

1947
NEW ZEALAND

STATE FOREST SERVICE

ANNUAL REPORT OF THE DIRECTOR OF FORESTRY FOR THE YEAR ENDED
31st MARCH, 1947

*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.

London, 12th July, 1947.

Sir,—

I have the honour to present herewith, pursuant to section 64 of the Forests Act, 1921-22, the annual report of the operations of the State Forest Service for the year ended 31st March, 1947.

This report incorporates a very much abridged statement of post-war policy, including a brief review of the first twenty-five years of organized forestry in New Zealand, together with proposals for its future development. Many excellent but necessarily voluminous reports on most aspects of forestry have been prepared by the departmental staff as a basis of review and forward planning. Presenting as they do much fundamental information hitherto unavailable, their publication should be proceeded with as soon as paper and printing facilities will permit. Only by this means can an adequate appreciation of the forestry problem and of its solution be gained by the public.

As judged against the background of experience presented to the fifth Empire Forestry Conference by delegates from twenty-six countries, it is clear that while New Zealand has much to learn in forest technique and higher research, its approach to and attack upon the timber-production problem of the next decade is fundamentally sound. It is bettered by few if by any other countries. This is directly attributable to the intrinsic soundness of the Dominion's general stabilization policy in respect both to wages and to the entire gamut of prices from over-the-counter goods to primary products—including timber—and to property. The inflationary and other undesirable effects of opposite policies in many other countries visited, and as reported upon by delegates and visitors, leave no possible room for doubt as to the basic correctness of the Dominion's economic policy. History will show that, even though

anomalies and hardships may have been suffered by some individuals, few countries in the world will emerge from the post-war period of readjustment with as sound an economic structure as New Zealand.

In retrospect the original post-war plan for forestry providing for the employment of over 4,000 men, largely in order to overtake serious arrears of silvicultural work, appears difficult to understand, but investigations show that towards the close of the war there was an almost universal fear of unemployment due to anticipated difficulties of conversion from a wartime to a peacetime economy. Virtually every country planned accordingly a full employment policy without realizing that the enormous accumulations of repair and maintenance work and of new capital construction, coupled with a huge pent-up demand for raw materials and consumer goods, would create the greatest man-power shortage in history and one which is likely to last for almost a decade, though perhaps threatened at times by sharp but short recessions in trade. It is against the background of this man-power shortage that forest works must now be planned for the immediate future.

I have, &c.,

ALEX. R. ENTRICAN,

Director of Forestry.

The Hon. the Commissioner of State Forests.

CONTENTS

	PAGE
Chapter I.—Post-war Forest Policy	4
Chapter II.—Administration	16
Chapter III.—Constitution of State Forests	18
Chapter IV.—Forest Management	18
Chapter V.—Silviculture	19
Chapter VI.—Forest Protection	21
Chapter VII.—Forest Engineering	25
Chapter VIII.—Extraction and Commercial Development	27
Chapter IX.—Timber Trade	31
Chapter X.—Utilization Technology	35
Chapter XI.—Miscellaneous	39
Chapter XII.—Timber Control	41
Appendix I.—Area of State Forests as at 31st March, 1947	48
Appendix II.—Summary of Planting and Silvicultural Operations in State Forests as at 31st March, 1947	49
Appendix III.—Creosoted Forest Produce	50
Appendix IV.—Imports of Sawm Timber and other Forest Produce	50
Appendix V.—Exports of Sawm Timber and other Forest Produce	51
Appendix VI.—Payments and Receipts for Year ended 31st March, 1947	52
Appendix VII.—Sawmilling and Sash and Door Manufacturing 1945-46	53-55
Appendix VIII.—Sawmills registered under the Sawmill Registration Regulations 1942	57
Appendix IX.—Forest Offences, 1946-47	57
Appendix X.—Localities of Managed Forests	58
Appendix XI.—Training and Recruitment, 1946-47	59
Glossary	60

