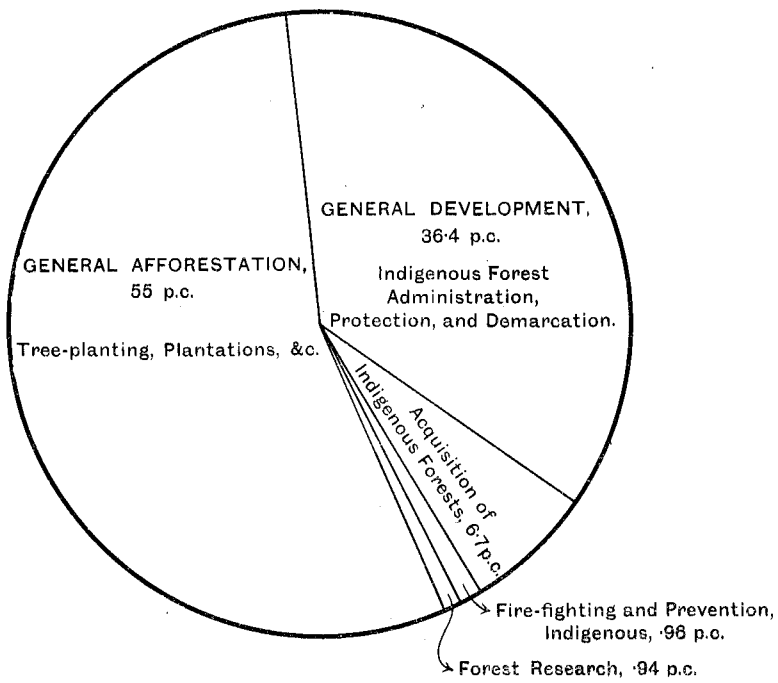
Item of Salaries.—The increase over the previous year is due to the creation of the Forest Service organization, and the engagement of a staff to administer, protect, and manage the 7,200,000 acres of national forest estate.

Items B, C, D, E.—These items truly represent the expenditures in the development of the Dominion's forest policy and the building-up of the national forestry business. They have paid for the Dominion timber stock-taking, forest-fire protection, forest surveys, demarcation, silvical research, and all the other factors bearing on an adequate system of timber-production. The total distributed managerial charge over the forest estate was 1·2d. per acre—surely not an excessive charge on a State asset valued conservatively at £35,000,000!

Item F.—3,408·5 acres of trees were planted, and 41,868·25 acres of growing forest protected, as against 1,381·5 acres planted and 38,459·75 acres protected during the previous year, at a decreased cost of £2,532.

Item G.—This item represents the purchase of a highly valuable timber tract necessary to the consolidation of State forest interests.

Item H.—This item principally represents unemployed relief grants to certain municipalities for tree-planting purposes.



Graphic Exposé, State Forest Service Expenditure for the Fiscal Year ended 31st March, 1922.

3. MANAGEMENT.

Timber.

The rapid exhaustion of standing-timber resources in certain well-known producing regions is being emphatically brought to the notice of the consuming public by scarcity of supplies and high prices during times of stress, and by floods, erosion, and the extension of barren wastes. Investigations made by this Service during the year indicate that within five years at least thirty sawmills in the King-country will have permanently closed, and that within fifteen years this Main Trunk - Ohakune district will have ceased to provide more than local timber-supplies. The centre of timber-production is moving to Westland, and the closed year is noteworthy for a marked increased potential milling-capacity in that district. It now totals 100,000,000 superficial feet per annum. Westland in conjunction with Southland will shortly be able to provide for the general national needs.

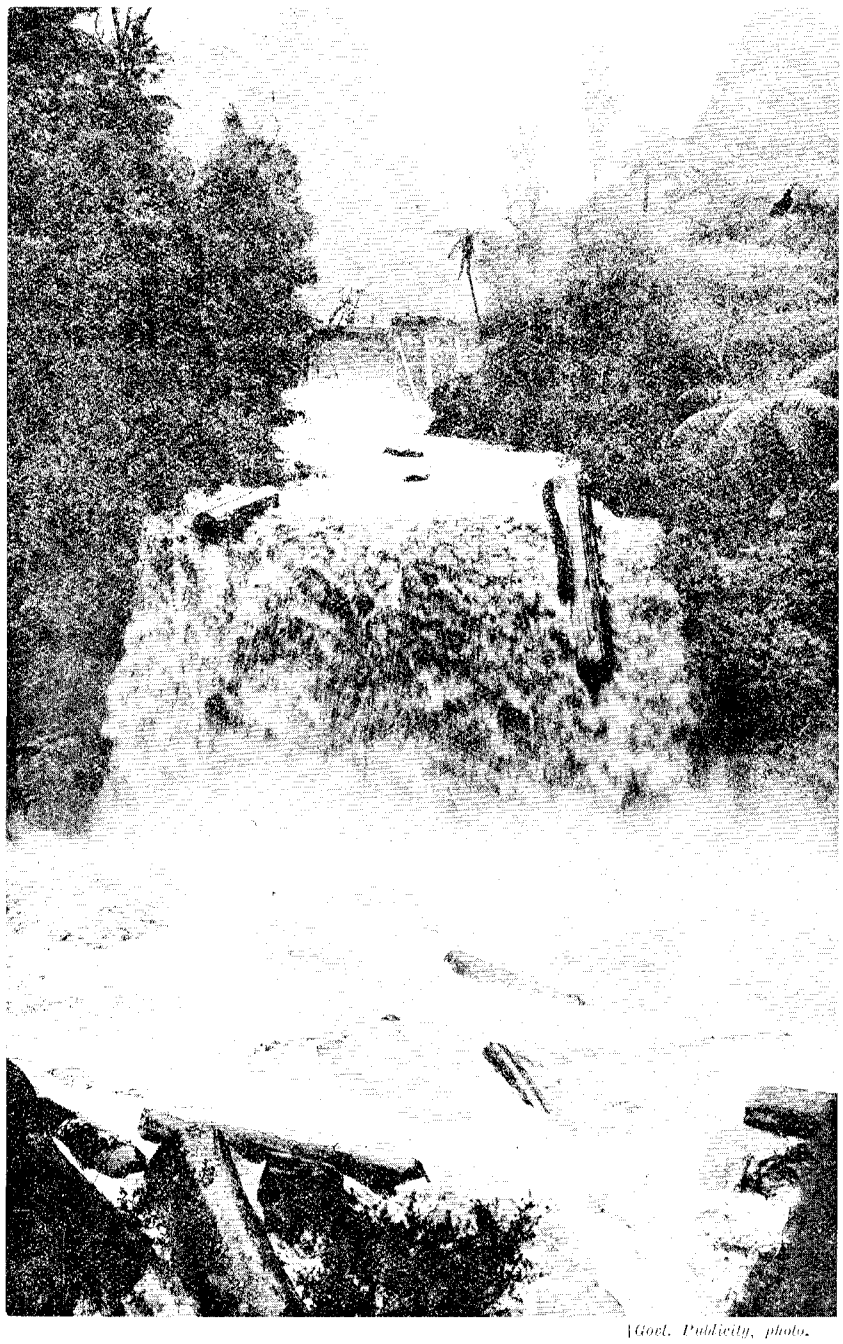
During the year a greatly increased interest has been taken in the Service timber-sales by the sawmillers and manufacturers. It is recognized that the attractive features of permanency, security of tenure and operation, and serial payments offered by the Forest Service timber-sales are substantial inducements to millers seeking continuity of operation and supplies.

The Service timber-sales for the past year totalled 33,000,000 sup. ft. on 2,900 acres, and were sold *en bloc* for £30,694 to *bona fide* sawmillers for exploitation within three to five years. The average sale price per 100 sup. ft. for silver-pine was 4s.; rimu, 1s. 10d.; white-pine, 2s.; totara, 4s.; matai and miro, 3s.; Southland beech, 1s.; miscellaneous species, 1s. These sales were made at satisfactory prices considering the diminishing demand for sawn timber and the reduced production in the sawmills of the Dominion. The areas realized on were timber lands of high agricultural value, and immediately the merchantable forest values have been removed settlement will be possible. The sales policy of the Service in making all sales competitive and on a basis of the total standing timber

in the parcel assures to the State as vendor the full and just competitive market value, and also encourages the purchaser to secure as full a utilization as is economic. An abstract of two typical sales made during the year follows:—

Wellington Region. Section 2a, Raetihi Block: Area, 202 acres.

This timber had been withheld from sale for some years, but, as the land is required for settlement, and several millers in the district had requested that the timber be appraised, the work was put in hand towards the end of last year, and subsequently the block was submitted for public tender.



[*Govt. Publicity, photo.*

WEALTH OF THE FOREST: KAURI LOGS BEING RELEASED BY THE TRIPPING OF A TIMBER DAM IN THE AUCKLAND REGION.

The timber comprises rimu, kahikatea, and matai—the first-mentioned species measuring approximately 4,000,000 ft. This high yield, combined with the fact that it is located within five miles of Ohakune Railway-station, made it of considerable value and interest. After keen competition a tender of £10,597 was accepted. The sale conditions provided for a deposit of 5 per cent. of the amount of the tender and payment of the balance quarterly in twenty equal instalments.

Westland Region. Part Provisional State Forest No. 1616: Area, 178 acres.

The timber on this block was applied for by the operators who held the adjoining bush, but, in accordance with the policy of the Service, it was advertised for sale by public tender in the usual manner. The total quantity of timber was estimated at 1,625,000 ft., the predominating species

being rimu, with a small quantity of totara and miro. The sale conditions stipulated that the timber be milled within three years, and that payment be made as follows: 20 per cent. of the purchase price and the usual license fee and appraisal costs to accompany the tender, the balance to be paid in four equal six-monthly instalments secured by approved promissory notes. In addition the customary ground-rent of 1s. per acre was charged.

Grazing.

A comprehensive investigation and study of the grazing-values of State-forest lands was completed during the year by the soil and grazing specialist of the Service, and as a result of the conclusions arrived at a grazing policy and method of control are now being finalized. While grazing uses of State forests must always be subordinated to the major activity of producing timber crops, nevertheless the proper use of stock in certain State-forest regions is of benefit silviculturally in checking the growth of inflammable undergrowth and in the reduction of the fire hazard. In drawing up grazing regulations care is being exercised to see that all grazing is accounted for, and the number of stock maintained as is commensurate with sound silvicultural practice. The State-forest lands are now undergoing classification for grazing assessment of long- and short-term leases and permits.

Game and Recreation.

The year is notable for the extended use that has been made of the State forests by tourists, trampers, fishermen, and hunters. Particularly in the case of woodlands in the neighbourhood of the larger centres is this interest evidenced. The rapidly increasing popularity of the national forest domain as a people's playground is being encouraged by the Service. During the year a general instructional policy has been prescribed for the guidance of the Service staff with regard to forests and bushes bordering lakes, streams, and public roads, as follows:—

(Circular No. 26.) State Forest Service, 10th November, 1921.

To all Conservators and Field Officers.

