1938.

NEW ZEALAND.

STATE FOREST SERVICE.

ANNUAL REPORT OF THE DIRECTOR OF FORESTRY FOR THE YEAR ENDED 31ST MARCH, 1938.

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

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

SIR, — Wellington, 1st July, 1938.

I have the honour to submit herewith the annual report of the operations of the State Forest Service for the year ended 31st March, 1938, as required by section 64 of the Forests Act, 1921–22.

In accordance with your desire to inaugurate a five-year programme of forest works, I have included in the beginning of the report a statement of those projects which appear essential to the carrying-out of a long-term forest policy.

I have, &c.,
A. D. McGAVOCK,
Director of Forestry.

Hon. Frank Langstone,
Commissioner of State Forests.

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REPORT.

SUMMARY.

FOLLOWING the practice of past years, the following brief review of the main activities of the Service is published for general information and easy reference by the busy reader. In most cases the subjects mentioned are dealt with in greater detail in the pages which follow.

Afforestation.—The total area of exotic State forests is now (in round figures) 428,200 acres. At Rotoehu, the new afforestation unit in the Bay of Plenty district, much preliminary work was necessary before tree-planting of any magnitude could be economically commenced, but nevertheless 237 acres were planted with stock raised in the Canterbury Conservancy.

Tobacco-culture, originally started under the supervision of the Department of Agriculture as a relief measure during the depression years, has been practised at the Station for the past six years, and when an afforestation project was decided upon the control of all operations was transferred to this Service. Although final figures are not yet available, it is confidently anticipated that last season's harvest will produce 35,000 lb. of high-grade cured leaf, for which a ready market exists. This Service gratefully acknowledges the valuable assistance it received from several expert Government officials, and particularly those of the Department of Agriculture, in preparing the leaf—*i.e.*, harvesting, curing, grading, &c.

Timber Sales.—The demand for blocks of milling-timber remained keen throughout the greater part of the year, but in some regions a falling-off was noticed in the last few months, and this accounts for the final figures being slightly lower than last year. The volume of timber sold was 103,341,000 board feet, with a stumpage value of £107,866.

Production of Timber.—The timber produced from all sources is expected to approximate 330,000,000 board feet. Last year's estimate of a similar quantity was not realized, final figures being some few million less. The total cut from State forests under all heads was 113,000,000 board feet, a slight increase on the total for the previous year.

Sawmills.—The recorded number of sawmills under all heads at the close of the year was 598, or four more than those for the year 1936–37. Of this total, 318, or 67 per cent., were operating full time, while 111 were closed, and 169 worked part time only. Sawmills cutting in State forests numbered 144, as against 138 last year.

Imports and Exports of Timber.—Schedules showing imports and exports of timber for the past three calendar years will be found in Chapter IV of the report. Prior to 1931 imports greatly exceeded exports, but during the following five years the position became reversed. Since 1936, however, whilst imports have again exceeded exports, it should be pointed out that more than 60 per cent. of the former comprised Australian hardwoods for railway-sleepers, poles, bridge-building, cross-arms, &c., and such timbers do not compete to any great extent with New Zealand timbers. Since 1931 the competitive imports have amounted to only 5 per cent. of the native-timber production.

The marked falling-off in exports apparent during the last three years is due, of course, to the restrictions placed on white-pine, which may only be exported when current production exceeds local consumption. Hopes of finding a steadily increasing market in Australia for o.b. matai, which is difficult to sell in the Dominion, and for rimu appear very bright, so that next year a rise in exports may be predicted with some confidence.

Opossum-trapping. The procedure outlined in last year's report for dealing with those who wished to trap opossums—*i.e.*, the allotting of blocks annually for one season only—was again followed for the year under review. Two hundred and sixty-three permits were issued to trappers to enter State forests, or seventy-one less than last year. This system of allotting blocks by public competition has worked with a minimum of friction and is undoubtedly the best method in the interests of all concerned. A close season was observed in North Canterbury Acclimatization District during the 1937 season, and it is understood that a close season throughout the Dominion will obtain for 1938.

Mining Privileges.—Applications for mining privileges continue to decline; 535 were dealt with, as compared with over 1,000 two years ago. Of the number first mentioned, only 25 per cent. affected State forests.

General.—I desire once again to record my supreme satisfaction with the work of officers of all ranks during the year of strenuous endeavour which has just closed; the results recorded herein are due in no small measure to the loyal, competent, and energetic assistance accorded to me on every occasion.

A FIVE-YEAR PROGRAMME OF FOREST WORKS, 1938 TO 1943.

Summary.

The principal features of the proposed five-year programme are: —

(1) The acquisition of 33,000 acres mostly of Crown lands for the creation of new and the extension and consolidation of existing State exotic forests.

(2) The afforestation with exotics of 82,000 acres, including the 33,000 acres to be acquired for this purpose.

(3) The reafforestation of 16,500 acres of cut-over indigenous forest land.

(4) Silvicultural operations, including thinning, pruning, &c., over 330,000 acres of State exotic forests.

(5) The improvement of housing-conditions for forest workers by the substitution of well-equipped huts for tent accommodation.

(6) The establishment of State-owned forest industries, including sawmills, box-factories, planing-mills, wood-preservation plants, &c., to act as demonstration, control, and salvage units in the exotic and indigenous forests.

(7) The placement under working-plan management of all State exotic forests to which State-owned forest industries are attached, all State kauri forests, and suitable administrative units in the silver-beech forests of Southland, the rimu pole-type forests of Westland, and the mixed rimu forests of the North Island.

(8) The substitution wherever possible of log sales for block disposal of standing timber.

General Policy.

For the first eighty years of its history, New Zealand's forest practice was one of "fell and burn." For the last twenty years it has been succeeded by a policy of "plant and preserve"—planting of rapidly growing exotics for the provision of adequate timber-supplies, and preserving the indigenous forest against fire and wasteful use for both timber-supplies and the maintenance of water, soil, and climatic equilibria, which are so essential to the agricultural prosperity and general well-being of the Dominion.

Concurrent with the establishment of over 400,000 acres of State exotic forests, almost 8,000,000 acres of indigenous forest have, with the co-operation of the Lands Department, been proclaimed State forest, whilst far-reaching reforms in the management of these forests have reduced fire losses to a minimum and effected considerable savings in the exploitation of the forest for timber-production.

The developments of recent years, instead of indicating any necessity for an amendment of the policy formulated during the 1919–25 period, emphasizes the accuracy of its original conception both of the forest problem and its solution. At the same time, the establishment of extensive areas of exotic forests has engendered a false sense of security with reference to the timber-supplies of the distant future. Although annual reports of the Forest Service have drawn attention to the limitation of exotic species, there is yet insufficient appreciation of the fact that experience with exotics in both Europe and North America has not been altogether successful. It is therefore necessary to urge that the indigenous forests should be regarded as more suitable for stable forest management than exotics, and that as a long-range policy the use of indigenous species and the adaptation of the virgin forest composition both for wood-production and for protection purposes should be regarded as the essence of New Zealand forestry.

In accordance with this policy it is proposed that fire protection and clear cutting under block sale shall be supplemented by experimental silviculture, and in particular by selective logging of all commercial forests carrying a good stock of young or immature timber. Likewise, in the management of the exotic forests the application of silvicultural treatment for the improvement of the forest, combined with exploratory utilization work, will become the dominant activities during the next five years. For the purposes of this report the various projects of the five-year programme of forest-works have been dealt with under the headings of "Establishment," "Silviculture," "Management," "Utilization," and "Employment."

Establishment.

Exotic Forests.

The original 1925 programme for exotic plantings provided for the establishment by the State within ten years of 300,000 acres of rapidly growing exotics, but was enlarged in 1931 to reduce the proportion of *Pinus radiata* to 30 per cent. of the total area of State plantings. By the use of other well-proved species the succeeding period has seen the reduction in *Pinus radiata* stands to less than 40 per cent. of the total State plantings. At the same time experiments have been instituted with new and promising species which may assist to produce in the distant future a balanced and uniform yield of forest products over a long period of years as well as a wide range of timbers for the diversified requirements of industry.

With rapidity and economy of establishment as dominant considerations in both the original and revised programmes, the formation of extensive planting units was a logical development, but with emphasis shifted to new species the interrelated questions of regional planning and multiple land use have forced attention upon smaller administrative units in which both agricultural and forestry land are combined. By segregating the various classes of land and combining the State growing of specialist agricultural crops requiring a high degree of technical supervision with the establishment of State exotic forests, year-round employment becomes possible. Forest community planning has therefore become a definite administrative objective, the first unit being that selected at Pongakawa, in the Bay of Plenty district, where tobacco-culture is being proceeded with as a specialist activity.

In conformity with the foregoing policy it is planned to establish with exotic species during the next five years a total of about 82,000 acres, of which 49,000 acres are already available for this work, leaving 33,000 acres—most of which is Crown land—to be acquired for the completion of the programme. The number of trees to be raised for this planting effort is estimated at one hundred and thirteen million, and the inclusion of a wide variety of species will have the desired effect of still further reducing the percentage of State exotic forests carrying *Pinus radiata*. At the completion of the programme not only will most of the principal administrative units be consolidated, but the State exotic stands, with their present acreage of over 428,000 acres, will attain a grand total of over 500,000 acres.

Indigenous Forests.

It is planned to inaugurate an active programme of reafforestation of indigenous forests with exotics. Hitherto such work has been entirely of an experimental nature, but the results have proved sufficiently promising to warrant a five-year programme totalling approximately 16,000 acres, 2,000 acres of which will be in the Auckland Forest-conservation Region, and 4,000 acres, 7,000 acres, and 2,000 acres respectively in the Rotorua, Wellington, and Otago-Southland Forest-conservation Regions, with minor acreages in the Nelson-Marlborough and Westland Regions. The number of trees required to complete this programme is estimated at eight million.

The outstanding features of the indigenous forest situation are that most of the commercial forests are in a stagnant or overmature condition in which net growth is offset by decay, and that they are being worked over at the rate of between 30,000 acres and 40,000 acres per annum without any provision for their re-establishment. To the extent that these forests are being protected against fire and wasteful use, they are being conserved, but the ultimate objective of converting them into a state of maximum productivity as rapidly as possible must be kept steadily in view, and the current programme of national-forest works inaugurates far-reaching administrative reforms which are directed towards the long-term objective of converting those stagnant or overmature virgin stands into healthy and productive forests.

SILVICULTURE.

Exotic Forests.

The essential silvicultural operations upon which hitherto the State Forest Service has concentrated its energies have been the clearing and underscrubbing in the older exotic forests. These operations, largely carried out with the assistance of unemployment funds, have materially reduced the fire risk and will facilitate future improvement cuttings. A commencement has been made likewise with the pruning of selected final crop trees in the older stands. Generally speaking, the work has been confined to the pruning of dead branches, but observational prunings of green branches have also been undertaken, and experiments are still proceeding with a wide variety of pruning-implements ranging from hand secateurs to heavy pole saws.

With the establishment of State sawmills, box-factories, and creosoting-plants, &c., in the State exotic forests a wide field of silvicultural operations becomes practicable within the next five years. The proposed programme of national-forest works provides for blanking, underscrubbing, thinning, and pruning operations over a total area of 336,000 acres, as compared with the treatment of less than 70,000 acres during the previous history of the Service. This work is estimated to necessitate the employment of an average of six hundred men for the whole of the five-year period.

Of equal importance with the development of improvement-cutting technique is the problem of harvesting the final crop and re-establishing the exotic forests. The necessity for a comprehensive study of cutting systems and of the relative advantages of natural regeneration and replanting is of such basic importance that, coupled with considerations of fire protection, it has been decided to introduce a policy of selling logs and other raw material. This policy of log sales follows European forestry practice, and will not only expedite the development of improvement-cutting and re-establishment technique, but will also facilitate protection against fire.

Indigenous Forests.

While little silvicultural investigative work has been possible in the indigenous forests during the past twenty years, a considerable amount of silvicultural knowledge has been accumulated as a result of observations made in connection with routine protection, cruising, and logging work. There is now little doubt that one of Nature's principal methods of perpetuating the high forests of the Dominion is through wind-throw, whereby mineral soil is exposed and the proper conditions created for the replacement of the overmature forest giants of kauri, rimu, white-pine, &c., by a crop of seedlings of these valuable species. While, therefore, the existing policy of clear cutting over-mature forest and protecting thereafter from fire is not far removed from Nature's management, it is just as certain that it does not facilitate the prompt re-establishment of the commercial species.