REPORT

CHAPTER I.—POST-WAR FOREST POLICY

1. *General Legislation and Administration.*—Characteristic of forestry in most English-speaking countries, that in New Zealand suffers from numerous misconceptions, invariably propounded by separate minorities interested in only individual aspects of forestry. One belief is that the only way to preserve the country's bird-life and to conserve its water and soil resources is to reserve from any working whatsoever all forests occurring over an altitude of 1,000 ft. above sea-level. Another is that the best way to preserve and perpetuate a forest is likewise to reserve it against either any exploitation or any silvicultural improvement whatsoever, the theory being that Nature cannot be bettered. Still another is that tree-planting, whether it be of indigenous or exotic species, is a panacea for all forestry ills. Unfortunately, no one of these postulates is practicable, all being based upon false premises. Only by a broad policy of conservation and use can the forests of the Dominion be effectively managed within the limits of the public purse to make a balanced contribution to the national economy. It is entirely feasible for the forest not merely to stabilize agricultural land, conserve water-supplies, support bird-life, supply recreational facilities, and give inspiration to all people, but also to provide the country's timber. The first President Roosevelt spoke well and truly when he said: "Forest conservation is the preservation of the forest by wise use." This has been and should continue to be, the basic concept of New Zealand's national forest policy.

Few people have stopped to calculate that were the Dominion solely dependant upon overseas countries for its timber-supplies at the present time it would take £17,500,000 to land our requirements in New Zealand. With a favourable trade balance of only £22,000,000, it can reasonably be claimed that New Zealand's timber-supply functions as a key item in the national economy, and that its perpetuation—and, better still, its expansion—is vital to the country's social well-being and to the maintenance and betterment of living conditions.

The Forest Act, 1921–22, and its subsequent amendments, under which the State Forest Service has now functioned for twenty-five years as the Dominion's organized forest authority, has proved a sound piece of legislation. Its basic strength lies in the continuity of use which it ensures for State Forest land, which cannot be alienated except by resolution of both Houses of Parliament. In the British tradition of *laissez-faire* land-management, however, it was shaped to deal almost exclusively with State forests, owners of other lands being left free to use or misuse them at will, unless they desired to bring them under the operation of the legislation voluntarily, either for purposes of management, &c., or for fire-prevention.

Three events have transpired to bring into sharp focus this fundamental weakness of the existing legislation. First came the get-rich-quick afforestation boom of the 1924–28 period. Although the undesirable financial promotion and management aspects have since been corrected as the result of a Commission of inquiry, neither continuity of land use nor effective technical management has been provided for. Then with the war came the need for cutting of produce from recently established exotic forests. Fortunately the war emergency legislation was available to encourage restocking and to give adequate protection to the owners against the serious fire hazards created by loggers and millers, but its use cannot be continued indefinitely. The third event was the disastrous series of fires in Taupo and elsewhere in 1946–47. These showed the voluntary fire-protection provisions of the legislation to be inadequate.

Concurrently with these events a radical and ever-increasing departure from the free-will land-use policy has developed as a result of excessive erosion and flooding in many parts of the Dominion. Recent legislation has established that in some cases a land owner may be restricted in the use of his land. Following the Taupo fires some measure of compulsion in observing minimum desiderata in fire protection has become widely recognized, and now legislation has been drafted following numerous discussions and various conferences with all interests concerned. There still remains the vital problem of private forest management, and a study of the latest legislation in overseas countries is now in progress with a view to evolving an acceptable concept of control and incorporating it in a consolidated forest statute.

2. *Organization, Recruitment, Training.*—With staff concentrated largely upon administrative reforms and practices in timber sales and upon large-scale exotic forest establishment it was possible for the Forest Service to operate for almost twenty years on a broad organizational basis. Administration was decentralized in conservancies as major territorial charges, but neither in these nor in Head Office was sufficient specialization developed to warrant detailed organization. Only with the accumulated arrears of silvicultural work in the exotic forests assuming threatening proportions and with the appointment of a significant number of technically qualified forest officers in 1939-40 was it possible to plan for the development of work on a divisional basis.

With the intervention of the war, reorganization was delayed until 1946, but, even so, personnel difficulties have allowed but reasonable staffing of only five divisions—services (clerical, accountancy, legal), engineering, development (training and research), commercial (timber sales, logging, sawmilling, &c.), and management (working plans, silviculture, &c.). One other division—public and private forestry—has as yet only a token staff, whilst two others—conservation and industrial—remain to be developed as suitable staff can be trained and assigned to these activities.

Like many technical organizations created in a new country, only a few key administrative and technical personnel were secured from abroad, virtually all the remaining administrative, field, and clerical staff being recruited from land-administrative organizations. Not unnaturally the field staff, qualifying by experience as they could for administrative posts at conservancy level, attracted the best officers for some eighteen years, during which time the number of technically trained personnel did not rise above seven, and some of the most promising clerical officers were lost to other Departments where promotion seemed more assured.