Scenery and Timber Sales.

As the national economy of New Zealand develops and her population increases the recreational value of State forests will likewise increase. The time will come when the national forests will be extensively utilized as vacation playgrounds by the people. It is therefore desirable that all officers carefully regard this aspect when defining timber-sale boundaries. Virgin forest growth bordering lakes, travelled highways, camping-places, bits of forest adjacent to summer resorts, &c., should be carefully excluded from the operation of the sale. Trees of outstanding size or magnificence, where easily accessible, might well be reserved, and generally wherever the forest or woods have a potential scenic or amenity value every consideration should be given by the responsible officer in preserving these assets from exploitation or destruction by exploitation.

Every responsible officer is therefore instructed to consider the æsthetic values of any timber-sale offering in defining the boundaries of same.

Director of Forestry.

The interrelation of forests, trees, and native birds as regards their perpetuation and regrowth requires the careful protection from destruction of pigeons, bell-birds, tuis, &c., and it has therefore been necessary in certain cases to refuse access to guns, rifles, and other firearms, and to confine shooting to the camera (Orongorongo, for instance). The introduction of exotic game has more or less upset the natural balance of a widespread area of State forests in New Zealand. Especial reference is made to deer. This animal is rapidly becoming an unmitigated nuisance throughout the Rotorua, Wairarapa, central Wellington, Nelson, Otago, Southland, and Westland regions, and its rapid increase is causing considerable alarm and concern in many parts of the country. As well as causing serious damage to cereal and root crops, very substantial destruction of natural tree regrowth, plantations, and reproduction has already resulted through the districts in question. The annual national loss from this source is estimated at £100,000. In some regions it is now a case of deer or forests. It is satisfactory to note that a conference has been called by certain acclimatization societies to consider this question, and already steps have been taken to keep the herds in check.

The Service has undertaken a comprehensive survey of the animal, its depredations, its possible economic usefulness, and means of control. A full report will be submitted during the current year.

The opossum has become a permanent denizen of our New Zealand forests, and promises to be a very productive source of by-revenue to the State and profit to the community. During the year over sixteen thousand skins, of a value of £5,337, were produced in and exported from New Zealand. Of this number it is estimated that at least ten thousand were trapped in State forests. Through its Ranger staff the Service was active in allocating trapping-grounds, repressing poaching and trespass, and in advising on proposed releases for propagation purposes. It is realized that opossum liberation in new country should be carefully considered and all factors weighed before turning loose so fertile and versatile an animal as the opossum. In this connection the Service has closely co-operated with the Department of Internal Affairs and certain acclimatization societies with a view to safeguarding the community interest.

Honorary Forest Rangers.

Many forest lovers and well-wishers have from time to time intimated a desire to co-operate with the Forest Service in protecting and safeguarding the forest values and native fauna therein. In order, therefore, that a suitable recognition may be publicly given to these estimable gentlemen, the

Hon. Minister of Forestry has appointed by due *Gazette* notice nineteen honorary forest rangers during the year, to act as collaborators with the State Forest Service. Their interest and support have already proven of great value and assistance to the Service and to forestry in New Zealand.

Forest-protection.

Forest-fires.

Analysis of all reported forest-fires on and adjacent to State forests during the year :—

Forest Conservation Region	Forest Fires, Number, Character, and Area.										Money value of forest-wealth destroyed.						Cost of protection, prevention, detection and control of State Forests.							Origin of destructive Forest Fires.										Permanent Forest Fire Prevention Improvements established in year.			
	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 £		Fire Patrol Force No. of Men	Period of Employment	Wages Cost £	Fire Equipment Cost £	Locomotion Cost £	Total Cost £	Saw milling operators		Travellers Trappers Sports		Land clearing operators		Unknown agencies		Fire Lookout Station State Forests	Fire Tool Depot State Forests	Fire breaks constructed State Forests
	S.F.	Priv.	S.F.	Priv.	S.F.	Priv.	S.F.	Priv.	S.F.	Priv.	S.F.	Priv.	S.F.	Priv.	S.F.	Priv.							S.F.	Priv.	S.F.	Priv.	S.F.	Priv.	S.F.	Priv.						
Auckland	4	8	0	0	10	50	30	150	40	200	0	0	100	0	100	0	8	11 mths	559-1-0	120-19-7	69-18-7	749-19-2	2	0	0	0	0	2	2	6	0	5	10
Rotorua	1	0	1½	0	0	0	0	0	1½	0	11	0	0	0	11	0	4	½ hr.	3-6	—	—	3-6	0	0	0	0	1	0	0	0	2	1	0
Wellington	4	23	0	1914	1	0	0	0	1	1914	0	1400	10	0	10	1400	4	100 days	87-0-0	30-0-0	58-0-0	175-0-0	3	0	0	3	1	20	0	0	0	0	0
Nelson & Marlborough	3	2	0	200	0	1500	60	300	60	2000	0	2500	0	0	0	2500	6	3 mths	154-8-8	9-16-8	65-18-11	230-4-3	0	0	0	0	2	2	1	0	0	0	0
Westland	1	0	0	0	1000	0	0	0	1000	0	0	0	0	0	0	0	13	6 hrs.	14-7-3	—	1-10-0	15-17-3	1	0	0	0	0	0	0	0	0	0	0
Canterbury & Otago	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	3 mths (1-6)	12-10-0	5-9-6	15-0-0	32-19-6	0	0	0	0	0	0	0	0	2	0	0
Southland	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3½ mths	57-17-0	—	4-1-3	61-18-3	0	0	0	0	0	0	0	0	0	0	0
Totals	13	33	1½	2114	101	1550	90	450	102½	4114	11	3900	100-10	0	111-10	3900	40	average per man 4·5 mths	885-7-5	166-5-9	214-8-9	1266-1-11	6	0	0	3	4	24	3	6	4	6	10

Forest-fire Statistics in the Dominion for the Fiscal Year ended 31st March, 1922: Lands on and adjacent to State Forests.

The fire season, which extended from October to April, was marked by frequent rains and periods of cold weather, which, combined with the prevention operations of the Forest Service, contributed in no small degree in keeping down controllable losses to a minimum. This is the first year in the history of New Zealand that any conscious and planned effort has been made by the State to deal with the arch enemy of destruction and waste in its forest resources. The most important technical problem that the Service has to deal with is forest-fire prevention, for without assured protection of managed forests against fire no scheme or plan of timber-culture is possible or practicable. The primitive taxad timber-trees of New Zealand are much more susceptible to death and damage by this agency than are modern types of conifers, and for that reason our activities must be much more complete than in countries of the Northern Hemisphere. It is a mistake, however, to say that forest-fire prevention is impossible in this country; for 100 per cent. forest-fire prevention is possible, and will be attained by the Forest Service in a few years. Effective control is not so much a matter of statute or regulation, although adequate fines and penalties are desirable and necessary, as it is a matter of public forest consciousness and appreciation of the forest as a tangible asset. It must not be regarded as something to be destroyed and gotten rid of at the earliest possible moment. It is only by co-operation in the best sense of the word between the forest officers, settlers, travellers, hunters, and loggers that successful fire-control will be attained. This factor is profoundly sensed by the Service, and in its fire patrols every effort has been made to secure an actual and real bond of sympathy between the public and the responsible fire-patrol officers. During the year well-planned patrols were operated in hazardous districts in the Auckland, Wellington, Nelson, and Southland Provinces, and it is satisfactory to note that in the forest regions in question substantial assistance was rendered to the Service fire-fighters in suppressing and eliminating fires. A start has now been made in the development of a safe fire-protective system, and by the creation of fire districts (as by the Forests Act, 1921) it is certain that much better results will be secured during the current year.

Timber Trepassers.

Several serious cases of timber-theft, illegal kauri-gum digging, trepass, and false returns have been satisfactorily dealt with during the year, and several thousand pounds recovered for the State in payment thereof.

Insect Damage.

The Service co-operated during the year with the Department of Agriculture in the preparation of a comprehensive bulletin dealing with forest insects and methods of control. It is understood that this much-needed publication will be issued by the Department of Agriculture during the year. No serious infestations by insects in State forests have been noted during the year, but eternal vigilance must be maintained, particularly with regard to the 42,000 acres of coniferous plantations.

Wild Pigs.

Complaints have been made from the Taranaki District relative to the harbouring of pigs in State forests. Control measures are being installed.

4. AFFORESTATION AND FOREST-EXTENSION.

The Service tree-planting activities for the year are presented in the following table:—

Summary of Operations on State Plantations during the Year ended 31st March, 1922.

Forest Plantation.	Number of Trees planted.	New Area planted.	Total Area planted in Trees, 1896–1922.
		Acres.	Acres.
Whakarewarewa	..	..	7,983·00
Waiotapu	..	..	9,540·00
Kaingaroa West	1,768,900	1,068	1,570·00
Kaingaroa Plains	2,008,000	1,665	8,475·00
Puhipuhi	..	..	1,200·00
Conical Hills	..	..	3,533·50
Pukerau	..	..	565·50
Dusky Hill	8,580	..	745·75
Greenvale	437,225	232	1,403·76
Gimmerburn	..	..	88·00
Naseby	348,125	230	2,138·75
Hanmer Springs	6,500	6	2,912·50
Balmoral	372,500	207	1,253·50
Raincliff	..	..	206·00
Experimental group	..	..	253·00
Totals	4,949,750	3,408	41,868·25

The planting of 3,408 acres during the year was the largest acreage dealt with in any year of State afforestation operations. It will be noted that plantings have been concentrated on those plantations where the best results are attained and, incidentally, where the need is greatest. It is proposed to further restrict plantation formation to those regions where it pays to plant.

Forest-extension.

The Government has been amply repaid for its initiation of a forest-extension scheme in the farming communities of the North and South Islands. The results of the efforts of its two field experts, by lecture, demonstration, and advice, are evident on comparison of the two years' deliveries of trees and seeds from the State nurseries. Nearly twice as many trees (about 900,000) were disposed of during the year to farmers and private tree-planters as in the previous year, and almost twice as many pounds of tree-seed were disposed of in 1921–22 (435 lb.) as in the last year (240 lb.). During the year addresses and lectures were given to Farmers' Union meetings and other public associations from North Auckland to Southland. Practical advice and assistance were rendered to hundreds of interested parties, and in many other ways the Service has rendered profitable assistance to the soldier settlers, the backblocks farmers, and the plains farmer in the successful establishment and growth of shelter-belts, wind-breaks, and farm-plantations. On the request of the Auckland City authorities a tree-planting plan and scheme of operation have been drawn up for its recently established municipal forest at Cornwallis Park. Auckland is to be congratulated on this progressive and forward policy of converting its barren reserves and domains into profitable tree-farms and playground resorts for its citizens. Under the direction of this Service, operations were begun during the year for the planting of the first compartment of 250 acres.

It is satisfactory to record the greatly widened demands that have been made on the Service in the rendering of planting advice and assistance through the mails, these inquiries for information running into thousands. (In this connection the Service extends an invitation to all to avail themselves of the twenty-two years of experience in the growth, propagation, and planting of forest-trees. Hardy, virile tree stock is also available to the public at prices approximating the cost of growing and shipment from its nurseries at Rotorua, Hanmer Springs, and Tapanui.)