There are two conclusions of importance. The first is that a comprehensive study must be initiated into the silvicultural characteristics of the principal commercial species, more especially of kauri, rimu, and silver-beech. Many decades must pass before such a study can be perfected, but considerable progress can be achieved even in the early years by investigating the raising of young trees from seed. This is not to indicate that large-scale artificial re-establishment is contemplated. The work is intended primarily to afford a working knowledge of the behaviour of the seeds and seedlings with a view to developing adequate silvicultural methods for natural regeneration.

The second, of even greater importance, is the conclusion that in all commercial forests carrying a good stocking of young or immature timber no logging should be allowed except under strict silvicultural measures. So small a percentage are these forests of the total commercial stands that their conservation should form the keynote of the indigenous-forest policy, as they must be considered a vital factor in the early development of an indigenous silvicultural technique.

Management.

Exotic Forests.

Forest management entails the preparation of working-plans to regulate the cut of the forest by co-ordinating the demand for finished products with the yield and silvicultural requirements of the forest. Measurement and estimation of the timber and of the rate of growth of the trees are necessary, but not until exotic forests are well established and commanding a residual or salvage value. It is for this reason that work on the necessary assessment surveys, &c., has been concentrated on the earlier planted areas in the Rotorua (Whakarewarewa and Waiotapu), Canterbury (Hanmer and Balmoral), and Otago-Southland (Dusky) Forest-conservation Regions. All five surveys indicate that the growth of the stand is conforming to anticipated results and give added confidence for the planning of future development.

Forest-management activities must be developed rapidly if the State is to realize effectively upon its enormous investments in exotic forests. Long-range planning is essential to major transport and utilization developments, and it includes the completion both of the assessment surveys already commenced and of an additional four in the Auckland, Rotorua, and Otago-Southland regions, the formulation of working-plans for the nine forest units covered thereby, and establishment surveys over the whole of the remaining exotic forests now established.

Indigenous Forests.

The application of management to indigenous stands has become a practical reality only in very recent years. Only with the anticipated exhaustion of the privately owned kauri forests within the next two years has the opportunity presented itself for an application of sustained yield forest management to the remaining virgin stands of this valuable and world-famed species. In pursuance of this policy a permanent extraction route has been constructed in the Omahuta State Forest, and investigative work in respect of release cuttings, &c., made in both this and the Herekino State Forest. The five-year programme likewise makes provision for the construction of extraction routes in the Puketi State Forest with a view to facilitating the extraction of supplies for the 1941–46 period. The annual cut for the years 1938–40 will be limited to 1,500,000 board feet, as during this period privately owned bush is being cut at the rate of between 6,000,000 ft. and 8,000,000 ft. per annum, but it is planned to make an intensive survey of the whole of the kauri forests and cut-over areas with a view to determining their exact resources and whether or not the annual cut can be increased above the 3,000,000 ft. level tentatively planned for the subsequent five-year period 1941–46.

The formulation of general working-plans for the regulated cutting of other species on a country-wide scale presents many difficulties, and with the possible exception of silver-beech cannot in the meantime be proceeded with. The most that can be done is, as previously reviewed, to bring under management as rapidly as possible all those areas carrying young and immature growth which may be formed into suitable administrative units, and in this connection it is planned to place immediately under management a 10,000-acre rimu pole-type forest in the vicinity of Lake Ianthe, in the Westland Forest-conservation Region. The plans for this area for the next five-year period have been designed to provide for the determination of the sustained yield of the forest, the formulation of a working-plan, the perfection of fire-protection technique, the construction of permanent extraction routes, the felling and extraction of logs, and the application of experimental silvicultural technique with a view to managing the forest on a sustained yield basis. Provision has likewise been made for the placing under management of an extensive rimu - white-pine - totara area in the Te Whaiti district of the Rotorua Forest-conservation Region. Logging by modern caterpillar tractor and arch equipment and a wide range of silvicultural experiments in connection therewith will be instituted immediately, an annual output of about 5,000,000 board feet of logs being scheduled for the period under review.

The silver-beech forests of Southland regenerate freely, and with proper management and protection successive crops of this timber can be expected. With this objective, forest-working plans are being prepared for the administration of areas considered suitable for the purpose. Such areas are being set apart as permanent State forests.

The significant feature common to all these management areas and units is their logging by the State and the sale of logs in place of trees. By no other means is it practicable to secure the close control of logging operations, so essential to the preservation of young growth and the encouragement of natural regeneration. Just as the inauguration of block sales in place of "royalty payments off the saw" has effected a marked reduction in forest wastage, so will the adoption of log sales further reduce avoidable waste.

General.

With an ever-increasing degree of silviculture management and utilization in both exotic and indigenous forests, general maintenance activities become of major importance. Improved roading, communications, fire patrol, and fire-break maintenance are essential to the protection of the State's large investments in growing forests, and while a well-planned and co-ordinated scheme of fire control has been developed for the State-owned exotic forests, with strategically located depots of fire-fighting tools, lookout towers, telephone-lines, fire patrols, and mobile fire-fighting units, the growing

numbers of itinerant motorists and recreationists such as hikers, &c., combined with the ever-increasing value of the forests, make it imperative that further protection be secured. More lookout towers must be provided, improved mobility also for patrols and fire-fighting units, detection and quick suppression tactics being the secret of successful fire protection and control.

Utilization.

Exotic Forests.

From a modest figure of 4,000,000 board feet in 1918–19 the production of exotic-pine timber increased eightfold to a peak record of 34,000,000 board feet in 1935–36, at which figure it ranks as the third most important timber produced in the Dominion. A subsequent decrease to 31,000,000 board feet in 1936–37 is due to the fact that log-supplies from old plantations and shelter-belts established by farmers in the early colonial days are now rapidly diminishing, constituting one of the basic considerations which have determined the Government policy of supplementing these diminishing supplies with timber from thinnings and improvement cuttings in the State exotic forests.

It is not in the form of sawn timber alone that the exotic species will be used. Already sales of firewood, rustic work, posts, poles, mining timbers, and sleepers have been made at Rotorua, Waiotapu, Hanmer, and Dusky. The sales of posts, poles, and sleepers, of course, have been strictly limited, on account of the lack of natural durability in most of the exotic timbers. Large markets for these products do exist, but high durability is essential to all, and the pole and sleeper market is supplied almost wholly from Australia and the post market from the indigenous forests. Only by the application of suitable preservative treatments may the State exotic forests supplement the declining supplies of indigenous post timbers and replace to any considerable extent the imported Australian hardwood products.

Encouraging as they have been, the sales of all types of products from both State exotic forests and privately owned mature stands have indicated the necessity for numerous reforms at every stage of production and manufacture. Failure to observe various fundamental precautions has resulted in the production of poor-quality material and created much prejudice against the use of exotic timbers for many purposes. Although no effort has been spared to educate exotic forest operators as to the handling and manufacture of their products, so little progress has been achieved over a comparatively long period of time that it has become imperative for the State to install utilization plants, including sawmills, box-factories, wood-preservation units, &c., which will effectively demonstrate the high quality of the products which can be manufactured from exotic timbers. So much trouble has been experienced during recent years in securing adequate supplies of good-quality boxes, especially for the fruit industry, that importations have been necessary, and the demonstration that boxes can be manufactured economically from thinnings and of a quality comparable with the best imported cases will not only ensure the local production of the whole of the Dominion's requirements, but will allow the fruit industry to realize the best value for its produce when packed in high-quality, reasonably priced containers.

Of ever-increasing importance is the necessity for demonstrating the value of exotic timbers for general building purposes, and the five-year programme provides not merely for the production of such timber, but for its extensive use in the housing programme of almost eleven hundred houses and hutments consequential upon the expansion of labour activities in both exotic and indigenous forests. The trend from seasonal to year-round employment makes the abandonment of tent accommodation and its substitution by commodious wooden housing a practicable objective, and marks a desirable step forward in stabilizing forest employment and in improving living-conditions in out-of-way locations.

Without exception the whole of the utilization projects listed for the 1938–42 period involve radical departures from current manufacturing, merchandizing, and wood-using practices in New Zealand, and, having for their objective as they do the establishment of permanent industries and communities, it is essential that the most modern equipment be employed. The programme accordingly provides for the establishment of suitable manufacturing and producing plants which will act as key units for the future guidance of the State in its policy of disposing of raw material. An additional factor necessitating State ownership of these units is the need for elasticity in respect to the type of raw material to be supplied during the earlier stages of operation. Reference has been made previously to the necessity for developing an improvement-cutting and re-establishment technique which will involve extraordinarily wide variations in the raw material made available for working up into the various products. The difficulty of dealing with such material in anything but a State-owned enterprise would prove quite uneconomical to the State, besides involving administrative difficulties which appear insurmountable. Of paramount importance, too, is the necessity for the State to have at its unlimited command manufacturing and producing units which may be operated, if necessary, twenty-four hours a day for the rapid salvaging of material damaged by extensive fire, wind-throw, insect or fungal attack, &c.

Only by the integration of the various manufacturing and producing units may maximum efficiency be obtained. Either improvement cuttings or final clear fellings will yield every type of raw material, and to minimize waste thereof it will be necessary to develop a co-ordinated demand for all classes of products, including firewood, rustic timbers, mining and scaffolding timbers, treated posts, poles, and sleepers, sawn timber for boxing and crating and for building and constructional work, and various classes of pulp products. The extent to which the various producing units may be integrated will be dependent upon the size of the available markets. This applies more particularly to pulp products, in which co-ordination of the local and Australian markets is essential if any marked progress is to be achieved.

Having regard to the foregoing principles, a five-year utilization programme has been developed providing, first, for the expansion of firewood sales, the marketing of larch rustic timbers, and the production and sale of pit props and round structural timbers; secondly, for the establishment of modern North-European-type sawmills complete with dry kilns, box-factories, and planing-mills at Rotorua and Conical Hills for the production of high-quality box shooks and building timbers; and, thirdly, for the installation of a non-pressure post and pole preservation plant at Hanmer and of pressure plants at Rotorua, Christchurch, and Conical Hills for the treatment of posts, poles, sleepers, and building timbers.

Indigenous Forests.

Both the intensity of forest management and the efficiency of forest land use are directly dependent upon the utilization of forest products. As a source of employment the indigenous forests would be of negligible importance if valued solely for the maintenance of soil, climatic, and water equilibria, and solely to the extent that they find additional use for the growth and utilization of wood products can they rank high in the field of national employment economics. Only by ensuring maximum efficiency in harvesting forest crops and their adaptation to modern requirements is it possible to safeguard the economic future of forestry. With a view to broadening and stabilizing the markets for various classes of forest produce, extensive investigations have been undertaken by the State Forest Service during practically the whole of its seventeen years' history. Not only have technical investigations been made into production methods and wood-using practices and into the elimination of waste and the use of non-commercial species, but many practical improvements have been effected in the everyday utilization of all important locally grown timbers. The outstanding developments of this period have been the establishment of kiln-drying and modern grading as practicable everyday realities, enabling the indigenous timbers to replace imported woods hitherto required on account of the lack of kiln-drying facilities, &c. These developments, backed by the information gained by the State Forest Service as a result of its investigations into the mechanical and physical properties of the locally grown woods, have enabled them to be used much more efficiently than hitherto and to replace to a considerable extent some of the imported timbers. Demonstrations of the effectiveness of wood preservation have likewise stimulated interest in this important branch of utilization, while extensive laboratory and commercial tests have defined within close limits the values of various indigenous timbers for pulp and papermaking purposes.

Considerable progress remains to be achieved, and previous experience indicates that practical demonstrations on a commercial scale are the most effective means of obtaining reasonable and lasting results. Indeed, in many cases, as already indicated in the case of the exotic forests, no other means is practicable, and this is especially so in the case of the rimu area which it is planned to place under management in the Westland Forest-conservation Region. Inasmuch as this area will be managed on a sustained yield basis and will require the development of a new logging and manufacturing technique, the same argument adduced for the establishment of a demonstrative manufacturing unit in the exotic forests applies with equal force to this indigenous forest unit, although provision therefor has not been made in the programme under review.

In the North Island the outstanding problem is the utilization of tawa, and it is anticipated that the opening of the State sawmill in the Rotorua exotic forests will afford opportunities of investigating on an adequate scale both the production and utilization of this important hardwood, as substantial markets, both local and export, are capable of development on a fairly large scale. The resumption of technical investigations is also recommended as essential to the efficient utilization of indigenous timbers, and a balanced programme of timber testing, wood preservation, kiln-drying, and pulp and papermaking tests has been drawn up with a view to expediting future developments of a commercial nature.

EMPLOYMENT.

The foregoing proposals of the five-year programme will provide work to the extent of about 103,000 man-months, equivalent to the employment of 1,700 men for the five-year period.

The forests offer an avenue of work ideal for emergency employment purposes, but the work is not suitable for all classes of labour. It requires physically fit men used to outdoor work of a strenuous nature, much of it semi-skilled, and with due care in the selection of individuals many will become permanent forest workers.

CHAPTER I.—MANAGEMENT.

1. AREAS UNDER CONTROL.

At the 31st March, 1938, the total area of land of all classes under forest reservation had risen to approximately 8,122,700 acres, a gross increase for the year of 157,301 acres.

It is pleasing to note that each year the forest estate of the Dominion is being slowly but surely increased, and it now forms nearly 12¼ per cent. of the superficial area of New Zealand. Impressive as these figures may appear to the layman, it should be pointed out that forestry authorities of world-wide repute are unanimous in the opinion that in an insular State such as ours 25 per cent., or double the present area, would not be too large to ensure a reasonable margin of safety. It may be added that the work of forest and land classification, referred to in last year's report, is not yet complete but is steadily progressing, with the result that from time to time further areas which are deemed unsuitable for farming will be proclaimed under the Forests Act, 1921–22. The closest co-operation with the Departments of Land and Survey and Agriculture exists in regard to this very important work.

TABLE I.

AREAS OF STATE FORESTS AS AT 31ST MARCH, 1938.

Forest-conservation Region.	Permanent State Forests.		Provisional State Forests.		Totals.	Percentage of Total Area of Region under Reservation.
	Ordinary.	National Endowment.	Ordinary.	National Endowment.		
	Acres.	Acres.	Acres.	Acres.	Acres.	
Auckland ..	360,331	81,646	117,566	14,006	573,549	6·67
Rotorua ..	364,850	240,044	133,798	80,268	818,960	16·29
Wellington ..	978,378	65,891	34,374	7,649	1,086,292	7·26
Nelson ..	452,014	121,615	1,056,041	627,870	2,257,540	32·21
Westland ..	621,195	163,305	521,761	421,436	1,727,697	44·72
Canterbury ..	427,209	3,647	..	..	430,856	4·53
Southland ..	447,350	55,774	710,932	13,740	1,227,796	7·23
Totals ..	3,651,327	731,922	2,574,472	1,164,969	8,122,690	12·24

Table 2 shows the areas (in forest-conservation regions) proclaimed under the Forests Act. The major area, 94,460 acres, comprises the high bush-clad country in the vicinity of Lewis Pass, North Canterbury, and embraces the forested land surrounding the headwaters of the Hope, Doubtful, Lewis, and Boyle Rivers.

The largest area set apart as a provisional State forest—viz., 16,502 acres—is located in the King-country, Ranginui Survey District, Auckland Land District. This block is regarded as potential farming-country, and if expert examination confirms this view the land will be released from reservation when the milling-timber has been removed.

The area of 20,691 acres permanently reserved in Rotorua Conservancy includes the new afforestation project of 19,628 acres in the Bay of Plenty known as Rotochu.

TABLE 2.

SUMMARY OF AREAS ADDED TO PERMANENT AND PROVISIONAL STATE FORESTS, 1ST APRIL, 1937, TO 31ST MARCH, 1938.

Forest-conservation Region.	Permanent State Forests.		Provisional State Forests.		Totals.
	Ordinary.	National Endowment.	Ordinary.	National Endowment.	
	Acres.	Acres.	Acres.	Acres.	Acres.
Auckland	36,521	..	16,502	..	53,023
Rotorua	20,691	..	3,183	..	23,874
Wellington	4,431	..	..	..	4,431
Nelson	30	..	1,896	1,045	2,971
Westland	..	..	..	..	..
Canterbury ..	94,460	..	..	..	94,460
Southland	2,459	..	5,545	..	8,004
Totals ..	158,592	..	27,126	1,045	186,763

Table 3, which follows, is self-explanatory. It records that, although 20,458 acres were withdrawn from the operations of the Forests Act, 19,496 acres of this total will still remain as a permanent reserve in terms of the Scenery Preservation Act, 1908.

The area of 18,825 acres in Nelson Conservancy lies along the Maruia Valley and embraces the headwaters of the Maruia River.

TABLE 3.

SUMMARY OF AREAS WITHDRAWN FROM PERMANENT AND PROVISIONAL STATE FOREST RESERVATION, 1ST APRIL, 1937, TO 31ST MARCH, 1938.

Forest-conservation Region.	For Settlement Purposes.		For Scenic Purposes.		Totals.
	Permanent State Forest.	Provisional State Forest.	Permanent State Forest.	Provisional State Forest.	
	Acres.	Acres.	Acres.	Acres.	Acres.
Auckland	51	..	..	..	51
Rotorua	..	..	47	..	47
Wellington ..	..	..	6	..	6
Nelson	..	249	..	18,825	19,074
Westland	..	205	..	..	205
Canterbury ..	..	..	..	..	..
Southland	..	196	218	661	1,075
Totals ..	51	650	261	19,496	20,458

2. Protection Forests.

The question of conserving the remaining indigenous forests on the hill country of the Dominion still continues to occupy a prominent place in the press and in the minds of the general public, more particularly when serious river-floodings, landslides, &c., occur, as has happened in recent months in the North Island. Whether such catastrophes can be attributed wholly to the destruction of the forest cover is still a moot point and the subject of controversy amongst experts. Possibly in the final analysis it may be found that the great ground movements which resulted from the Hawke's Bay earthquake of February, 1931, have played a large part in causing the excessive landslides referred to, but undoubtedly stream flow can be regulated and rapid run-off following heavy rains prevented by the presence of a good forest floor of ferns, mosses, lichens, &c., such as are found wherever the forest cover has been undisturbed.

The Service has therefore kept the important question of the extension of forest-protection areas continually in the foreground, and is pleased to report that over the past four years 1,780,000 acres of this class of forest have been permanently reserved. The area so reserved for the year just closed exceeded 100,000 acres, and when negotiations now in hand are completed a further area of approximately 74,000 acres covering the northern portions of the Kaimanawa and Ahimanawa Ranges will be added.

It has been mentioned in previous reports, but may be repeated for general information, that Conservators of Forests have standing instructions that all bush within 10 chains of any public highway, along the banks of rivers or lakes, and on watersheds must be conserved for scenic purposes, and when sawmill areas are being demarcated any bush which comes within this category should be excluded therefrom.

It may also be repeated that water-conservation and the prevention of erosion and denudation through the maintenance of forest cover is one of the chief functions of the Forest Service.

It is such a popular fallacy that the extraction of logs from a standing forest must of necessity seriously reduce the protection value of the forest that it may be well to point out that under proper forest management the taking-out of selected trees has in most cases a beneficial effect in this respect by encouraging the rapid growth of secondary species which very quickly heals the scars made by the removal of the large trees.

3. Forest Reconnaissance, Inventory, and Timber Cruising.

Indigenous Forests.

The reconnaissance-work in hand at Herekino State Forest (North Auckland) at the end of the previous fiscal year was completed shortly afterwards, and the investigating officer compiled a report on the kauri areas with an inventory of the timber, accompanied by topographical and type plans. The forest was subdivided into compartments, but a working-plan was not prepared, as it is not proposed to exploit this timber at present.

The reconnaissance of Omahuta Forest, in the same conservancy, was also completed, and a comprehensive report and inventory of all species prepared. This forest has been subdivided into compartments suitable for the introduction of working-plans, and future operations herein will be on a properly managed basis.

Similar work at Waipoua Forest was extended, and all the forested area in Block VII, Waipoua Survey District, was topographically surveyed and the timber typed and estimates made. Work of a similar nature was carried out with respect to the kauri-bearing areas in Block III, and a cruise of the timber was commenced. From the areas already cruised it appears that the former estimates of timber quantities have been unduly optimistic.

Preliminary work was undertaken at Puketi State Forest with a view to locating a suitable main access and extraction route to enable road-work and later a reconnaissance and topographical survey to proceed, but work was retarded owing to flooded rivers and other difficulties. It is hoped that more progress will be made this year.

At Warawara State Forest reconnaissance-work on a moderate scale was commenced, 575 chains of grid-lines being chained and contoured, 650 chains of boundary-lines opened up, and a compass traverse made of 250 chains of tracks.

In Rotorua Conservancy 836 chains of external boundaries of State forests were redefined, and similar work in Nelson totalled 620 chains, where also 6,181 acres were topographically surveyed and 18,000,000 board feet of milling-timber located on 5,665 acres.

A very large reconnaissance survey carried out in Westland Conservancy to ascertain more accurately the remaining supplies of white-pine covered a total area of 51,000 acres near Wataroa and Waiho, Okura-Jackson's Bay, and Stillwater-Karangarua River localities.

In Southland Conservancy reconnaissance surveys were made over 8,504 acres in all, and the volume of timber thus located was 59,413,700 board feet.

Timber cruising field parties were fully engaged throughout the whole year cruising blocks of timber to meet the demands of sawmillers, who not infrequently are nearly "cut out" before making their requirements known for new supplies. A function of the Service is also the cruising of timber on behalf of the Lands and Survey and Native Departments, &c., and much work was done under this head, particularly in Rotorua, Wellington, and Southland regions.

Exotic Forests.

A topographical survey of Rotoehu Exotic Forest (Rotorua Region) is proceeding at the time of going to press, and already 4,650 acres have been surveyed by the plane-table method, for which the country is well suited. Four thousand eight hundred acres have been subdivided into blocks and compartments.

Towards the close of the year a preliminary reconnaissance was commenced in connection with the proposal to obtain a water-supply for this station by reticulating Pongakawa Valley Settlement from Waitahanui River. This work will proceed until completed.

Inventory.—The inventory of the older portions of Hanmer Plantation (referred to in last year's report) was completed, and a working-plan for this and Balmoral Plantations is now being compiled.

4. State Afforestation.

Table 4 summarizes the position of the exotic State forests as at the close of the year under review and requires little explanation. It will be noticed that the gross area has been increased by the inclusion of the new afforestation project—Rotoehu—to which reference is made in other portions of the report.

Planting proceeded only on a very minor scale, being mainly confined to the Auckland and Rotorua Conservancies, and the recorded total of 1,705 acres is the smallest for two decades.

In addition, however, a gross area of 10,700 acres was reconditioned by interplanting, blanking, and replanting with species more suitable to the locality, &c. Nearly one-half of the area so dealt with is at Kaingaroa, where more than 250,000 acres have now been planted in trees.

It may be stated that, of the gross area of 617,568 acres, the non-plantable land—*i.e.*, the land absorbed by roads, fire-breaks, rides, swamps, administrative buildings, &c.—comprises approximately 140,000 acres.

TABLE 4.

Summary of Operations in Plantations as at 31st March, 1938.

Plantation.	Year of Commencement	New Area planted, 1937.	Total Net Area planted.	Gross Area of Plantation.
		Acres.	Acres.	Acres.
Waipoua	1925	201	1,560	12,600
Puhipuhi	1904	..	1,176	1,558
Riverhead	1926	39	11,063	11,956
Maramarua	1928	..	12,303	14,087
Tairua	1930	544	11,150	48,510
Rotoehu	1937	237	237	19,628
Whakarewarewa	1898	..	8,033	10,073
Waiotapu	1901	..	7,051	7,974
Kaingaroa	1913	42	259,178	327,931
Tongariro	1937	77	77	1,800
Erua	1930	179	3,116	6,648
Karioi	1927	..	17,191	33,689
Golden Downs	1927	19	19,311	22,557
Westland	1922	2	3,064	5,839
Hanmer	1901	7	7,784	10,372
Balmoral	1916	191	21,282	24,012
Eyrewell	1928	3	18,343	19,266
Naseby	1900	2	3,053	4,032
Dusky	1898	..	4,470	6,866
Conical Hills	1903	..	3,612	3,805
Pukerau	1915	..	565	628
Blue Mountains	1925	..	8,775	9,661
Pebbly Hills	1930	..	4,353	5,330
Minor areas	1875–1937	162	1,463	8,746
Totals	..	1,705	428,210	617,568

5. Sales of Timber.

The demand for milling-timber continued fairly keen throughout most of the year, although there was a noticeable slackening off in some districts during the latter months, due probably to accumulation of stocks of inferior grades, o.b., &c. As will be seen from the appended schedule, the quantity of timber sold was slightly lower than the previous year's figures. In Westland a new record was set in regard to timber sales, the figures (exclusive of sales on Warden's areas) being sixty-one sales affecting 4,020 acres valued at £40,808 and of an estimated quantity of 45,915,100 board feet.