In any review of national forest-extension the important activities of the Dominion Nurserymen's Federation must be recorded. This group of private nurserymen has been very active during the year in pushing the sale of trees for the planting of tree plantations and shelter-belts, and the Federation, with a sincere desire to widen planting interest, during the year undertook to supply trees at the same prices as sold by the Forest Service. (This undertaking has been continued for the current calendar year.)

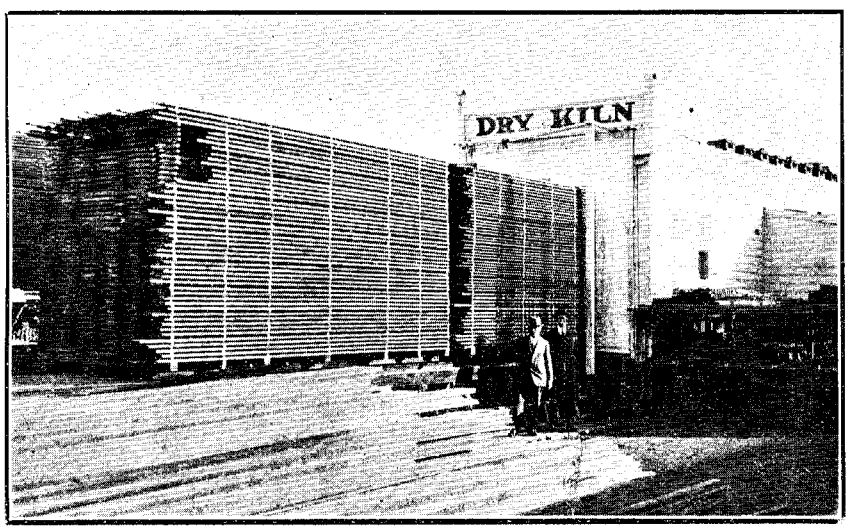
CHAPTER IV.—RESEARCH AND EXPERIMENTS.

Economics.

During the year a thorough investigation was made of the economic position of the timber-manufacturing industry in New Zealand with regard to present and future supplies of raw material, the relation of sources of supply to markets, the incidence of timber royalties and timber-stumpage prices, and the development of a stable industry in certain forest regions where the timber crop is and always will be the best crop. It was found that under present conditions of utilization only

10 per cent. of the exploited forest reaches the consumer in the form of square-edged lumber, with a wastage of eight times as much ligneous material as is utilized. It was noted that certain territories, such as Auckland, Hawke's Bay, Marlborough, and upper Nelson, which a few years ago were exclusively timber-exporting regions, have now become dependent in a large measure for their timber-supplies on other centres. Building-timber cargoes have been imported into Auckland City from Southland and Westland mills; *Pinus insignis* fruit-case timbers were imported into Nelson from Canterbury; and other extraordinary timber movements have been noted during the year. More and more is the community becoming dependent on the forest resources available from State forests in Westland, Southland, and through the central North Island massif. It is only a question of time when the country will face a real and actual timber famine; and it behoves this agency of Government to solve the problem of a balanced Dominion-wide supply and demand by the elimination of waste, more efficient conversion, better conditioning of timber, and the utilization of our substitute timbers, such as the beeches, tawa, kamahi, rata, and others.

Notable advances in manufacturing technique and utilization have been made during the year; and the preliminary steps towards the erection of a paper-pulp mill have been taken by a New Zealand group in Westland. This plant will use as raw material rimu and white-pine slabs and mill-waste. A complete wood speciality factory, turning out handles in all numbers, clothes-pegs, dowels, &c., from Southland beech, has been established in Southland. Several sawmills throughout the Dominion have installed Dutch ovens for the burning of sawdust and the generation of steam, thus freeing valuable mill-refuse for other purposes. The construction of a modern woodworking plant equipped for the manufacture of ready-cut houses was begun during the year by the Railway Department at Frankton. In many other ways a marked improvement in wood-conversion, technique, and economy of manufacture has been evidenced. The Service has contributed in no



[*State Forest Service, photo.*

SEASONING TIMBER BY THE DRY-KILN PROCESS: MR. C. E. OTLEY'S KILN AT CHRISTCHURCH.

small way by assisting in the greater stability and refinement of the timber industry, and it aims to help further by the operation of a wood-waste exchange, by continuity of exploitation through its timber-sale policy, forest-products studies in timber-testing, conditioning research, educational propaganda, and by other means and resources in its power.

FOREST-PRODUCTS INVESTIGATIONS,

The greatest forestry problem in New Zealand is the fuller use of our timber resources—the "cut-hack-burn" day is, or should be, past in the interest of the Dominion. The problem is to turn to more use the weed trees and "garbage of the forest," and by this means bridge over a future possible epoch of want and privation. In recognition of the importance of this work, an engineer in forest-products was appointed early in the year to initiate and carry out the many problems concerning wood and its better utilization in New Zealand.

Substantial progress has been made during the year in their solution. A study was made of markets for timber-products, utilization methods and technique, application of timber in use, and general suitability of various classes, grades, and qualities, and possibility of substitution therefor (a bulletin dealing with this subject will be published this calendar year). With a view to bringing the tawa and Southland-beech timber before the consuming public a comprehensive series of engineering and physical-strength tests were begun at Auckland in co-operation with Auckland University College. The results, while as yet incomplete, are very encouraging, and point to a wide potential application in commerce for these two most important species.

The standard export bushel apple-case specification was, in co-operation with the agricultural authorities, rewritten, and a package obtained to satisfactorily compete with the best North American type of case.

Two patented fixtures, constructions for butter-boxes, using only one-third of the timber volume of the old-style box, were submitted to test, and the designs much improved thereby.

Substantial assistance has been rendered to the public in the identification of indigenous timbers involved in sales and disputes. In this connection Professor Kirk, of Victoria College, has lent his time and knowledge in the intricate microscopic examination of many critical specimens. To him is extended the grateful appreciation of the Service and its friends.

Arrangements were concluded with the Dominion Federated Sawmillers' Association during the year whereby Dr. H. Tiemann, the world's authority on timber seasoning and conditioning, was retained to visit New Zealand to review the timber-conditioning problem and suggest ways and means of betterment. (A full report will be published this current year on the result of Dr. Tiemann's investigations.)

Service tests of certain New Zealand timbers as to their suitability for telegraph-, telephone-, and transmission-line purposes were begun during the year, and final results will be available within the current year. The timbers tested were rata, kowhai, and red-beech.

With a view to developing a cheap but effective method for preserving posts, poles, and outdoor constructional timber cut from plantation trees, wind-breaks, and shelter-belts, a co-operative treating project was entered into with the New Zealand Coal-tar Products Company, of Wanganui. The experimental plant was erected at the State Rotorua tree-nurseries, and a series of tests and experiments were begun and are now under way. (A bulletin containing a full description of the cost, construction, use, and cost of operation of a simple inexpensive form of heating plant for farmers will be published within twelve months.)

A depository for all statistics bearing on timber-manufacturers, timber-users, timber-production, import and export, has been established, and during the year over three hundred memoranda of advice and assistance have been given to timber-users. An educational exhibit and display of New Zealand timbers was made in conjunction with the Dominion Federated Sawmillers' Association at the Wellington Tariff Exhibition, and was inspected by over four thousand visitors. With a view to demonstrating the versatility and effectiveness of certain New Zealand woods, certain sample products were constructed and placed in service. These products included tool-handles and clothes-pegs from beech; beer-barrels, butter-boxes, and tallow-casks from tawa; and wooden matches from waste white-pine. (Bulletins dealing with the use of tawa and Southland beech will be published in this calendar year.)

Letters of advice on plant lay-out and special machinery were given to a large number of manufacturers during the year. (The timber-using public is invited to take full advantage of the facilities of this Forest Service in any matter concerning wood.)

Silvical and Silvicultural Research.

Success in producing New Zealand's timber requirements will only come by reproducing and rebuilding our great indigenous forests. It is to the woods of Westland, Southland, and the central North Island that the Dominion must ultimately look for its major supplies, for there are the forests and the lands chiefly suitable for forestry. Whether the key to silviculture will be found by the regeneration of the indigenous forests, the propagation of exotic pines, or by a compromise remains yet to be determined. It is to these serious and vital practical problems that the silvical work of the Service has been confined during the year. Mr. W. R. McGregor, M.Sc., of Auckland University College, has continued his investigation into the life-history of the kauri forest on the Waitakere Ranges and in the Waipoua Forest, with very satisfactory interim results. Substantial progress in the investigation of the floristic aspects, and of the various habitat factors, have been made. Instruments have been evolved for photometric purposes, and a considerable volume of data concerning light-requirements and light-conditions in different types was collected. Several experimental plots for the periodic measurement of kauri rate of growth were established, and several hundred records taken. The study of the kauri reproductive habits has been pushed to near completion, and the fruiting characteristics of the tree have been subjected to review.

Mr. McGregor states: "It is hoped that the coming season may see the establishment of several field experimental stations on a more satisfactory basis than has been possible hitherto. In carrying out the research one of the greatest difficulties arises from the complete lack of reasonably trained assistance in the field. . . . I would again emphasize the necessity for the preservation of all natural shelter wood on land unsuitable or not immediately necessary for agriculture. . . . 'Cut-over' country is generally considered worthless and subjected to much wanton destruction; yet I believe that one result of the present investigation will be to establish the fact that such areas are destined to prove forest capital of the first value."

Outstanding progress has been made in the research investigations of Mr. Charles E. Foweraker, M.A., M.Sc., F.L.S., of Canterbury University College, as to the ecology and regeneration of the taxad rain forest of the South Island west coast. This important study, which will provide the economic key to the re-establishment and practical management of the South Island rain forests, was begun two years ago, and will be continued to completion. Field studies for the year under review were carried out in the Hokitika, Lake Kanieri, Waitaha, Harihari, Okarito, Waiho, and Ngahere localities. Definite data were obtained as to the taxad species and varieties, composition of the forest, climate and geological condition, life-history and natural regeneration, and as to the relation of logging, fire, and stock-grazing to natural regrowth. The interim conclusions of Mr. Foweraker indicate that if logged areas are unfired and stock excluded regeneration is certain.

The opportunity is again taken by Mr. Foweraker to emphasize the forest-fire menace. An extract from his recent report is as follows: "References to fire have been made in this report. Again it must be emphasized that the menace of fire to regeneration on cut-over areas is altogether under-

estimated. After an area is logged much light and sun are admitted, the floor and slash dry up, and become as tinder during the summer. Sooner or later a fire starts, perhaps from a logging winch or locomotive. This fire spreads miles in a few hours. All taxad seeds and seedlings are destroyed. After a month or two various weeds gain a footing; 'fireweed' *(Erechtites)* is the common first-comer. Other weeds, chiefly exotics, come in; stock often browse round and bring weed-seeds with them. A second growth of broad-leafers, such as wineberry and fuchsia, comes up from seed carried probably by birds. Frequently another fire occurs, and the process recommences, only this time weeds and fern soon get the upper hand. In this manner the original forest-floor, the seed-bed *par excellence* of the taxads, is destroyed, and is replaced by a thick matted turf of exotic weeds, native sedges and rushes, blackberry and fern, and the whole area becomes a waste, the handling of which for afforestation presents a difficult problem. The need for fire-control must be emphasized. Fire must be regarded as an evil—a more or less preventable evil."