In Southland twenty sales were effected covering 17,707,100 board feet sold for £15,066. In addition to the quantity of milling-timber sold, many sales of firewood, posts, poles, strainers, droppers, battens, house-blocks, &c., were made by permit. Post-splitting blocks of silver-pine, totara, red-beech, &c., were eagerly sought after, more particularly in Westland, in the King-country, and in Rotorua Region, and so keen was competition for such areas that splitting rights disposed of by public tender generally brought royalties much in excess of upset prices.

TABLE 5.

Year.	Number of Sales.	Quantity sold.	Sale Price.
		Board Feet.	£
1933–34	83	49,026,300	52,118
1934–35	117	65,302,700	71,243
1935–36	130	102,219,800	131,447
1936–37	146	107,429,600	124,522
1937–38	140	103,341,450	107,866

Milling-timber cut from State forests (including Warden's areas) totalled approximately 113,000,000 board feet.

The volume of timber cut from all sources is estimated to be 330,000,000 board feet, of which 35 per cent. was cut from areas controlled by the Forest Service; the remaining 65 per cent. came from Native and privately owned bush.

6. West Taupo Timber Lands.

The arrangement with the Lands and Survey and the Native Departments for the periodical patrol of their lands was continued by a Forest officer, who was responsible for the detection of two cases of timber trespass during the year.

The matter was referred to the Aotea District Maori Land Board for appropriate action. It is pleasing to record that the trespass and vandalism so rife in former years have now almost entirely disappeared from this large tract of forested country.

7. Waitangi Endowment.

Tree-planting on a small scale was continued, and at the close of the year the new planted area totalled 42 acres—35 acres of *P. taeda* and 7 acres of *Agathis australis* (kauri). The area was clear felled and burned prior to planting. The planting stock mentioned was raised in the local nursery. Other nursery operations consisted of the sowing of 1 lb. *E. regnans*, 1 lb. *P. patula*, and 237 lb. *Araucaria excelsa* (Norfolk Island pine). Before it was arrested, a "damping-off" disease took a heavy toll of the young Kauri-trees in the nursery. Maintenance-work on fire-breaks, roads, &c., was kept well up to date.

CHAPTER II.—FOREST PROTECTION.

1. General.

The year's weather has been marked by vagaries which affected the forester quite differently from the man in the street. The outstanding events were an exceptional fine and hot spell in late November and the first few days of December, particularly on the central volcanic plateau of the North Island; an extremely prolonged dry spell in summer and autumn in Otago and Southland; and one violent storm of wind and rain in early February affecting forests in Coromandel Peninsula and the western end of the Bay of Plenty.

Severe fire losses in indigenous State forests were experienced in the unexpected fine spell in November–December. These are dealt with in detail below: but it may here be noted that they were accompanied by other losses in Crown forests, Native-owned forests, and privately owned exotic forests. Records subsequently furnished to the Forest Service by the Director of the Meteorological Office showed that on two successive days relative humidity in the early afternoon fell to 30 per cent. and lower, without any warning that could be interpreted from preceding weather conditions, the accompanying temperature being in the vicinity of 85° F. A relative humidity of 40 per cent. is usually accepted in other forest countries as the line of crucial forest-fire danger, and never previously has that figure been recorded even at the height of the usual February–March danger season in the course of the numerous readings taken for many years at forest stations. A sudden drop to 30 per cent., therefore, so early in the season as 29th November was in the nature of a catastrophe, as unpredictable as an earthquake; and, as in the case of earthquake, no administrative measures could be taken save to minimize fire damage after it occurred. The "dry air snap" was fortunately of very short duration.

The localized storm of early February caused a certain amount of damage to leaders in young plantations, but its chief effect on the Forest Service was that almost in its direct path lay the new tree-nursery and tobacco-farm at Rotoehu State Forest. The tobacco, which had had practically ideal weather all the season, was almost at the first-picking stage, and in one night it suffered very severely from both wind and rain. Some 5 in. of rain fell overnight, and at least fifteen hundred plants were blown completely out of the ground. The rest was naturally much damaged: but ideal weather ensued from then to the end of the harvest, and recovery was rapid and much better than the most optimistic could have anticipated on the morning after the storm.

Another effect of the early dry hot spell of November was very heavy nursery losses of line-sown pines from "collar scorch." This is a well-known cause of nursery losses in sub-tropical and warmer countries, and is the real reason in most other countries why cheap open-line sowing cannot be practised. It has never before caused losses in New Zealand: but the exceptional early heat of December, above referred to, coincided with the sprouting period, and in one case the crop which was expected to reach the nine million mark was virtually a total loss. The effect will be on the 1939 planting programme.

The dry Southland summer had no spectacular ill results for forestry, but it was probably responsible for a condition of homestead and estate trees greatly at variance with the statement made in the final sentence of this paragraph in last year's report. It was there stated that "the more arid areas of the South Island received much heavier rains than usual, and the forests present an appearance of greater well-being than for several years past." At the time of writing, this was true: but the excessively wet 1936-37 summer affected both normally arid and normally moist districts in the South. For the normally moist South Otago and Southland this was followed by an unprecedented drought, and the two extremes in successive years have spoiled many farm and run wood lots. The sudden decadence of such belts throughout the southern portion of the South Island was a marked feature of the mid and late summer this year.

2. Forest Fires.

With the exception of the short but very exceptional periods referred to above, the year may be classed as a "comfortable" one from a Forest officer's viewpoint. The fire season was a prolonged one, but not of intense hazard, and the numerous small fires could be coped with by dint of regular and unceasing staff activity.

Central Plateau Fires (Wellington and Rotorua Conservancies).—These all occurred during the period 29th November to 2nd December. The most remarkable feature was the virtually simultaneous outbreaks of quite disconnected fires over a limited and sparsely settled area of country. Some arose in or adjacent to sawmill areas, one at least occurred at the same time in a remote area of untouched forest (Native owned) many miles from the nearest habitation or industry, and one occurred in the well-protected areas of an afforestation company.

The total damage is difficult to state with accuracy, but it is certain that over 40,000,000 board feet of mature milling-timber of indigenous species was killed. Salvage operations will reduce this loss considerably, as there will probably be at least a year yet before decay reaches a point when it will be economically unsound to proceed further in salvage. It should be noted, too, that the above figure is the grand total of losses from forests of all ownerships. The State Forest loss, with which alone this report should be concerned, is the much lower figure of 17,000,000 board feet on 900 acres.

There were no fire losses in exotic State forests. The area and volume of exotic forests destroyed on private land is not known, as the State Forest Service has neither the duty nor the powers to investigate such matters.

The outstanding matter of fire-fighting this year, apart from the above matters, has been the high costs incurred and the number of fires fought without any loss of forest-produce in State forests. Conditions have been such that the patrol and defensive staff could reach and cope with many small fires before they reached the forest boundaries. Suppression-costs therefore bear in the accounts an apparent disproportionate ratio to actual fire losses. Viewed from the correct angle, however, this indicates effective protection.

Another feature of this year's work has been the increasingly effective and willing co-operation of the public in actual fire-fighting, as distinct from notification of fires. There have been so many cases of this assistance that it would be both impossible and invidious to cite names beyond making special mention of trampers' squads, particularly of the Tararua Tramping Club during a potentially serious fire in beech-protection forest which occurred during a holiday week-end in January. The assistance of the National Broadcasting Station in releasing constant short warnings and reminders throughout the holiday season has undoubtedly been a factor to be appreciatively acknowledged, and arrangements are in train to link up all automobile associations into a chain of protective patrols along highways.

The total reported fires in State forests was thirty-eight and in other forests eight. The total acreage burned over was 2,814, of which 1,800 comprised milling-bush, 661 scrub, &c., 199 cut-over bush, and 154 miscellaneous.

3. Fire Districts.

Forest-fire districts throughout the Dominion now number fifty-six, and cover a total area of 3,123,500 acres. Three new districts were constituted during the year—one at the request of a local body, another at the request of the Lands and Survey Department, and the third, which covers an area of 25,670 acres, protects a State forest in the Auckland Conservancy.

4. Animal Destruction.

The total number of harmful animals destroyed in State forests was 44,723, as against 44,157 last year. The continued decrease in the rabbit kill—viz., 38,986, compared with 43,056 in 1936-37—is probably due to a reduction in the rabbit population caused by previous intensive campaigns over a period of years.

The list of animals killed is as follows: Rabbits and hares, 38,986; deer, 850; pigs, 282; goats, 90; horses and cattle, 23; opossums, 336; rats, stoats, ferrets, weasels, and cats, 4,156.

In addition, 28,168 opossums were taken by licensed trappers.

5. Forest Pathology.

The most important pathological work during the year was a comprehensive housing survey to ascertain the extent of borer and decay in buildings. The prevalence of the longhorn beetle, *Ambeodontus tristis*, was the most significant aspect of this investigation; the common house borer, *Anobium domesticum*, was found also in a large proportion of houses.

No serious outbreak of disease has occurred in State forests, nor has any new parasite likely to endanger the standing timber been discovered. Several parasitic fungi, causing minor losses in forest nurseries, are being kept under observation.

CHAPTER III.—UTILIZATION.

1. General.

During the year ended 31st March, 1938, further progress was achieved in the planning of organization and equipment in connection with the sawmilling and creosoting plants which are being established for the development of the State exotic forests. Association also with the Department of Industries and Commerce on the Government Timber Price Committee was continued in investigations into the prices of forest products, in the administration and operation of the export butter-box pool, and in the organization of the supply of containers required for New Zealand's export produce trade.

(*a*) *Prices.*

The consolidation of regional timber workers' awards into a Dominion award during the latter part of the year had the effect of moderately increasing wage rates in logging and sawmilling operations, in timber-yards, and in box-factories, &c. This necessitated a renewal of negotiations between the Government Timber Price Committee and the various organizations affected, as a result of which agreement was reached upon the consequential increases in the price of timber and boxes, &c.

The price increases agreed to for sawn timber varied from 4d. to 1s. 1d. per 100 board feet over the cut of the log, the increases varying with the species and with different producing regions. Agreement was also reached with manufacturers of dairy-produce containers to an increase in price of $\frac{3}{8}$d. for butter-boxes and $\frac{1}{2}$d. for cheese-crates.

(*b*) *Export Butter-box Pool.*

During the year the export butter-box pool scheme entered upon its second season, and marked progress was achieved in ridding the dairy industry of the bogy of short supply of butter-boxes which was such a feature of the previous season. Although at the commencement of the 1938 39 season a shortage of seasoned timber was anticipated during the flush dairying months and it was deemed expedient to import 500,000 spruce boxes in shook as an insurance against fire and other risks incidental to box-manufacture, no actual shortage developed at any period. Due to the abnormally dry season which occurred, the number of boxes actually used during the first ten months was 750,000 below estimate and only 250,000 of the imported spruce boxes were used, leaving the other 250,000 together with a like quantity of white-pine boxes in store for next season's pool.

The Government Timber Price Committee, acting as advisors to the Minister of Agriculture, negotiated standard prices for butter-boxes and supervised the distribution of white-pine supplies to box-factories. The acute shortage of white-pine which was so pronounced during the previous year was effectively overcome and, except for a minor shortage during the earlier months of the year, ample stocks have been available throughout the season, and at the commencement of the next pool will be twice as large as on previous occasions. Although butter-box prices advanced slightly during the season in sympathy with increased costs, they are still well below those which ruled in early post-war years.

To spread the manufacture of butter-boxes as evenly as possible throughout the year, and to afford the dairying industry the maximum possible protection against any shortage of supplies, arrangements were made for dairy companies to stock boxes to the limit of their factory storage-capacity. In addition, stocks were built up at central storage depots in the Waikato and Manawatu districts, and from these supplies were drawn during the peak months of butter-production. The system is being developed to the fullest possible extent consistent with effecting economies in box-manufacture and securing the lowest possible box prices for the dairying industry.

(*c*) *Organization of Export Fruit-case Supplies, &c.*

The supply of export cheese-crates and fruit-cases again occupied considerable attention by the Government Timber Price Committee. Co-operation with the New Zealand Boxmakers' Association provided an adequate supply of cheese-crates, although with the increasing scarcity of suitable insignis pine in some North Island districts careful organization was required to secure the supplies required. Eventually a scheme was evolved whereby crates were sold at standard prices at certain price points, thereby ensuring to competing dairy companies in various districts standard crate prices irrespective of the source of supply. As a result of the ruling shortage of

suitable exotic timber, which will not be alleviated until the State Forest Service sawmills are in production, producers are being forced to use a wide variety of indigenous species previously regarded as unsuitable for cheese-crate manufacture. Rimu, for example, is now being used to some extent for cheese-crate ends, while miro, matai, tawa, hinau, pukatea, kohekohe, and even rewarewa have been used for battens.

The New Zealand Fruitgrowers' Federation continued to organize the supply of export fruit-cases, the Government co-operating to secure agreement upon prices, &c. No fruit-cases were imported during the year, and the requirements of the industry were satisfactorily met by local boxmakers, although during the latter part of the year local shortages developed due to abnormally large orders being placed by growers at very short notice. After considerable difficulty the shortages referred to were overcome, but it has again to be stressed that growers must do their utmost to give reasonable notice of their requirements in order that the local boxmakers may make the necessary provision for the raw timber required to meet their needs. Accurate notice of the growers' requirements not only ensures that the necessary cases can be secured, but allows production to be spread over the greater part of the year and ensures economies in production which are reflected in lower prices.

2. Logging and Hauling.

With marked improvements in the design, construction, and operation of Diesel equipment, power units of this type are finding an ever-increasing field of application in both logging and hauling. The serious fire hazard attached to all direct-fired steam equipment favours its replacement on a wide scale, more especially with the development of selective logging in both indigenous and exotic forests, and not only for tractor logging but even for the old-established ground and overhead skidding this substitution is taking place and must be encouraged.

Tractor logging continues to grow in importance, and offers the most promising solution to the problem of economic selective logging. Although the equipment involves a high initial expenditure and has a relatively short life, its operating economies at the ruling wage level are large, and as manufacturers produce better and cheaper and higher-powered machines and improve their servicing facilities throughout the Dominion a large expansion in tractor logging is anticipated.

The hopes of this Service, expressed in the last annual report, that some improvement would be effected in the then ruling limitations of loads on road vehicles were realized during the year, and the placing of the limitations on a per-axle basis is a step in the right direction. By allowing the use of vehicles with larger payloads not only will haulage costs be reduced, but the economic haulage radius expanded, thus increasing the life of mills operating on scattered stands of timber, and allowing the opening-up of new mills in hitherto inaccessible forests. More particularly for long hauls the Diesel-engined vehicle is making a substantial contribution to decreased costs.

3. Sawmilling, Woodworking, &c.

In the realm of sawmilling and woodworking generally the ruling wage level provides a greater incentive than ever previously for increased efficiency and reduced production costs, to which, however, there are serious limitations in many instances due to the small size and/or short life of producing units and to the restricted finances of operators. Mechanization at every stage of production, together with improved routing of products during manufacture, remains the only solution of the problem, but without a marked improvement in costing control is unlikely to achieve the best results.

Loss of effective sawing-time at the main breakdown saw due to the use of old types of carriages and of poor log-turning equipment remains a basic weakness in many sawmill plants. In the handling of timber likewise, sorting-tables, package or bundle handling, and mechanical piling are required to replace manual labour in sawmills, timber-yards, and wood-working plants in general. Wood-working plants in particular, including planing-mills and box-factories, are with few exceptions characterized by crowded machine conditions and lack of waste-conveying equipment, both of which preclude economic handling.

Following the comments made in the last annual report regarding the inherent sawing accuracy of log frames, a complete set of high-speed equipment, together with accessory conveying and edging plant, has been purchased to demonstrate the production of sawn timber from the thinnings yielded by the State exotic forests and which hitherto has proved economically inconvertible by the equipment now in general use. As indicative of the economy offered by this modern equipment, it may be mentioned that working with logs averaging less than 12 in. in diameter a daily output per man on the sawing-floor of over 5,000 board feet has been attained in Northern European mills, as compared with from only 500 board feet to 1,500 board feet with much larger logs in New Zealand operations.

4. Drying of Timber.

During the year there were no modern kilns installed by operators new to this field, but in a number of cases extension of their kiln-drying equipment was undertaken by sawmillers and timber-merchants already equipped with such facilities. Modern dry kilns installed in New Zealand are now capable of drying approximately one-third of the finishing timbers used by the building trade, indicating in no uncertain manner the growing appreciation by the industries concerned for a properly dried product. Although some prejudice still exists in the minds of many consumers due to previous experiences with badly kiln-dried timber, there is no question that kiln-drying has become a practical reality in the timber trade and that further installations will be undertaken in the near future.

Incorrect practices adopted in kiln-drying, however, have been brought to the attention of the State Forest Service on numerous occasions during the year, and the attention of all interested in the subject is again drawn to the fact that satisfactory results can be secured only if standard and well proven practices are adhered to. The subject has been dealt with in previous annual reports, which should be carefully perused by all interested. It is again emphasized that disastrous results may follow the drying of mixed qualities, thicknesses, and species of timber, and that separate drying of different qualities, thicknesses, and species is invariably recommended.

5. Grading.

The so-called "National Grading Rules for Building Timbers," which were originally formulated in 1928, were revised during the year in co-operation with the Dominion Federated Sawmillers' Association. As a result of experience gained since their inception it has been found necessary not only to improve some of the grades and better the description of others, but also to simplify the rules in general and amend the grade names to allow of their universal use in all timber-producing regions. It is confidently anticipated that the revision will have the desired effect of securing their adoption by the Standards Institute as a New Zealand standard specification, when they will become in fact as well as in name "The National Grading Rules for Building Timbers."

Standard grading rules for the marketing of white-pine were introduced in September, 1937, the basic consideration in the determination of grades being the percentage of usable box cuttings which each grade should produce. Very satisfactory results and a marked reduction in disputes between buyer and seller have occurred since the introduction of these rules, which it is anticipated will become a New Zealand standard specification within the near future.

Co-operation was continued with the New South Wales Forestry Commission in carrying out a study into the grading of New South Wales hardwood poles, cross-arms, sleepers, and general construction timbers for use in New Zealand. Further visits by officers of the Commonwealth were paid to New Zealand and conferences arranged with representatives of all important wood-using Departments and Power Boards, as a result of which a specification covering the supply of New South Wales desapped hardwood poles is ready for submission to the New Zealand Standards Institute as a New Zealand standard specification. Similar specifications covering other New South Wales hardwood products will become available during the ensuing year.

6. Wood Preservation.

The past year, like those immediately preceding, has reflected an ever-increasing scarcity of naturally durable woods whether for constructional timbers, for railway-sleepers, for poles, or for fencing-material. The demand for fencing-posts, in particular, has been exceptionally heavy during the last two years, so much so that the concrete post has made some headway, but it is anticipated that as soon as large quantities of creosoted material are available from the treating-plants at Rotorua, Hanmer Springs, and Conical Hills the wooden post will regain this lost ground.

For the production of creosoted poles, larch and Australian eucalypts will be largely employed, and various studies instituted during the year may make these even more valuable than they have already proved. Both have proved somewhat difficult to treat, and, in comparison with the imported Australian hardwood pole, have suffered hitherto from the fact that they split rather badly during seasoning and must be of liberal dimensions accordingly. A preliminary full length salt-seasoning treatment immediately after felling promises to virtually eliminate splitting, while a similar butt-creosoting treatment promises to increase the penetration and absorption of the creosote in the most vulnerable portion of the pole.

Wastages and losses due to sap stain and mould were unusually large during the year, particularly in white-pine shipped from the West Coast of the South Island to the North Island butter-box factories. Open piling and avoidance of block stacking except for very short periods is essential with this timber during warm humid weather. The same comment applies to the exotic-pine timbers, the sap staining of which is so prevalent as to prejudice most consumers against its use for anything but low-grade containers and temporary construction work, &c. For this reason in all State Forest Service sawmills provision is being made either for dry kilns or for dipping treatments, or for both, so that consumers may be assured of receiving clear bright stock free of sap stain and mould.

Unnecessary alarm over the insect attack of timber continues to be expressed from time to time and is responsible for much illogical use of timber, to such an extent in fact that it is having a serious and far-reaching effect upon the marketing of all building timbers. Users fail to realize that in most cases the attacks have been due wholly to wrongful design, to lack of maintenance, or to some other avoidable cause, and that merely specifying heart rimu or so-called "borer-treated" flooring and weather boarding in place of rimu will not achieve the desired result of furnishing an insect-proof or insect-free structure. Only by the adoption of proven designs and constructional details of an adequate standard of supervision during erection and of regular inspection and maintenance during use may a wooden structure be expected to give that fifty to one hundred years of life which may reasonably be anticipated.

7. Miscellaneous.

The large-scale commercial shipments to Great Britain of butter packed in rimu boxes confirmed the results of the earlier small-scale tests. The rimu proves to be as non-tainting as, if not more so than, white-pine, but does not nail as easily as the softer wood, and further experiments must be instituted to determine the best type of box-construction for this timber.

During the year arrangements were concluded for the local production of clothes-pegs from tawa, and investigations initiated into the suitability of mountain-beech for a variety of turnery products.

CHAPTER IV.—THE TIMBER TRADE.

1. General.

The latest figures collected by the Government Statistician for the production of rough-sawn timber record a total cut of 306,000,000 board feet for the year ended 31st March, 1937, as compared with 293,000,000 board feet for the previous year. The recorded cut falls short of the predicted production of 320,000,000 board feet, due to the fact that an anticipated revival of public confidence in building failed to materialize during the year. With the continued acceleration of the Government's house-building activities, however, timber consumption was on the increase during the year ending 31st March, 1938. For this period the New Zealand Railways record the handling of 490,000 tons of timber, representing an increase of 8·5 per cent. on the previous year, and indicating an annual cut for the period amounting to 330,000,000 board feet. Any material increase above this level for the year ending 31st March, 1939, is unlikely, owing to the usual contraction of private building operations as a result of rising costs.

While the total production reported for the year ended 31st March, 1937, showed an increase of 4½ per cent. over the previous year, it is worthy of note that the two species ranking second and third in importance —namely, white-pine and insignis pine— registered a substantially decreased cut. In the case of white-pine the decrease from 52,000,000 board feet to 47,000,000 board feet was more or less in accordance with expectations, being due not only to the cutting-out of various white-pine forests in the North Island but to a diminishing supply of easily accessible timber in the South Island. For the year ended 31st March, 1938, it is estimated that white-pine production will prove to have fallen still further to about 40,000,000 board feet, at which level it will probably be stabilized for some years to come.

In the case of insignis pine, it was confidently anticipated in the last annual report that production for the year ending 31st March, 1937, would prove to amount to 40,000,000 board feet, whereas a decrease to 31,000,000 board feet was recorded, due not to declining demand but to the cutting-out of those scattered private supplies such as farm shelter-belts and plantations which have hitherto constituted the main source of log-supply. Although materializing somewhat earlier than anticipated, this decreased supply of logs from mature trees will cause only a temporary drop in production. In the form of both thinnings and large logs the State exotic forests are commencing to yield an ever-increasing supply of softwood timber which, within a few years, will rank only second in importance to rimu.

Rimu, by virtue of its wide distribution throughout the Dominion and as the country's principal building timber, registered a considerable increase in production, but the cut of kauri, matai, beech, and totara remains virtually stationary, due to the strictly limited supplies of these species.

2. Domestic Markets.

The trend of the building trade over the year ended 31st March, 1937, was downwards throughout, but for the year under review has been consistently upwards, with a consequential improvement in the demand for timber. For the year ended 31st March, 1938, the number of dwelling permits recorded by the Government Statistician amounted to 4,432, of which 1,768, or 40 per cent., were for the State Housing Department. The value of these permits, amounting to £4,450,000, compares strikingly with that of the 3,282 dwelling permits recorded for the previous year, amounting to £2,795,000. In the one month of March, 1938, as many as 504 dwelling permits were recorded, setting the highest monthly record since September, 1927. The total value of permits for all buildings for the year ended 31st March, 1938, amounting to £8,162,000, represents a 24-per-cent. increase over the figures for the previous year, and likewise constitutes the highest annual record since 1930.