The completion of this research will enable the definitive formulation of silvicultural and logging regulations on the State-forest lands of Westland.

Study of the Structure and Growth of New Zealand Taxad Trees.

Two very important subsidized studies were commenced last year at Canterbury University College by Miss F. B. Murray, M.A., and Mr. E. W. Bennett, M.Sc., under the direction of Dr. Charles Chilton, with whom was associated Mr. Charles Foweraker. The first research (conducted by Miss Murray) will disclose the condition of taxad-seed germination and the growth and establishment of taxad seedlings, a knowledge of which is vital to proper silvicultural regulation. Miss Murray has practically completed the following precis of research:—

(1.) Investigation of the fruit and seed of silver-pine *(Dacrydium Colensoi)*, with notes and drawings.

(2.) Investigation of the stages in germination and establishment of the seedling of silver-pine. Complete description and drawings have been made.

(3.) Comparison of the seedling of silver-pine with that of rimu *(D. cupressinum)*, with descriptions and drawings. A table of features for identification of these two very similar seedlings has been outlined.

(4.) Preliminary investigation of the seedlings of miro *(Podocarpus ferrugineus)*, kahikatea *(P. dacrydioides)*, and matai *(P. spicatus)*.

This research is of the utmost importance, as it aims at covering—(*a*) The season of seed maturity; (*b*) the percentage of fertile seed produced by average taxads; (*c*) the physical and chemical conditions of the seed-bed; (*d*) the time of germination under known physical conditions; (*e*) the establishment of the seedling; (*f*) the reaction of the seedling to environmental changes.

(5.) Preliminary investigations on the structure of the fruit and seed of miro, kahikatea, and totara.

The second research (by Mr. Bennett) deals with the nature and significance of the growth-rings and the volume increment of wood in the New Zealand taxads. Systematic investigation was begun on the totara *(Podocarpus totara)* by a morphological study of the winter-bud scales, scale-scars, and whorls, to be followed by age calculations of branches and anatomical investigation of the stem of totara, miro, and matai.

KEY TO THE IDENTIFICATION OF NEW ZEALAND TIMBERS.

Professor Kirk, of Victoria University College, has undertaken during the year a most valuable study of the utmost economic importance—*i.e.*, the working-out by microscopic means of a key to the identification of all our commercial trees. (This Service has gladly undertaken to supply Professor Kirk with a wide range of wood specimens, accurately named.) Professor Kirk reports substantial progress in this labour of love, and it is understood that he will make public the result of his research within a few months.

THE NEW ZEALAND BEECHES.

The outstanding scientific event of the year was the announcement of Dr. Cockayne, F.R.S., on the hybridization of the red-beech *(Nothofagus fusca)* with the mountain-beech *(Nothofagus cliffortioides)* or the black-beech *(Nothofagus solandri)*. It is hoped that Dr. Cockayne may be enabled to continue this valuable research to completion.

DEMARCATION OF SAMPLE PLOTS.

One of the first steps in organizing our forests and regulating the cut therefrom is to ascertain the rate of growth, the annual increment, and the forest relation to light, climate, and soil factors. To ascertain volume accretion over a period of years it is necessary to establish, measure, and record many plots of growing forest, containing thousands of trees of all ages and classes, as true average resultants are only possible by this means. During the year, in pursuance of this need, thirteen representative sample plots were defined and carefully recorded for recurrent measurement in the Auckland, Rotorua, and Westland regions.

FOREST EXPERIMENT STATION.

The crystallization of a sane policy of silviculture and the building-up of a forest-management technique must be based largely on adherence to natural laws. Therefore continuous study and observation of different methods of planting, logging, forest-protection, forest grazing, and the influence of exploitation on the regeneration of the profitable species, on stream-flow, run-off, and climate, is vital to

successful forest-production. All these works can only be carried out at a properly equipped forest experiment station. During the year, therefore, a 5,000-acre area in Westland suitable for the purpose was dedicated, demarcated, and a preliminary internal survey was made. A tree-nursery site was located, and proceedings taken to acquire same. It is hoped that funds will be provided to permit of the active operation of this centre of intensive scientific study and research.

Sand-dune Reclamation.

A pressing and important economic problem is the reclamation and bringing into productivity of the several hundred thousand acres of New Zealand's coastal wandering sand-dunes. The menace of these useless sand-wastes to contiguous fertile lands along the west coast of the North Island is serious and actual. During the year a sand-dune reclamation experiment station was established by this Service at the mouth of the Rangitikei River, about nine miles north of Foxton. The chosen area contains about 2,000 acres of west-coast littoral, and may be considered typical of the North Island condition. During the year the area was fenced, 35 acres of wandering dunes were planted with marram-grass, 250,000 stool-shoots were set out in a suitable nursery, and several small nursery plots were established throughout the area and sown down with marram-seed. A large variety of cuttings, seeds of shrubs, several hundred Douglas fir, *Pinus insignis*, and *Pinus ponderosa* were planted in order to ascertain the species suitable for usage as protective belts. Definite forms of foredune fences for the fixation of the sand-dunes were established, and costs of construction have been carefully kept. As a result of this sand-dune reclamation work (which will be continued for three or four more years) the Service will be able to present a definite procedure of construction, cost, method, and result for the purpose of bringing into national production at least 300,000 acres of land which to-day is not only worth nothing, but is ever encroaching on the most fertile and valuable agricultural lands in the North Island.

Economy in Afforestation.

Notching versus *Pitting*.

Experiments in more direct methods of planting in the Rotorua region plantations have been successfully performed during the year. It was found that the substitution of notch planting for pitting (adopted experimentally over several hundred acres) will result in the lowering of establishment costs by 15s. per acre (a direct saving of at least £6,000 per annum in the annual North Island planting programme). A comparison of results indicates that the trees have succeeded as well, if not better, by the notching method than by pitting. This system is commended to private tree-planters.

Direct Sowing.

Direct-sowing experiments were continued during the year at Kaingaroa Plains Plantation, where 50 acres were sown with the following seeds: *Pinus insignis*, *P. ponderosa*, *P. Murrayana*, Douglas fir, *Cupressus Lawsoniana*, *Sequoia sempervirens*, and *Eucalyptus obliqua*. As in the previous year, a grain-drill was used, but a more careful adjustment was made to the conditions by removing all the coulters with the exception of one at each end, spaced 7 in. apart. This ensured the seed entering the ground more evenly, and the result was that a better germination was secured. The results by this method were satisfactory only with *Pinus insignis* and *P. ponderosa*. This experiment will be continued, and an autumn sowing of *Pinus insignis* will be tried. The cost of seeding was £1 5s. per acre for labour and material.

Experimental Planting of Eucalyptus Gigantea.

In 1917 an experimental area of this tree was planted on the pumice plateau (Kaingaroa). Its establishment has proven successful, and demonstrates that this very valuable eucalypt timber-tree is suitable for planting in districts of low winter temperature. It is recommended to private planters accordingly.

Timber-volume Tables and Mill Studies.

In order that greater accuracy might be secured in standing-timber estimation, valuation, and appraisal, a programme of merchantable-tree measurement under actual exploitation conditions was begun during the year. The resultant tables will give the actual out-turn in volume of all merchantable trees from the lowest size cut up to the maximum size, and for each commercial species—rimu, matai, miro, totara, and white-pine. This project will be completed during the current calendar year. Mill studies have been undertaken in the various Dominion timber regions for the purpose of determining the actual out-turn in sawn forest-products from trees and logs of various dimensions and species subjected to varying methods of conversion. The co-operation of the milling industry has been secured in the preparation of this data, and the results (which will be of great practical value in logging and milling operations) will be made available to the public on completion.

CHAPTER V.—GENERAL.

Report of the Timber Trade for the Fiscal Year ended 31st March, 1922.

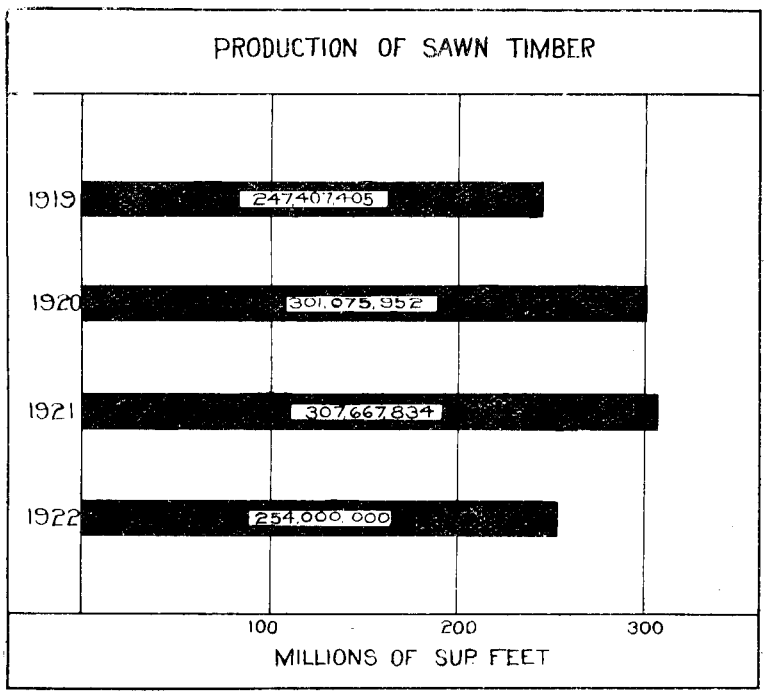
Production.

A statement showing the actual output in superficial feet of the various kinds of timber from New Zealand sawmills during the years ended 31st March, 1920 and 1921, has been compiled from figures supplied by the Government Statistician. While complete returns for the year ended 31st March, 1922, are not yet available, it has been possible to arrive at a fairly accurate estimate from figures supplied by the Government Statistician and the Secretary of the New Zealand Federated Sawmillers' Association.

Production of Sawn Timber.

Item.	1920.		1921.		1922.
	Sup. ft.	Percentage.	Sup. ft.	Percentage.	
Kauri *(Agathis australis)*	26,094,822	8·67	20,393,7 8	6·63	The estimated total output is approximately 254,000,000 sup. ft. Complete returns are not yet available, but details will be obtainable from Volume III of the Report on the Statistics of the Dominion for the year ended 31st March, 1922.
Rimu *(Dacrydium cupressinum)*	141,825,326	47·10	153,529,022	49·90	
White-pine *(Podocarpus dacrydioides)* ..	81,369,931	27·03	73,16 ,750	23·78	
Totara *(Podocarpus totara)*	20,507,162	6·81	17,984,189	5·85	
Matai *(Podocarpus spicatus)*	17,761,542	5·90	21,329,043	6·93	
Beech *(Nothofagus Menziesii, N. solandri,* and *N. fusca)*	3,435,356	1·14	6,348,594	2·06	
Pinus insignis	5,867,951	1·95	9,711,918	3·16	
Other	4,213,862	1·40	5,202,530	1·69	
Totals	301,075,952	100·00	307,667,834	100·00	

The estimated total output for the year ended 31st March, 1922, was approximately 15 per cent. below that for the previous period. The general decline in demand, which set in during the January–March quarter of 1921, continued during the year. Production, however, did not fall away immediately, owing to the existence of unfilled orders and forward contracts. The South Island mills were the first to experience the slump. The production of these districts has shown a heavy decrease

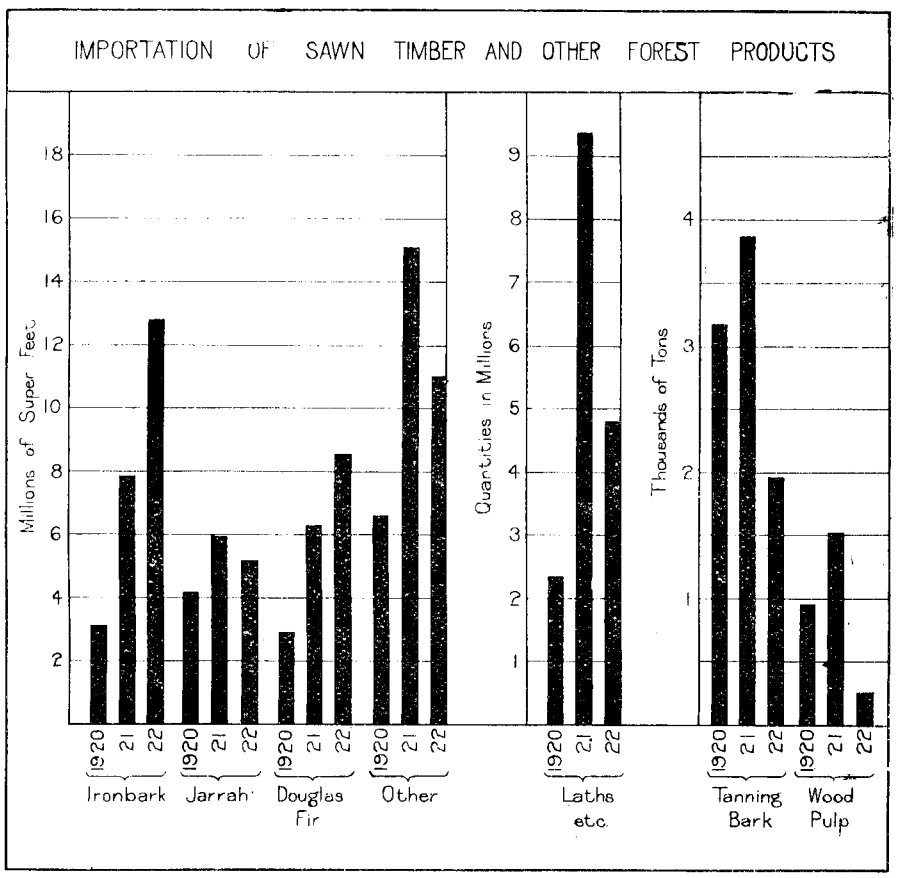


Graph showing Production of Sawn Timber for Period 1919–22.

since July of last year. The North Island mills, on the other hand, continued to produce at approximately the January–March, 1921, figure until December, but have since that date been forced to reduce their cut considerably. In several districts where mills only supply the local markets, and particularly the farming community, the production has fallen from 47 per cent. to 70 per cent., a reflection on the serious curtailment of the spending-power of the rural population. First-class skilled and unskilled labour has been available during the whole period under review, and millowners have been enabled for the first time in many years to raise staffs to pre-war standards of efficiency.

Import.

Timber imports show a small increase of 2,191,292 sup. ft., but a decrease in value of £45,433, The continued activities of the Electric-power Boards and of the Department of Public Works are responsible for the increased consumption of ironbark. While the value of this timber has risen considerably in Australia, a slump in the market, combined with improved buying methods, has enabled these bodies to purchase at a price only slightly in advance of that paid during the year ended 31st March, 1921. Jarrah, however, second in importance of the Australian timbers imported into New Zealand, shows an increase of 8s. 5d. per 100 sup. ft. for the same period, making a total increase of 17s. 8d. per 100 sup. ft., or 75 per cent. over the figure for the year ended 31st March, 1920. The available supplies of this timber are much smaller than is generally suspected. All other timbers registered a decrease in value. The figures relating to Douglas fir (Oregon pine) are a reflection of the conditions ruling in the lumber-markets on the Pacific coast of Canada and the United States. From a peak basis price of $74.50 per 1,000 sup. ft. c.i.f. New Zealand ports, reached in May, 1920,



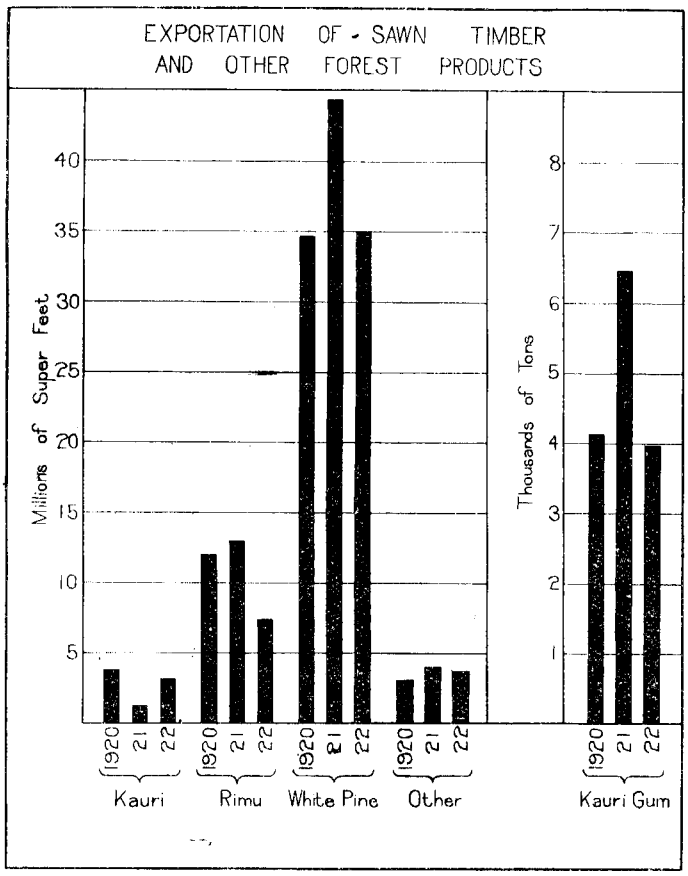
Graph showing Importations for Period 1920-22.

the value of this timber has now fallen to $34.50, which corresponds to the average import value f.o.b. exporting ports of 15s. 4d. per 100 sup. ft. for the period ended 31st March, 1922, compared with £1 5s. 11d. for the previous year. Freights from the Pacific coast of Canada and America have likewise decreased from $25 to $16 per 1,000 sup. ft.

Export.

The flooding of the Australian markets with Baltic and Canadian and American Pacific coast timbers caused a considerable slackening in the demands for rimu and white-pine. At present no preferential tariff exists in favour of the local timbers, but it is hoped that this state of affairs will be remedied as a result of the visit to Australia of the Hon. Downie Stewart, Minister of Customs, early in the year. The superiority of the New Zealand woods is, however, being proved daily beyond all doubt, and it is anticipated that the Australian markets will return to normal within a short period. In spite of slack markets, it is pleasing to record that the average value of all sawn timbers exported to Australia showed an increase of 1s. per 100 sup. ft. over that for the year ended 31st March, 1921. This increase was by no means equally distributed, as is shown by the following statement: Kauri increased 3s. 4½d. per 100 sup. ft., white-pine increased 2d., and beech 3s. 1d.; while rimu decreased 2d., and other New Zealand timbers decreased 2s. 8d., per 100 sup. ft.

Other forest-products exhibit a still further increase in value. The figures quoted cover the values per ton for the years ended 31st December, 1919, 1920, and 1921. Tanning-bark—1919, £12; 1921, £17 16s. 11d. Kauri-gum -1919, £61 16s. 4d.; 1920, £85 18s. 2d.; 1921, £94 2s. 7d. Fungus—1919, £59 14s. 4d.; 1920, £106 15s. 3d.; 1921, £159 1s. 2d.



GRAPH SHOWING EXPORTATIONS FOR PERIOD 1920–22.

Markets and Prices.

For the period under review the general trend has been towards a price-reduction in conformity with decreased costs of production. Though continually increasing discounts on list prices have been obtainable from the beginning of the year, no general reduction was announced until the 24th March, 1922, when the North Island sawmillers made a reduction on certain classes of matai and rimu amounting to approximately 10 per cent. There are indications that the Westland and other South Island sawmillers will make a similar reduction early in April or May, 1922. The general slackening in demand for timber throughout the year is due in great part to inactivity in the building and constructional trades. Labour and material costs have combined to make building-costs so excessive that many new projects have been suspended until both have been reduced to a reasonable basis. Undoubtedly timber has been called upon to bear an undue proportion of blame for these high building-costs owing to the failure of the public to realize that only 18 per cent. of the cost of the house is accounted for by this material. The present time, however, is considered most opportune for building operations, as labour costs have been considerably reduced and timber-prices have been cut to the bone. Furthermore, sawmillers have avoided creating unemployment by working mills considerably in excess of market demands, with the result that large stocks of well-seasoned timber are available for immediate use. A sudden building boom is not in the interests of the community, as an artificial value is thereby added to both labour and material; but ruling conditions call for a steadily increasing activity in the building and constructional trade. This is essential for an improvement in the present economic position.

Trade-extension.

A close analysis of the statistics relating to the import of timber indicates clearly the general trend of the commercial world. Consumers are daily demanding more and better service from the manufacturers. The growing popularity of Douglas fir (Oregon pine) is due in a great part to the grade, seasoning, and strength guarantee which usually accompanies it, and is a stimulating factor in the efforts of the New Zealand manufacturer to sell the local timbers upon a similar basis. Such a service ensures not only more profit to the sawmiller, but better value to the consumer or purchaser. It is also evident that many opportunities still exist for the specialized use of many of the local timbers.

With proper development of the economic research work of the Forest Service it should be possible to reduce the forest-products imports by at least 80 per cent., thereby effecting a direct annual saving to the community of at least £250,000 in transport charges alone.

Forest Service Reference Library.