Although numerous other wood-using industries displayed a similar improvement in demand, the real production capacity of the industry has not been strained. Admittedly, there has been some shortage both of certain timbers and of specific qualities and grades, but on the other hand there has been a corresponding surplus in others. This position arises from the illogical use of the natural product of the log, and, as discussed elsewhere in this report, is entirely correctable by improved wood-using practices.

The subject of prices has been dealt with under Chapter III.

Imports for the year increased to 39,000,000 board feet, the largest item being 24,000,000 board feet of Australian hardwoods for poles and sleepers, representing a 20-per-cent. increase over the previous year, due to extensive railways and public-works constructional activities. Owing to shipping difficulties the importations of North American softwoods were smaller than anticipated, but, whereas Douglas-fir imports rose from 4,000,000 board feet to 6,500,000 board feet, redwood, on the other hand, recorded a decrease. Virtually the whole of the imports of all timbers must be regarded as unavoidable, due to the non-availability of local substitutes during the period under review.

3. Exports.

Exports continued to decline during the calendar year 1937, and the recession from the 1936 figure of 27,000,000 board feet to less than 18,000,000 board feet is due largely to the reduced exports of white-pine as a result of the paramount necessity for conserving white-pine supplies for essential domestic uses.

As discussed under "Forest Policy," the extreme shortage for essential local requirements which developed in 1936 finally necessitated the complete control of white-pine exports during the year, and it is unlikely that any substantial increase in the exports of this timber can be anticipated.

Rimu exports recovered most of the ground lost in the previous year, being 2,500,000 board feet higher, though still slightly below the 1935 record. Contrary to expectations, insignis-pine shooks did not reach the 1935 level, but nevertheless showed a substantial increase on the previous year.

The recession in silver-beech exports so prominent over the 1935–36 period has not continued, but increased production costs, with the necessity for increased prices, have intensified marketing problems in Australia.

The most noteworthy feature of the export statistics is that, without exception, the major items, including kauri-gum, showed a substantial increase in unit values.

TABLE 6.

REPORTED PRODUCTION OF ROUGH-SAWN TIMBER, BY SPECIES.

(From information supplied by the Government Statistician. All figures refer to the years ended 31st March, 1935–37.)

Species.	1935.		1936.		1937.	
	Quantity.	Percentage of Total Quantity.	Quantity.	Percentage of Total Quantity.	Quantity.	Percentage of Total Quantity.
	Ft. b.m.		Ft. b.m.		Ft. b.m.	
Rimu	125,488,000	51·4	157,631,000	53·8	174,779,000	57·1
White-pine	52,294,000	21·5	52,075,000	17·8	46,959,000	15·1
Matai	13,880,000	5·7	19,069,000	6·6	20,295,000	6·6
Kauri	5,553,000	2·3	7,332,000	2·5	7,791,000	2·5
Totara	8,867,000	3·6	11,778,000	4·0	11,444,000	3·8
Beech	7,725,000	3·2	8,855,000	3·0	8,809,000	2·9
Insignis pine	27,311,000	11·2	34,104,000	11·6	31,484,000	10·3
Miro	915,000	0·4	772,000	0·3	1,777,000	0·6
Tawa	746,000	0·3	25,000	..	439,000	0·1
Rata	92,000	..	126,000	..	155,000	..
Other	911,000	0·4	1,308,000	0·4	1,957,000	0·7
Total ..	243,782,000	100·0	293,075,000	100·0	305,889,000	100·0

TABLE 7.

REPORTED PRODUCTION OF ROUGH-SAWN TIMBER, BY PROVINCIAL DISTRICTS.

(From information supplied by the Government Statistician. All figures refer to the years ended 31st March, 1935–37.)

Provincial District.	1935.		1936.		1937.	
	Quantity.	Percentage of Total Quantity.	Quantity.	Percentage of Total Quantity.	Quantity.	Percentage of Total Quantity.
	Ft. b.m.		Ft. b.m.		Ft. b.m.	
Auckland	100,780,000	41·3	118,538,000	40·4	128,602,000	42·1
Hawke's Bay	11,867,000	4·9	12,781,000	4·4	12,746,000	4·2
Taranaki	2,291,000	0·9	4,330,000	1·5	4,967,000	1·6
Wellington	22,731,000	9·3	22,937,000	7·8	21,696,000	7·1
Marlborough	2,954,000	1·2	2,511,000	0·9	1,817,000	0·6
Nelson	11,198,000	4·6	17,322,000	5·9	14,700,000	4·8
Westland	57,543,000	23·6	73,921,000	25·2	77,726,000	25·4
Canterbury	5,085,000	2·1	6,085,000	2·1	7,357,000	2·4
Otago	5,489,000	2·3	6,476,000	2·2	7,143,000	2·3
Southland	23,844,000	9·8	28,174,000	9·6	29,135,000	9·5
Totals ..	243,782,000	100·0	293,075,000	100·0	305,889,000	100·0

TABLE 8.

EXPORTS OF SAWN TIMBER[1] AND OTHER FOREST PRODUCE.

(From information supplied by the Comptroller of Customs. All figures refer to the years ended 31st December, 1935–37.)

Item.	1935.		1936.		1937.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
	Ft. b.m.	£	Ft. b.m.	£	Ft. b.m.	£
White-pine[2]	22,709,000	214,240	14,824,000	140,000	3,110,000	32,370
Rimu[3]	9,009,000	69,820	6,095,000	49,800	8,711,000	84,800
Beech	2,766,000	29,350	2,033,000	20,470	2,076,000	24,570
Matai	2,842,000	22,810	2,142,000	16,620	1,829,000	17,950
Kauri[4]	627,000	18,050	934,000	26,380	639,000	21,240
Insignis-pine box-shooks[5]	1,607,000	9,660	899,000	10,760	1,161,000	17,930
Other—						
New Zealand	25,000	430	29,000	670	131,000	1,990
Foreign	57,000	830	50,000	1,090	58,000	690
Totals	39,642,000	365,190	27,026,000	265,790	17,715,000	201,540
	Tons.		Tons.		Tons.	
Kauri-gum	2,872	79,110	3,237	96,160	3,226	151,590
Tanning-bark	..	..	..	..	19	150
Fungus	76	5,370	47	5,020	46	6,070

(1) 1935: 95 per cent. to Australia, 4 per cent. to Pacific Islands, 1 per cent. to United Kingdom; 1936: 95 per cent. to Australia, 3 per cent. to Pacific Islands, 2 per cent. to United Kingdom; 1937: 91 per cent. to Australia, 6 per cent. to Pacific Islands, 3 per cent. to United Kingdom. (2) Exported for butter-boxes, shelving, whitewood furniture, &c. (3) For flooring, linings, and joinery. (4) For floorings, linings, tanks, and vats, &c. (5) Principally for Pacific Island fruit-cases.

TABLE 9.

IMPORTS OF SAWN TIMBER AND OTHER FOREST PRODUCE.

(From information supplied by the Comptroller of Customs. All figures refer to the years ended 31st December, 1935–37. Value represents value in country of export, plus 10 per cent. expressed in terms of New Zealand currency.)

Item.	1935.		1936.		1937.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
Hardwoods—	Ft. b.m.	£	Ft. b.m.	£	Ft. b.m.	£
Australian hardwoods ..	23,416,000	298,000	19,955,000	270,890	24,169,000	342,890
Oak	1,550,000	24,760	2,691,000	40,780	3,518,000	66,350
Total	24,966,000	322,760	22,646,000	311,670	27,687,000	409,240
Softwoods—						
Douglas fir	3,472,000	25,790	4,170,000	36,560	6,509,000	53,230
Butter-boxes	756,000	13,160	1,513,000	29,310	1,456,000	30,530
Redwood	1,255,000	15,980	2,115,000	28,120	1,718,000	24,760
Total	5,483,000	54,930	7,798,000	93,990	9,683,000	108,520
Other	907,000	16,710	682,000	16,690	2,084,000	39,570
Grand total ..	31,356,000	394,400	31,126,000	422,350	39,454,000	557,330
Laths, palings, shingles, &c.	..	4,110	..	5,587	..	2,909
	Tons.		Tons.		Tons.	
Tanning-bark	2,173	21,880	1,248	14,810	862	8,309
Wood-pulp	4,246	37,150	4,406	47,790	5,030	59,227

CHAPTER V.—GENERAL.

1. Legislation.

No amendments to the Forests Act, 1921-22, were made during the year under review.

Section 24 of the Reserves and other Lands Disposal Act, 1937, revokes the provisional State forest reservation over a total area of 16,860 acres situated in Una, Lewis, and Travers Survey Districts, Nelson Land District, and declares the land to be a scenic reserve.

Section 26 of the Reserves and other Lands Disposal Act, 1937, revokes the provisional State forest reservation over the following areas, and declares the lands to be scenic reserves:—

(1) Section 9, Block I, and Section 14, Block V, Matakitaki Survey District, Nelson Land District, containing 1,965 acres.

(2) Section 44, formerly part Section 18, Block XII, Tautuku Survey District, Otago Land District, containing 42 acres 1 rood 36 perches.

(3) Section 39, formerly part Section 14, Block VIII, Tautuku Survey District, Otago Land District, containing 24 acres 2 roods 14 perches.

(4) Land in Blocks XV and XVII, Waikawa Survey District, Southland Land District, containing a total area of 594 acres.

2. Finance.

Receipts.

The gross receipts show an increase of £11,478 when compared with the receipts for 1936–37, and reflects on the increased business of sawmilling industry generally. A summary showing the main revenue items is appended:—

Item.	1937–38.	1936–37.	1935–36.	1934–35.
	£	£	£	£
Indigenous-forests receipts—				
Timber-sales	96,741	91,980	74,828	47,179
Timber royalties and trespass	8,151	6,257	5,006	5,449
Leases, grazing	1,493	1,692	1,757	1,646
Sawmill-sites, industrial, &c.	638	705	957	1,417
Miscellaneous	4,934	4,252	2,844	2,125
National Endowment Account allocation	24,756	21,807	15,712	10,990
Nurseries and plantations—				
Trees and seeds	8,555	7,097	5,874	4,094
Firewood and poles				
Miscellaneous				
Totals	145,268	133,790	106,978	72,900

Payments.

A considerable increase is recorded in the net expenditure for the year when compared with previous years, the total for the current year being £297,859, an increase of £58,885 over the expenditure for 1936–37. As explained in the report for 1936–37, the expenditure on afforestation was increased considerably by the adoption of standard wages on all afforestation schemes and that such charges were borne to a greater extent by the State Forests Account. To provide work, additional equipment and accommodation was necessary, and the increased expenditure on afforestation amounted to approximately £37,000. Owing to the increased revenue, the allocation to the National Endowment Account was augmented by £5,524.

A table showing the expenditure for the last four years under main headings is appended:—

Item.	1937–38.	1936–37.	1935–36.	1934–35.
	£	£	£	£
Fixed charges and staff salaries—				
Interest and expenses of raising loans	263	801	525	172
Staff salaries	57,185	51,616	41,374	34,155
Allocation of revenue—				
National Endowment Account	16,458	10,934	7,117	3,436
Local-body payments, &c.	16,329	16,739	9,243	5,903
Management, establishment, and development—				
Indigenous forests	22,205	17,863	14,763	11,735
Fire-fighting equipment and prevention	887	415	415	805
Educational: Reference library, &c.	341	194	260	445
Research and experimental equipment, &c.	988	567	836	528
Afforestation: Nurseries and plantations	177,141	139,761	60,642	59,136
Land-purchase	1,110	..	70	..
Miscellaneous	79	84	500	343
Sawmill and creosote plant	4,873	..	..	..
Totals	**297,859**	**238,974**	**135,745**	116,658

3. Honorary Forest Rangers.

Honorary forest rangers associated with the Service in the protection of State forests were increased during the year by twenty-two appointments, and, taking into account two resignations, this corps of voluntary assistants now totals 184.