The resources of the central office and regional libraries in essential technical references, instructional works, and dendrological authorities were strengthened during the year by the addition of 902 works. Exchange relations have been established with practically every country carrying out forestry activities. Our exchanges totalled 450 publications with Empire and foreign services. The total number of books, works of reference, and other publications now filed is 2,057. (The public is invited to take advantage of the facilities offered by the reference library.)

The Forest Atlas.

Out of the total number of eighty forest-atlas sheets which are being compiled, on a scale of 1·5 miles per inch, for the forested regions of New Zealand, fifty-one sheets have been completed, and five thousand copies have been distributed to the various regional officers. These forest-atlas sheets, which form the mother maps for all forest reconnaissances, surveys, cruises, silvical reports, and all other activities, are considered as the basis for the permanent and historical record of each forest. The atlas staff has produced during the year 1,034 plans, maps, tracings, and map-sheets. The photographic records have been added to during the year by the addition of 1,200 negatives, 196 lantern-slides, and 900 ft. of film descriptive of forest-work, the timber industry, and tree-planting. These have steadily improved during the year, and now include a fine series dealing with many of our principal timber-trees. In addition, the work performed by the Agricultural Department's staff photographer has provided a unique series of kauri-timber pictures. These photographs are indexed and recorded, and have proved of the greatest value for illustrative purposes.

Office System and Work.

A modern series system of current and permanent record filing was evolved and put into operation during the year. This system includes the international method of recording State forestry activities, and may be considered as embodying the latest improvements in office efficiency and routine. The regional offices have been closely co-ordinated with the central office in numbering and classification.

Correspondence.—Received: Letters, 12,200; telegrams, 600; parcels, 240; circulars, form letters, &c., 61. Despatched: Letters, 15,120; telegrams, 800; parcels, 576; circulars, form letters, &c., 2,200.

ANNEXURES.

ANNEXURE I.—STATE AND PROVISIONAL STATE FORESTS AND FOREST RESERVES.

Area in Acres at End of Fiscal Year 1922.

Land District.	Area in Acres at End of Fiscal Year 1921.		Changes in Area during the Fiscal Year 1921–22: Net Increase in Acres.		Area in Acres at End of Fiscal Year 1922.			Percentage of Area of Land District in Permanent and Provisional State Forest and Forest Reserves.
	State Forest.	Provisional State Forest.	State Forest.	Provisional State Forest.	State Forest.	Provisional State Forest.	Forest Reserves.	
North Auckland	106,956	14,898	Nil	1,192	98,981	16,690	3,193	2·6
Auckland ..	144,796	589,560	1,049	Nil	145,845	587,813	2,316	8·1
Hawke's Bay ..	199,653	15,350	Nil	38,385	199,653	53,735	16,921	4·9
Taranaki ..	69,564	36,079	Nil	6,560	69,500	42,639	40,811	6·3
Wellington ..	500,506	Nil	16,284	27,638	516,790	27,638	9,091	7·8
Nelson ..	19,955	1,971,068	Nil	13,475	19,955	1,984,543	8,470	42·7
Marlborough ..	79,753	105,631	1,990	14,000	81,743	119,631	6,194	7·5
Westland ..	1,542	1,627,961	636	104,551	2,178	1,732,512	119	44·9
Canterbury ..	290,176	Nil	104	Nil	290,280	Nil	..	3·0
Otago	129,465	253,022	Nil	64,110	128,280	317,132	543	4·9
Southland ..	136,306*	521,082	Nil	1,391	136,306	522,473	..	8·3
Totals ..	1,678,672	5,134,651	20,063	271,302	1,689,511	5,404,806	87,658	..

* Alteration due to revision of last year's figures.

Permanent and provisional State forests and forest reserves under Service control comprise 10·8 per cent. of the total area of the Dominion. Total area of State forest and provisional State forest at 31st March, 1922, 7,181,975 acres.

ANNEXURE II.—REPORT UPON FORESTATION OPERATIONS IN THE NORTH ISLAND.

(H. A. Goudie, Conservator of Forests, Rotorua Conservation Region.)

Extension of Plantations.

The plantations in the North Island, which now cover an area of 28,768 acres, were increased during the year by 2,681 acres, planted at the two Kaingaroa Plains stations. On the whole the planting has been very successful, the death-rate being estimated at 14 per cent. at Kaingaroa West and 10 per cent. at Kaingaroa Plains, or an average of 12 per cent. over both stations.

The extension work has been very accurately costed this year. Over the actual period of operations—viz., from October, 1920, to October, 1921—the costs, including labour, materials, salaries, and trees, were as follows: Kaingaroa Plains Plantation, £5 6s. 3d. per acre; Kaingaroa West Plantation, £5 4s. per acre. The labour charges have been reduced very considerably by the substitution of notch planting in lieu of pitting. It is estimated that the alteration in method will result in a saving of at least 15s. per acre in the establishment charges.

Tree-growing.

During the year 1,760,000 trees were raised from seed, the principal species being *Pinus ponderosa*, *Pinus insignis*, Douglas fir, *Cupressus Lawsoniana*, and eucalypti in eleven species. The germination was satisfactory except in the case of *Pinus insignis*, of which a second sowing had to be made. After

[*Govt. Publicity photo.*

Recording Annual Growth: A Sample Plot in the Whakarewarewa State Forest.

many years of immunity from the ravages of the grass-grub this pest again made its appearance in the nursery stock, and was responsible for the destruction of close on 300,000 Douglas fir lined out during the spring. Hitherto the depredations of this insect have been confined to trees which have remained in the seed-beds for two years, and it is the first time in the history of the nursery that newly lined-out trees have been attacked. For this reason it was concluded that the insect concerned is a different species to the one hitherto prevalent in the nursery. The prevalence of large numbers of bronze beetles in the months of January and February makes it certain that the destruction was due to this species of insect.

Huts.

Twelve small three-roomed cottages were re-erected on the plantations during the year for the plantation labourers. These buildings were economically erected by using two of the cell-huts which were taken over from the Prisons Department as a nucleus and adding a room, 12 ft. by 8 ft., and a 4 ft. 6 in. veranda. This improvement in accommodation has assisted very materially in retaining the services of good workmen.

Labour.

No difficulty was experienced during the year in obtaining a sufficiency of labour.

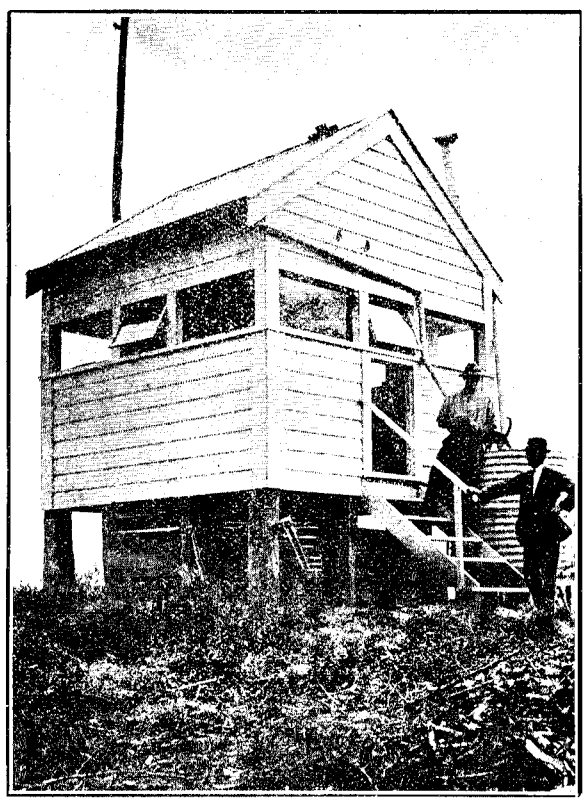
Fire Protection.

The erection of lookout stations on Mount Kakapiko and Maungakakaramea to serve the needs of Whakarewarewa and Waiotapu Plantations respectively, as forecasted in last year's report, was

undertaken and accomplished during the year. These buildings, erected to a standard, are 12 ft. by 12 ft. in dimensions, very stoutly built, and with a heavy glass window the full length of each side to afford an uninterrupted vision in all directions. Each station is connected by telephone to the various ranger stations, so that an outbreak of fire can be promptly reported in its incipient stages. The inauguration of the lookout has relieved the responsible officers of much of the anxiety which commonly exists during the fire season. The system marks a distinct advance in fire-protective measures, as it not only ensures promptness in dealing with a dangerous outbreak, but it enables a fire to be localized, and saves time in investigating an outbreak which is too far away to be of any danger to the plantation. The fire-breaks have all been put into a very efficient state by burning off wide strips outside the plantation boundaries, and thus securing a safety-zone which will be efficient for twelve months.

Sale of Trees and Tree-seeds.

During the season there was a large demand for trees and seeds. Eucalypts for the production of fencing-timber, &c., and *Pinus insignis* for shelter were the principal requirements. It is evident the Service is filling a long-felt want, and is giving satisfaction. Orders for trees to the number of 788 were filled to farmers, public bodies, School Committees, and soldier settlers, totalling 627,950 trees. For tree-seeds 448 orders were received, the amount sold being 409½ lb., valued at £370 16s. 7d. A large portion of the seed went to the Hawke's Bay District, and to places



[*Govt. Publicity, photo.*

Guarding the State Forests from Fire: One of the Lookout Stations in the Rotorua Region.

where it is difficult to forward young trees. The number of letters, packets of seed, advice-cards, and price-lists sent out in connection with the sale of trees and seeds during the year numbered 7,161, the letters of advice upon tree-planting being a particularly heavy item. Many letters in appreciation of the quality of the stock sold were received, and also a considerable number of offers of assistance in the matter of distributing price-lists, &c., from storekeepers, dairy companies, Postmasters, school officials, Stock Inspectors, and private persons. These offers were mostly spontaneous, and indicate to some extent the widespread interest which exists at present for forestry. To the circulars sent out to public bodies a large number of favourable replies were received, and there is no doubt that considerable planting will be done by municipalities, Harbour Boards, &c., in the near future. Many of them are at present hampered by financial difficulties, and others have practically no reserves or places to plant up, and no funds to purchase land. The posters exhibited in the post-offices, leaflets, and the advertisements in the *Agricultural Journal* have elicited a very large number of inquiries for price-lists and information regarding tree-planting. It is also evident from correspondence received that a large proportion of farmers had no knowledge of the existence of this branch of the Department's work, and a very considerable increase in the number of trees sent out can be confidently expected.

Revenue.

Following are particulars of the revenue derived from the nursery and plantations during the last two years :—

	1921–22.			1920–21.		
	£	s.	d.	£	s.	d.
Sales of trees	1,530	13	3	677	3	8
Sales of tree-seeds	370	16	7	153	6	7
Sales of firewood	2	0	0	194	11	6
Sales of posts, &c.	0	12	0	3	10	0
Grazing	150	10	10	112	5	11
Rent of departmental cottages	380	6	9	289	11	8
Sundry recoveries	11	8	9	181	12	6
	£2,446	8	2	£1,612	1	10

Programme for 1922.

The land-clearing, preparatory to planting an area of 2,300 acres at Kaingaroa Plains, is completed, and the tree-planting work will be commenced early in the coming year. The principal trees to be planted are Douglas fir and *Pinus ponderosa*, and it is expected that the plans laid down will absorb three million trees.

ANNEXURE III.—REPORT ON FORESTATION OPERATIONS IN THE SOUTH ISLAND.

(D. J. Buchanan, Conservator of Forests, Canterbury-Otago Conservation Region.)

Extension of Plantations.

The total area planted during the year at the three afforestation stations amounted to 675½ acres. The total area planted to date in the South Island amounts to 13,100 acres. Of the total number of trees transferred to plantations—viz., 1,055,350—some 117,500 were utilized for blocking up. The total output for the year was 1,442,452. The total number of seedlings raised during the year is approximately 1,867,100, while the total to date amounts to 50,388,896. The total number of trees in nurseries on the 31st March, 1922, was 4,496,530, and the estimated output for the coming season 1,200,000. At the various plantations results are good as far as the hardier species such as *Pinus ponderosa* and *Pinus laricio* are concerned. A trial planting of 7,300 one-year seedlings at Greenvale gave satisfactory results, and a further trial will follow this year. At Naseby Plantation one-year-old seed-bed trees of *Pinus ponderosa* and *Pinus laricio* were planted with good results, the death-rate being about 3 per cent. This system eliminated lining out, and the experiment will be followed up at Greenvale this year, if possible. The general growth of established trees in the plantations has been quite up to the average, and they are in a generally healthy state, no disease of any importance having made its appearance.

Labour.

Labour conditions have been easy, and there has been no difficulty in maintaining an adequate working staff throughout the year.

Unemployment Relief Works.

The Government decided to undertake road-formation in the plantations during the winter months with a view to ameliorating to some extent the unemployment problem. At Greenvale Plantation some four miles and a half of roading were formed through the centre of the plantation, giving good access to the various blocks which will ultimately be planted. At Hanmer Springs, where the old prison-camp buildings were utilized for accommodation of the men, good work was done in the way of forming roads and fire-breaks, &c. Some six miles of roads were formed, giving access to the more distant portions of the plantations, and a road was also formed from the main road to the fire-station, some of the labour being utilized for the erection of the lookout hut. Various fire-breaks were also brought into a better state of efficiency.

Sale of Trees to Farmers and Public Bodies.

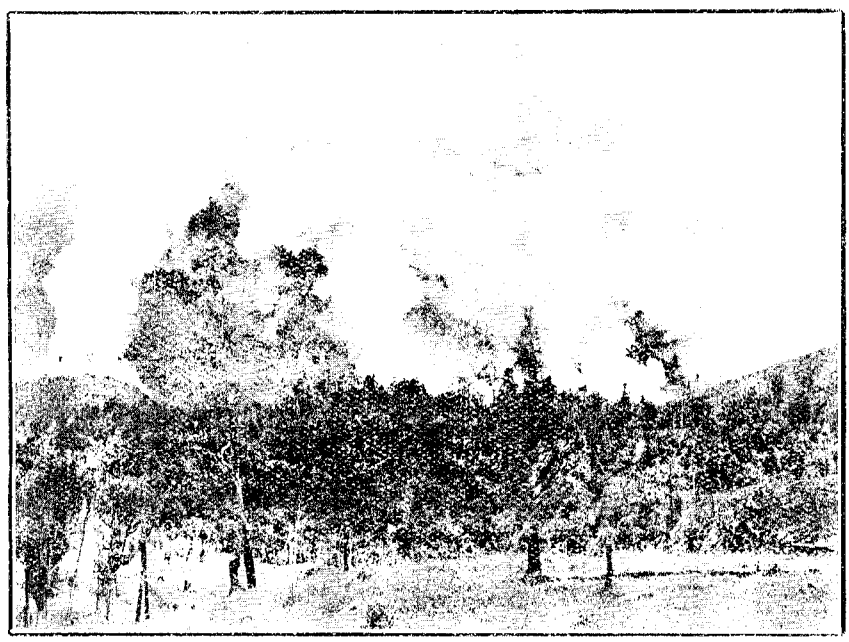
Some 269,602 trees of various species and 26 lb. of tree-seeds were supplied to farmers and others during the year. The major portion consisted of *Pinus insignis*, of which species 171,762 were supplied ; *P. ponderosa*, with 22,440 ; Douglas fir, 20,409 ; *Pinus laricio*, 18,217 ; and *P. muricata*, 15,500 ; &c. Applications exceeded the supply by as much again. An advertising campaign has been inaugurated with the object of pushing the sale of trees and generally fostering a demand, and encouraging a more active interest in forestry amongst the general public of the Dominion. A circular letter was posted to all City and County Councils, &c., outlining the advantages of tree-planting, and various posters and leaflets are being distributed as widely as possible throughout the South Island. The orders already received indicate that the demand will be fully maintained during the coming season.

Grazing by Sheep on Plantations.

The departmental flock has been maintained at Conical Hills Plantation with the usual good results, and the fire-breaks continue to be kept in a safe condition there by this method. At Hanmer Springs Plantation grazing was discontinued, as it was found that there was danger of damage to crops and to trees during the winter snowfall.

Fire Protection.

During the year fire lookout stations were established at both Hanmer Springs and Conical Hills Plantations. The first mentioned is placed on an eminence above the plantation, and with visibility in every direction, giving a panoramic view of the whole plantation area. A lookout man is on duty here constantly during the danger season. He is provided with field glasses, a block map of the plantation, and is in telephonic communication with administrative headquarters, as well as with two other stations from which immediate assistance can be obtained. At Conical Hills a hut has been placed in a commanding position, and a man is on duty continuously during the season.



[*F. L. Hargreaves, photo.*

Fire, the Arch enemy of The Forest: Fire Tragedy of Past Years.

He is also in telephonic communication with the ranger's office. Fire breaks have been kept ploughed or cultivated where necessary, and the usual protective measures maintained throughout. It is satisfactory to report that no fires have occurred during the past year, largely due to the fact that we now have the willing co-operation of the adjoining settlers in protecting the plantations from encroaching fires.

Revenue.

The amount of revenue derived from the South Island plantations and nurseries during the year was £2,012 3s., details of which are given below:

	1921–22.			1920–21.		
	£	s.	d.	£	s.	d.
Trees and seeds	752	10	2	273	15	9
Sheep	553	17	4	157	1	3
Wool and skins	68	11	8	59	15	1
Firewood, poles, &c.	112	0	3	213	14	5
Grazing	11	0	0	29	19	6
House-rentals	404	10	8	363	4	0
Sundry recoveries	309	9	11	7	15	0
Totals	£2,012	3	0	£1,135	8	0

Housing.

At Naseby Plantation a sun-dried brick cottage of five rooms was completed for the ranger in charge, and similarly at Conical Hills Plantation a wooden cottage. The Conservator's house at Tapanui was repaired, as were the ranger stations at Hanmer Springs, Greenvale, and Tapanui. A much more contented staff is the result.

General.

I regret to have to report considerable damage by red deer at Dusky Hill Plantation. The matter is a serious one, threatening the success of afforestation operations in this district, and drastic measures will have to be taken to mitigate the damage and eradicate this pest. No serious damage is reported from other stations.

Owing to the financial stringency of the period a very much restricted programme is to be undertaken during the incoming season. The present plantation area at Naseby, which is almost completed, will be placed on a maintenance basis, as will also that at Balmoral Plantation. The main planting activities will be conducted at Greenvale Plantation, where the programme laid down comprises approximately 300 acres of new area.

ANNEXURE IV.—SUMMARIES.

Summary of Operations in Nurseries during the Year ended 31st March, 1922.

Name of Nursery.	Total Expenditure.				Trees in Nurseries.		
	Tree-growing.	Maintenance.	Buildings, &c.	Total.	Estimated Trees raised during Year.	Output of Trees.	Estimated Number in Nurseries at 31st March, 1922.
						Trees sent to Plantations during Year. / Trees sent to Outside Places during Year.	
	£ s. d.	£ s. d.	£ s. d.	£ s. d.			
Rotorua ..	7,882 3 4	467 3 9	23 0 1	8,370 7 2	1,760,000	3,782,320 / 627,950	8,000,000
Tapanui ..	2,476 13 11	2,545 13 5	828 4 7	5,850 11 11	1,050,300	445,725 / 106,355	2,077,670
Ranfurly ..	521 8 7	1,029 13 4	152 10 8	1,703 12 7	..	348,125 / 75,197	412,385
Hanmer Springs..	1,836 2 2	1,692 10 4	292 0 0	3,820 12 6	816,800	379,000 / 88,050	2,006,475
Totals ..	12,716 8 0	5,733 0 10	1,295 15 4	19,745 4 2	3,627,100	4,955,170 / 897,552	12,496,530

Summary of Operations in Nurseries from 1896 to 1922.

Name of Nursery.	Total Expenditure.				Estimated Number of Trees raised.	Output of Trees.	
	Tree-growing.	Maintenance.	Buildings, &c.	Total.		To Plantations.	To Outside Places.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.			
Rotorua ..	78,732 6 7	8,531 2 6	13,650 14 5	100,914 3 6	76,536,488	65,498,006	3,038,482
Tapanui ..	35,828 1 1	9,309 7 6	7,440 13 11	52,578 2 6	22,030,268	16,935,843	1,511,710
Ranfurly ..	18,332 7 5	3,724 8 9	4,552 16 1	26,609 12 3	7,664,947	6,419,293	483,656
Hanmer Springs	20,823 3 3	5,099 17 10	4,747 8 11	30,670 10 0	17,461,611	12,178,905	759,004
Scarborough* ..	6,399 9 10	..	2,856 17 3	9,256 7 1	3,059,610	1,965,095	1,094,515
Kurow* ..	960 4 2	..	2,109 18 5	3,070 2 7	172,460	..	172,460
Totals ..	161,075 12 4	26,664 16 7	35,358 9 0	223,098 17 11	126,925,384	102,997,142	7,059,827

* Nursery now closed.

N.B.—Expenditure has not been allocated to "Maintenance" separately until 1917–18.

Summary of Operations in Plantations during Year ended 31st March, 1922.

Name of Plantation.	Trees.			Total Expenditure for Year, including Cost of Trees from Nurseries.	New Area planted.
	Number received from Nursery.	Number used to replace Losses.	Number planted on New Area.		
				£ s. d.	Acres.
Kaingaroa West	1,768,900	405,900	1,363,000	6,672 13 1	1,068
Kaingaroa Plains	2,008,000	50,000	1,958,000	8,935 2 0	1,665
Conical Hills	..	..	..	1,909 13 11	..
Pukerau	..	..	..	872 10 4	..
Dusky Hill	8,500	8,500	..	428 18 3	..
Greenvale	437,225	84,000	353,225	6,685 9 8	232
Gimmerburn	..	..	..	32 14 3	..
Naseby	348,125	25,000	323,125	4,799 12 1	230
Hanmer Springs	6,500	..	6,500	1,822 5 9	6
Balmoral	372,500	..	372,500	5,302 5 1	207½
Totals	4,949,750	573,400	4,376,350	37,461 4 5	3,408½

Summary of Operations in Plantations from 1896 to 1922.