An appeal for the co-operation of automobile patrolmen in the prevention of damage by the lighting of fires, &c., brought instant response from the executives of the various automobile associations, and a number of patrolmen and other officers have already been appointed honorary forest rangers, while further appointments are being dealt with. This co-operation of such an important Dominion-wide service will undoubtedly provide additional safeguards to our widely distributed forests.

The Service is indebted to all honorary forest rangers, and is appreciative of the protection afforded to our forest heritage by their gratuitous services, and once again records its thanks to these willing assistants.

APPENDIX I.

SUMMARIZED REPORTS ON STATE AFFORESTATION.

Auckland Region.

Tairua Plantation.—Although three dry periods were experienced with high fire hazards, the season as a whole was conducive to good tree-growth, and the plantation is developing satisfactorily. The new planting consisted of 206,460 trees on an aggregate area of 544 acres, the species used being *P. palustris*, *P. radiata*, *P. pinaster*, *P. sondereggeri*, *P. canariensis*, and 665 poplar cuttings. Eight pounds *P. pinaster* and 64 lb. *P. radiata* seed were collected. Interplanting with *P. ponderosa*, *P. radiata*, *P. palustris*, and *P. taeda* (248,000 trees in all) absorbed an area of 404 acres previously planted with unsuitable species, while 6 acres were blanked with *E. gigantea* and *E. obliqua*.

In the nursery 462,300 trees were lifted and sent out to plantations, 68,000 were retained for future use, and 165 lb. of seed of seven different species were sown.

Speaking generally, all trees are making good headway at this station, *P. caribaea* being particularly good.

Riverhead.—The fire risk at this station was probably greater than at any other in the conservancy owing to the prevalence on the boundary of the plantation of danthonia, which flourishes in a dry season, and extreme vigilance was necessary throughout the dry summer months to prevent fires from encroaching on the trees. In one instance one fire lit by an adjoining land-owner without a permit was only extinguished with difficulty. Legal proceedings will be taken against the offender.

This plantation is now practically planted up, but during the season 39 acres of stunted bush was interplanted with *Thuja plicata* and *Cryptomeria japonica*.

From selected trees in the neighbourhood 45 lb. *P. pinaster* and 6 lb. *P. radiata* seed were collected. The general appearance of the plantation gives an impression of vigour and vitality.

Maramarua.—This plantation is on a maintenace basis, and, with the exception of some minor blanking, no planting was done. Pruning with slashers was carried out for some months; 328 acres were treated by removing the branches to a height of 8 ft. Maintenance-work consisted of clearing fire-breaks, roads, tracks, culverts, &c., shifting telephone-lines, and painting buildings.

From the nursery 104,900 trees were lifted for planting at other stations and 8,600 trees were lined out. Ten pounds of *P. radiata* were sown, and germination produced a remarkable crop of 12,000 seedlings.

Waipoua.—The planting season was favourable and 201 acres were planted, mainly with *P. palustris* (96 acres) and *P. taeda* (91 acres). At present the newly planted trees are promising well, but when they are affected by the westerly saline winds so prevalent in this locality they may receive some set-back.

The usual maintenance of buildings, roads, fire-breaks, &c., was kept well up to date.

Puhipuhi.—The topographical and species survey mentioned in last year's report was completed. The pine stands have reached the stage when low pruning should be done, and this work will shortly be put in hand. Operations during the year consisted of maintenance of fences and fire-breaks and control of noxious weeds.

Rotorua Region.

Kaingaroa Plantation.—The existing area was increased by 42 acres, on which were planted approximately 31,400 *P. murrayana*. The area was made up of odd corners, strips along firebreaks, &c. In the nursery at Wairapukao a total sowing of 644 lb. of *P. ponderosa*, *P. laricio*, *P. murrayana*, and *P. radiata* seed was made during the months of November and February. The earlier sowing germinated well, particularly *P. laricio* and *P. ponderosa*, but *P. murrayana* was again disappointing. Germination of the late-sown *P. radiata* was just commencing at the date of preparing this report.

From 14th May to 12th July blanking was carried out over a total area of 5,284 acres, and 2,398,000 trees, principally *P. murrayana* and *P. ponderosa*, were planted to replace ones which had died.

Rotoehu Plantation.—Operations commenced at this new station on 1st June last, and planting began towards the end of July and continued until 237 acres were planted, mainly with *P. radiata* and 16 acres of *Sequoia sempervirens*, 12,000 trees per acre being used of the first-mentioned species and 300 trees per acre of the latter; the spacing of *P. radiata* was 6 ft. and that of redwood 12 ft., interplanted with poplar cuttings similarly spaced. Three poplar species and 767 cuttings were used. An inspection of the planted area in March showed that the *P. radiata* had struck well, but the strike of the other species was only fair.

In the nursery 189 lb. of seed of a variety of species were sown which produced 179,000 young trees.

Whakarewarewa Plantation.—Twelve acres were underplanted with *C. macrocarpa*, and although special care was taken with this difficult species a mortality of 40 per cent. occurred.

Present tree stocks in all nurseries are estimated to total 9,405,000 of which 5,500,000 will be carried over until next season, 2,490,000 will be available for local use, 955,000 for transfer to other regions, and the remainder for use by other Government Departments.

The seed collected and extracted to date totals 800 lb., but 300 sacks of *P. murrayana* cones remain to be treated.

Wellington Region.

Karioi Plantation.—At this station the season December to March was exceptionally dry and the fire hazard correspondingly high. Numerous fires lit by sparks from locomotives occurred along the railway-line, but owing to a special fire patrol right through the fire season no fire entered the plantation. This plantation is now planted up, but blanking was carried out on an area of 616 acres.

Nursery stock at present numbers 1,109,000 two- and three-year-old trees, which will be kept in lines for another year. Nursery seedlings in beds comprised in all 737,000 *P. ponderosa*, *P. murrayana*, and *P. laricio*.

Erua Plantation.—At this station 179 acres of cut-over forest were planted with 73,000 trees, and 20,000 poplar cuttings were lined out in the nursery. Generally speaking, all trees are making good growth, and the 1930 planting is now showing up above the second growth. In this respect *Thuja plicata* shows better tree form than *C. lawsoniana* and appears better able to cope with this class of country.

Nelson Region.

Golden Downs.—At Golden Downs exotic State forest 18 acres, portions of fire-breaks, &c., were planted, mostly with *P. pinaster*, and 581 acres were replanted with more suitable species, principally *P. laricio*, *P. ponderosa*, and *P. muricata*. Blanking was also done as required, and an average strike of 90 per cent. seems certain.

An average rainfall of 21·16 in. was recorded over the growing season—October to March—compared with 24·12 in. over the eight previous years. Repairs to roads and tracks and river-protection work was carried out. No fires occurred, although eighteen permits to burn were granted during the fire season. The local staff co-operated with settlers during "burning off" operations and rendered valuable assistance in burning dangerous places at or near the forest boundary. Tree-cleaning from fern and other weeds covered 2,146 acres and will be continued until the planted trees are able to fend for themselves.

From the nursery 2,864,000 trees were lifted and 1,218,000 lined out: 152 lb. of seed was sown which yielded 1,540,000 trees. Seed collected and extracted totalled 347 lb.

From Dumgree, 150 cords of firewood were sold to the Railways Department and 302 lb. of seed (mainly *P. laricio*) was collected. The cutting-out of unthrifty stands and underscrubbing and light thinning of *P. radiata* in compartment 1 were continued.

Westland Region.

Tree-cleaning was carried out over an area of 300 acres in compartments 4, 5, 8, 9, and 10. Four different species of poplar numbering 4,400 were planted along fire-breaks, and the usual maintenance-work was carried out.

A small sowing of seed was made in the nursery, and some trees were lifted for planting elsewhere, and others lined out.

Canterbury Region.

New planting on a minor scale along fire-breaks, &c., was undertaken at Balmoral to an extent of 191 acres, and along water-races at Eyrewell, 3 acres.

Twenty-eight pounds *P. radiata* and 1 lb. *P. murrayana* seed were sown, and the resultant crop is estimated to be 248,000. Planting stock one- and two-year old is estimated to equal 380,000. Good weather conditions favoured tree-growth at all stations.

At Balmoral 1,182 acres of trees were green pruned to a height of 6 ft., and at Eyrewell and Hanmer similar treatment was given over 2,588 acres and 887 acres respectively. Various types of pruning-saws, slashers, and axes were used in these operations. Thinning was done at Hanmer (138 acres) and Balmoral (29 acres). Firewood extracted from Hanmer forest finds a ready sale, many hundreds of cords being supplied during the year to Queen Mary Hospital, in addition to local sales, and 275 cords for camp use.

The North Canterbury Electric-power Board purchased 200 larch poles for electric-power lines, and 7,400 rails found a ready market. The value of the forest-produce extracted during the year was £1,024.

Southland Region.

As the exotic State forests in this conservancy are all fully stocked, afforestation operations were confined to minor blanking, interplanting, and replanting. A total of 276 lb. of seed was sown and produced a crop of 435,000 seedlings. Save for 36 lb. at Beaumont and 13 lb. at Naseby, all the seed was sown at Pebbly Hills. At this station 205,000 trees were lifted, of which 54,000 were lined out and the balance used for planting; at Beaumont 30,000 were lifted; and at Naseby 55,000 were taken from the nursery for planting.

Seed collected totalled 225 lb. of various species, as against 183 lb. for the previous year.

The estimated trees in stock number 556,000.

Silvicultural operations may be summarized as follows: Area green pruned, 606 acres; area thinned for utilization, 108 acres; area underscrubbed and thinned, 445 acres.

The volume of milling-timber extracted was 105,200 cubic feet, or 10,500 cubic feet more than in 1936–37.

APPENDIX II.

LIST OF COMMON AND BOTANICAL NAMES OF SPECIES MENTIONED IN THIS REPORT.

1. Indigenous.

(a) Softwoods :—

Kauri (*Agathis australis*).
Matai (*Podocarpus spicatus*).
Miro (*Podocarpus ferrugineus*).
Rimu (*Dacrydium cupressinum*).
Silver-pine (*Dacrydium colensoi*).
Totara (*Podocarpus totara*).
White-pine (*Podocarpus dacrydioides*).

(b) Hardwoods :—

Beech (*Nothofagus* spp.).
Hinau (*Elæocarpus dentatus*).
Kohekohe (*Dysoxylum spectabile*).
Mountain beech (*Nothofagus cliffortioides*).
Pukatea (*Laurelia novæ-zelandiæ*).
Rata (*Metrosideros* spp.).
Red beech (*Nothofagus fusca*).
Rewarewa (*Knightia excelsa*).
Silver beech (*Nothofagus menziesii*).
Tawa (*Beilschmiedia tawa*).

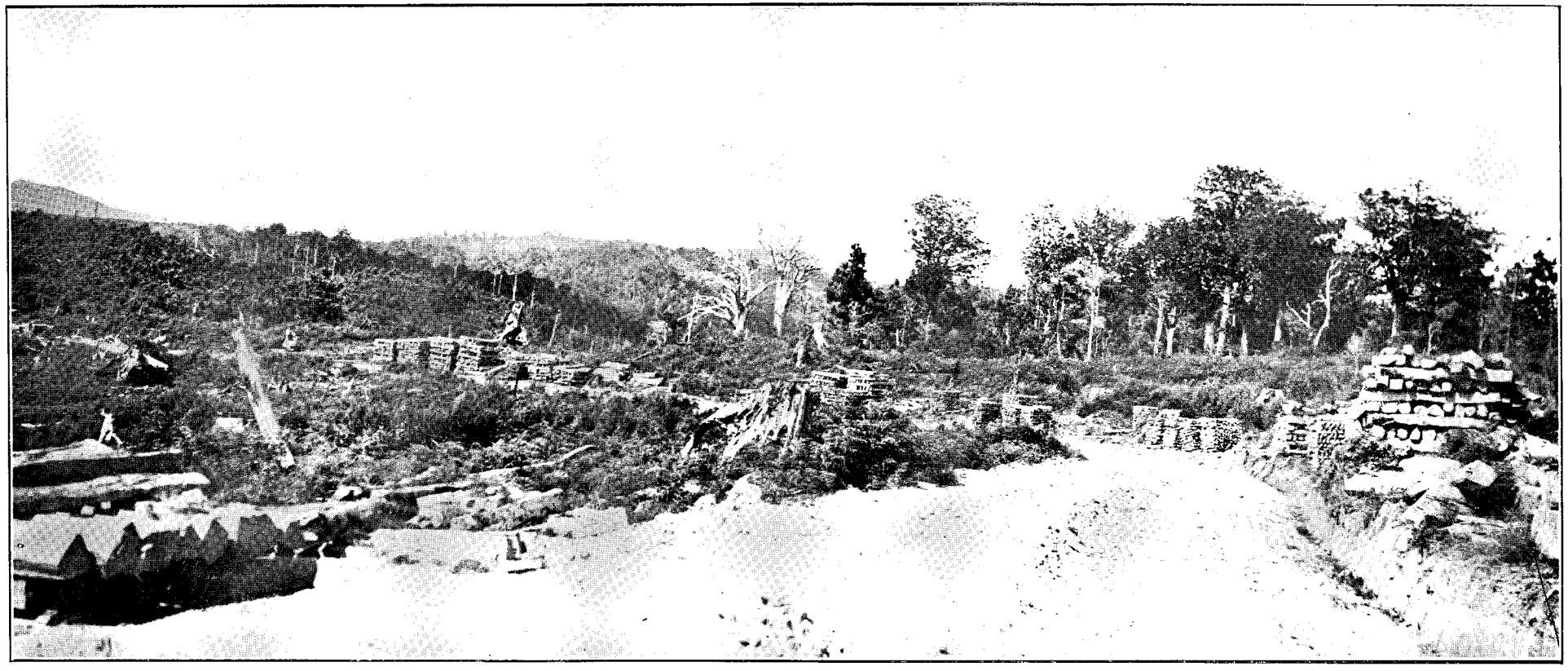
2. Exotic.