Name of Plantation.	Trees.				Total Expenditure to Date, including Cost of Trees from Nurseries.	Total Area planted.	Total Expenditure per Acre planted, including Cost of Buildings.
	Number raised from Seed sown *in Situ*.	Number received from Nursery.	Number used to replace Losses.	Total Number in Plantations.			
					£ s. d.	Acres.	£ s. d.
Whakarewarewa	109,725	20,602,850	3,976,264	16,736,311	110,152 6 3	7,983	13 16 0
Waiotapu	83,121	26,889,849	5,384,709	21,588,261	112,854 4 0	9,540	11 16 7
Kaingaroa West	..	2,386,770	405,900	1,962,870	12,731 9 7	1,570	8 2 2
Kaingaroa Plains	..	14,449,733	1,938,660	12,511,073	66,535 3 4	8,475	7 17 1
Puhipuhi	..	1,419,000	419,000	1,000,000	11,433 17 9	1,200	9 10 7
Conical Hills	..	10,751,401	1,465,105	9,286,296	59,906 0 0	3,533½	16 19 0
Pukerau	..	870,860	57,300	813,560	8,331 9 1	565½	14 14 7
Dusky Hill	..	3,061,997	881,160	2,180,837	23,098 5 11	745⅝	30 19 5
Greenvale	..	2,507,570	269,125	2,238,445	34,638 12 4	1,403¾	24 13 6
Gimmerburn	..	936,235	783,339	152,896	6,907 0 1	88	78 9 9
Naseby	..	5,433,083	672,805	4,760,278	41,455 17 11	2,138¾	19 7 8
Hanmer Springs	..	9,576,833	1,814,149	7,762,684	44,758 17 0	2,912½	15 7 4
Balmoral*	..	2,580,047	598,440	1,981,607	31,069 14 8	1,253½	24 15 8
Raincliff	..	..	..	50,000	1,107 17 2	206	5 7 6
Experimental Group.							
Waitahuna	..	42,025	11,500	30,525	319 7 9	11	29 0 8
Tekapo	..	48,000	..	48,000	275 8 3	29	9 9 11
Dumgree	..	1,679,765	1,110,125	569,640	16,309 16 7	209	78 0 9
Galloway	..	6,930	3,050	3,880	84 19 10	2	42 9 11
Omarama	..	4,390	..	4,390	80 12 9	2	40 6 4
Totals	192,846	103,247,338	19,790,631	83,681,553	582,051 10 3	41,868¼	..

* Includes purchase of 6,499 acres at 10s. per acre.

ANNEXURE V.—EXPORTS AND IMPORTS OF SAWN TIMBER AND OTHER FOREST-PRODUCTS.

Exports.

(From information supplied by the Comptroller of Customs. All figures refer to the fiscal years ended 31st March, 1920, 1921, and 1922, except those for kauri-gum and fungus, these covering the preceding calendar year in each case.)

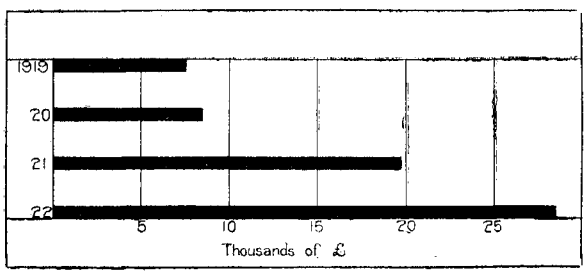
Item.	1920.			1921.			1922.		
	Quantity.	Per-centage.	Value.	Quantity.	Per-centage.	Value.	Quantity.	Per-centage.	Value.
	Sup. ft.		£	Sup. ft.		£	Sup. ft.		£
Kauri	3,719,610	6·84	45,763	1,201,455	1·91	19,019	3,070,135	6·26	53,781
Rimu	12,125,889	22·57	96,135	12,981,010	20·75	110,274	7,440,464	15·16	62,651
White-pine	34,827,162	64·82	317,150	44,382,691	70·88	474,757	35,000,184	71·33	377,224
Beech	772,661	1·43	7,266	221,395	0·35	2,578	1,146,995	2·34	15,120
Other (New Zealand)..	2,264,588	4·22	18,362	3,822,401	6·10	37,971	2,380,860	4·85	20,485
Other (foreign) ..	15,092	0·12	269	2,450	0·01	97	31,652	0·06	826
	53,725,002	100·00	484,945	62,611,402	100·00	644,696	49,070,290	100·00	530,087
	Tons.		£	Tons.		£	Tons.		£
Tanning-bark ..	47	..	564	..	..	..	59	..	1,035
Kauri-gum	4,128	..	255,812	6,481	..	556,756	3,901	..	367,197
Fungus (New Zealand)	49·45	..	2,953	78·8	..	8,413	80·8	..	12,852

Imports.

(From information supplied by the Comptroller of Customs. All figures refer to the fiscal years ended 31st March, 1920, 1921, 1922.)

Item.	1920.		1921.		1922.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
	Sup. ft.	£	Sup. ft.	£	Sup. ft.	£
Ironbark	3,101,575	58,395	7,819,857	152,291	12,783,676	255,305
Jarrah	4,199,964	49,610	5,918,063	97,166	5,136,333	105,972
Douglas fir (Oregon) ..	2,889,801	26,982	6,325,236	82,020	8,527,611	65,371
Other	6,676,302	145,465	15,155,910	396,979	10,962,738	246,375
	16,867,642	280,452	35,219,066	728,456	37,410,358	673,023
	Number.		Number.		Number.	
Laths, rails, palings, &c. ..	2,332,182	6,373	9,373,235	22,156	4,782,392	11,602
	Tons.		Tons.		Tons.	
Tanning-bark	3,184	39,990	3,749	60,567	1,946	27,960
Wood-pulp	942	23,018	1,521	41,425	232	9,200

ANNEXURE VI.—FINANCE STATEMENTS.



Growth in State Forest Revenues for the Fiscal Years indicated.

STATE FORESTS ACCOUNT.

RECEIPTS AND PAYMENTS FOR THE YEAR ENDED 31ST MARCH, 1922.

Receipts.	£ s. d.	£ s. d.
To Cash in hand, 1st April, 1921 ..		9,536 10 2
Loan Account—		
Debentures issued ..	85,000 0 0	
Stock issued — N.Z. consolidated inscribed stock (6 per cent.)	1,774 12 10	
Premium	5 16 9	
		86,780 9 7
Revenue—		
National endowment		2,390 6 3
State and provisional State forests—		
Rents, royalties ..	24,320 1 0	
Nurseries and plantations—		
Trees	2,100 11 7	
Firewood and poles ..	107 2 3	
Seeds	372 0 9	
Sheep — Wool, skins, and grazing ..	584 2 10	
Rent of departmental houses	784 17 5	
Sundries	124 18 11	
		28,393 14 9
Sale of horses	..	52 6 5
		£127,153 7 2

Payments.	£ s. d.	£ s. d.
By Charges for raising loans		9 16 2
Interest on debentures issued	9,797 9 7	
Sinking fund	387 6 1	
		10,184 15 8
Salaries—		
General	20,766 1 9	
Afforestation	10,427 12 4	
		31,193 14 1
General development—		
Motor vehicles, field and office equipment ..	3,816 1 2	
Demarcation	667 19 1	
Forest atlas	766 13 0	
Communication expenses, office supplies, printing, and advertising ..	1,508 19 4	
Fiscal management expenses	585 4 9	
Forest and grazing reconnaissance, timber valuation and appraisal, policing, patrol, and maintenance	5,495 7 5	
Travelling-expenses ..	2,351 12 3	
Office rent, heating, and lighting	1,577 10 4	
Transportation expenses and upkeep of motor vehicles	587 7 4	
Temporary assistance ..	159 9 6	
Legal expenses and contingencies	36 7 1	
		17,552 11 3
Forest-fire fighting—		
Equipment and protection improvements ..	72 11 6	
Locomotion	190 3 10	
Wages	773 10 0	
		1,036 5 4
Educational—		
Reference library and photo equipment ..	369 1 1	
Photographic records and material	293 18 9	
Trade publications and preparing Service bulletins	95 13 4	
Exhibits and technical museum	42 19 5	
Rangers' instruction school	46 7 10	
		848 0 5
Forest research—		
Forest ecology	599 0 9	
Silvicultural management studies	201 14 3	
Utilization	198 4 6	
		998 19 6
General afforestation—		
Nurseries and plantations—		
Tree-planting, clearing, building, &c... ..	43,581 19 0	
Land-purchase for extension	2,127 16 1	
Sand-dune reclamation ..	261 15 10	
Cost of trees gratis to soldiers	862 18 4	
Preparation of planting plans	525 17 2	
Tree-seed collection ..	9 16 6	
		47,370 2 11
Acquisition of indigenous forests—		
Acquisition of areas in Hurakia and Manganui Survey Districts ..	..	7,172 11 5
Miscellaneous—		
Trounson Park — Fencing and erection of caretaker's cottage ..	257 17 7	
Subsidies to Wellington and New Brighton Councils for tree-planting ..	1,076 19 6	
Law-costs (Trounson Park)	65 2 9	
Allowance to Mrs. Steers (removal expenses) ..	10 0 0	
		1,409 19 10
Cash in hand at 31st March, 1922 ..		9,376 10 7
		£127,153 7 2

E. PHILLIPS TURNER, Secretary of Forestry.
A. W. GYLES, Accountant.

The statement has been examined and agrees with the total receipts and expenditure as disclosed by the Treasury accounts.—G. F. C. CAMPBELL, Controller and Auditor-General.

Loan Account as at 31st March, 1922.

To Loan authority—	£	s.	d.	By Debentures issued—	£	s.	d.
Section 50, Finance Act, 1916	50,000	0	0	1916–17—Section 50, Finance Act, 1916	10,000	0	0
Section 32, Finance Act, 1918 (No. 2) ..	200,000	0	0	1917–18—Section 50, Finance Act, 1916	28,100	0	0
Section 16, Finance Act, 1920	250,000	0	0	1918–19—Section 50, Finance Act, 1916 .. £11,900; Section 32, Finance Act, 1918 .. £15,000	26,900	0	0
				1919–20—Section 32, Finance Act, 1918 (No. 2)	65,000	0	0
				1920–21—Section 32, Finance Act, 1918 (No. 2)	70,000	0	0
				1921–22—Section 32, Finance Act, 1918 (No. 2) £50,000; Section 16, Finance Act, 1920 .. £35,000	85,000	0	0
				N.Z. consolidated inscribed stock, 6 per cent.: Section 16, Finance Act, 1920 ..	1,774	12	10
				Balance of authority	213,225	7	2
	£500,000	0	0		£500,000	0	0

Approximate Cost of Paper.—Preparation, not given; printing (1,475 copies, including illustrations and graphs), £47 10s.

By Authority: W. A. G. Skinner, Government Printer, Wellington.—1922.

Price 9d.]