(a) Softwoods :—

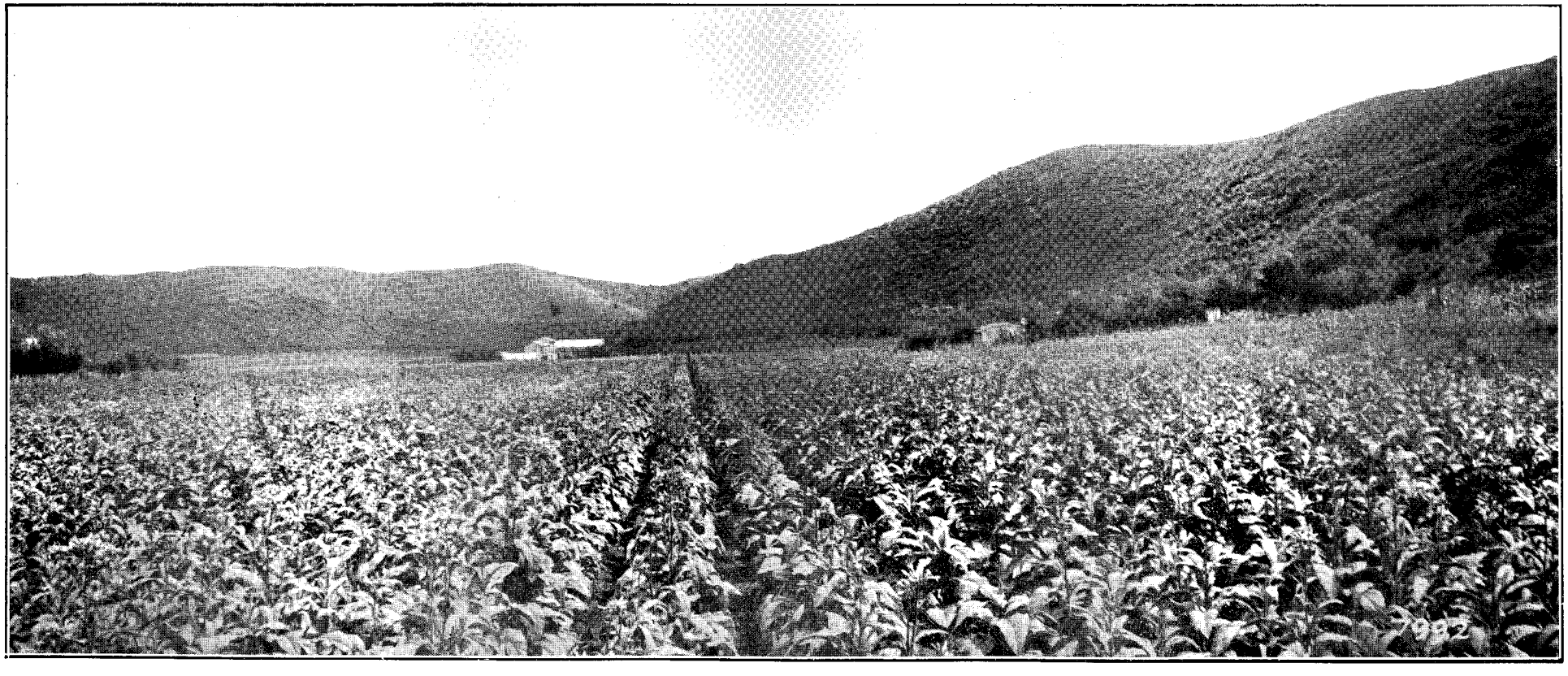
Canary Island pine (*Pinus canariensis*).
Corsican pine (*Pinus laricio*).
Douglas fir (*Pseudotsuga taxifolia*).
Hybrid longleaf pine (*Pinus sondereggeri*).
Insignis pine (*Pinus radiata*).
Japanese cypress (*Cryptomeria japonica*).
Larch (European), (*Larix decidua*).
Lawson's cypress (*Cupressus lawsoniana*).
Loblolly pine (*Pinus taeda*).
Lodgepole pine (*Pinus murrayana.*)
Longleaf pine (*Pinus palustris*).
Macrocarpa (*Cupressus macrocarpa*).
Maritime pine (*Pinus pinaster*).
Norfolk Island pine (*Araucaria excelsa*).
Redwood (Californian), (*Sequoia sempervirens*).
Shortleaf pine (*Pinus echinata*).
Slash pine (*Pinus caribæa*).
Spruce (*Picea* spp.).
Western yellow pine (*Pinus ponderosa*).
Western red cedar (*Thuja plicata*).
Pinus patula.

(b) Hardwoods :—

Australian hardwoods, principally *Eucalyptus* spp.
Mountain ash (*Eucalyptus gigantea*).
Mountain ash (*E. regnans*).
Oak (*Quercus* spp).
Poplar (*Populus* spp.).
Stringybark (*Eucalyptus obliqua*).



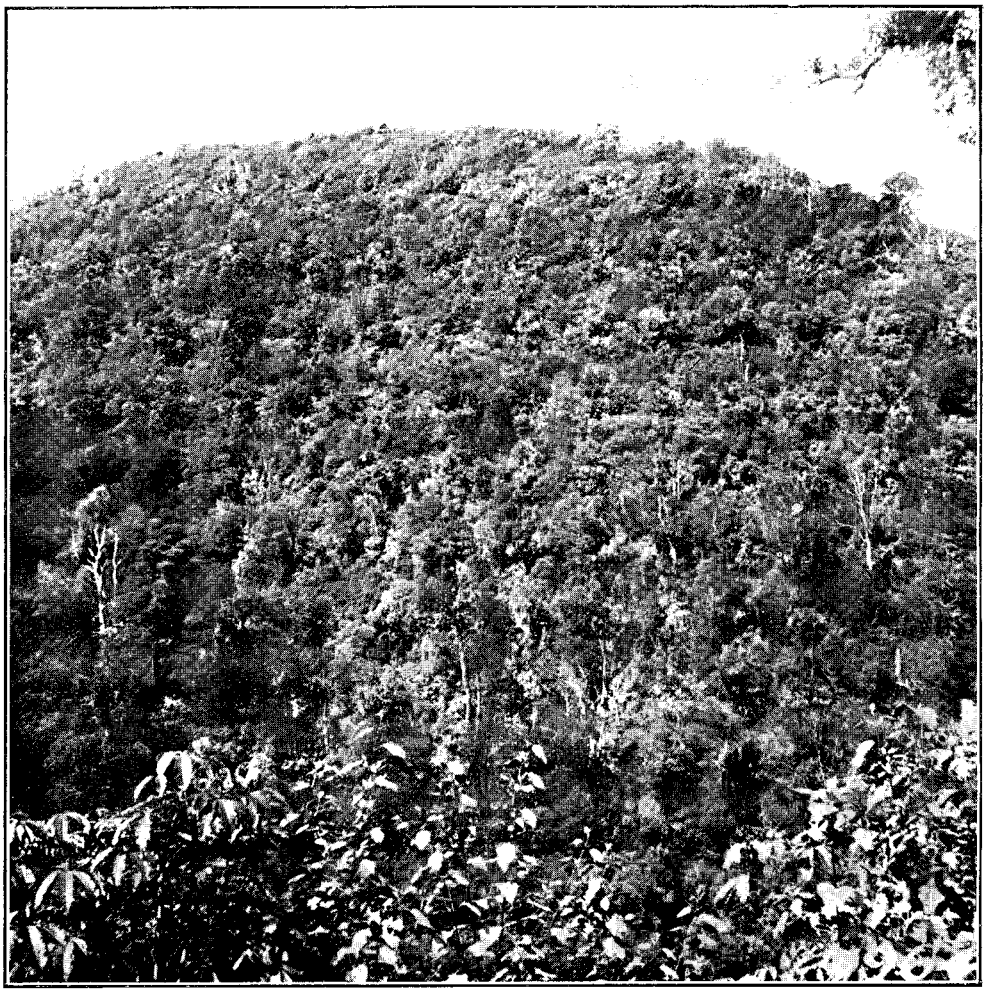
FOREST PRODUCE EXTRACTED TO THE ROAD-SIDE FROM OLD WORKINGS AND NEW ACCESS ROAD, OMAHUTA STATE FOREST, NORTH AUCKLAND.



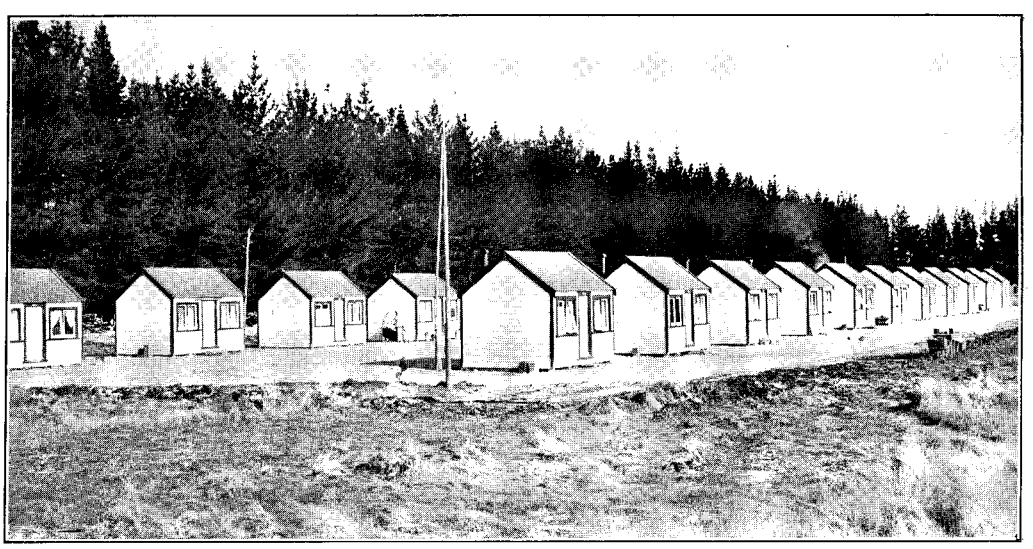
The 1937–38 Crop at the Pongakawa Tobacco Plantation, Bay of Plenty District.

Exotic Pine Fence-posts from Thinnings at Conical Hills Plantation, Otago, being seasoned prior to creosoting.

Larch at Conical Hills Plantation, Otago, Thirty-three Years Old, thinned to 400 Trees per Acre. All Thinnings larger than 1½ in. diameter have been utilized for Posts, Poles, Stakes, or Firewood.



A Steep Hillside, Wairarapa District, showing Regrowth after the Milling-timber has been removed. Fire and Stock excluded.



Accommodation for Workmen at Kaingaroa Plantation, showing the Standard Type of Two-men Huts now being built for State Forest Workers.

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