When eventually in 1939-40 it was possible to secure the services of fourteen additional technically trained staff, the necessity for more highly qualified administrative officers had become so acute that it was necessary to allocate the most promising to administrative rather than to technical duties. The result was to further discourage the clerical staff as well as to cause apprehension in the minds of the field staff, but eight years of a firm and aggressive system of promotion and salary adjustment solely by merit and without regard to seniority or to divisional classification—Professional (technically qualified), General (field), or Clerical—has had the desired effect of reassuring all officers that they have equal opportunities for advancement.

Lack of recruitment during the pre-war decade following the depression, together with the absence of graduate foresters due to the closing of the two University Schools of Forestry, had created such a gap in the departmental cadre by 1939 that it was necessary to evolve a plan which would ensure a regular quota of all grades and divisions of officers for the future requirements of the Dominion. The basis of this planning, which accepted as a principle the inseparable relationship of recruitment and training, was the development of a twenty-year staff objective. Forecasting numerically the administrative and executive staff which would be required to implement existing and projected forest works, it was disclosed that the technically qualified staff would have to be almost quintupled and the field staff trebled.

The fundamental concepts of the scheme are the continuous annual recruitment of some twenty carefully selected youths, the provision of both professional and vocational training to a much higher standard than has previously obtained, and the close association of officers of different Divisions—Professional, General, and Clerical—during their training as inductive to and essential for the optimum co-operation and mutual understanding between all officers in the normal practice of their duties. The European system of sending carefully selected applicants into the field for experience and observation before proceeding with any type of formal training has been adopted with excellent results.

In regard to higher forestry education, the decision was reached that post-graduate training was preferable to the inclusion of forestry subjects in an under-graduate course, and a basic science degree (B.Sc. with some prescribed subjects) was laid down as a prerequisite. To provide the post-graduate course, the Forest Service planned to establish a departmental training centre at Rotorua where this and all auxiliary branches of forestry training could be centralized. As the intention was to provide advanced forest training up to the highest professional standards, it was felt that University recognition in the form of a degree could eventually be expected on the evidence of the results achieved.

Meantime, of course, this would have meant that the early graduates of the centre would be deprived of forestry degree status and would thus be at a disadvantage in competition with later graduates whose post-graduate training might be recognized by the University. The conception of a provisional departmental post-graduate course has therefore been held in abeyance pending consideration by the Senate of the University of New Zealand of Forest Service proposals for the establishment of a Post-graduate Forestry School at the Rotorua Training Centre and affiliated with the Auckland University College.

In any educational organization the teaching staff is obviously a vital factor, and in accordance both with prevailing opinion abroad and with its own experience the Forest Service was forced to the conclusion that at least six highly trained lecturers were required adequately to staff a forestry training establishment to the standard demanded of modern forestry education. The maximum annual demand in New Zealand for graduate foresters is unlikely, on a long-term basis, to exceed ten, but the Forest Service plan provides a solution to the problem of reconciling an adequate lecturing staff with so small a number of students seeking post-graduate training annually. The need for the establishment of a Forest Experiment Station to co-ordinate all forestry research had been fully appreciated for many years, and it is proposed to link the Training Centre with the Experiment Station so as to enable the highly qualified specialist officers attached to the latter to act in the capacity of part-time lecturers at the Training Centre when required. Thus the Training Centre need have only two or three full-time lecturers (including the Principal) on its staff. Such an arrangement is justified not solely on the merit of economy of staff, but in the provision of opportunities for instructional staff to keep thoroughly conversant with the latest forestry technique and practice—a factor of great importance in a progressive teaching institution.

In addition to post-graduate forestry training, the scheme provides for courses for non-professional students, and in particular those technical trainees who undergo field training for advancement to forest-ranger status; short courses for skilled workmen and junior staff in the specialized branches of forestry, mainly of an elementary nature; and refresher courses for more senior officers of all Divisions are envisaged as essential parts of the functions of the Training Centre.

The post-war programme of recruitment and training planned in 1939 is, in fact, functioning; certain factors tend to cloud the long-term issue, such as the necessity for special rehabilitation measures and the present abnormal shortage of trained foresters in New Zealand justifying the recruitment of a number of professional foresters from

overseas. Such emergency action, however, in no way obstructs the operation of the twenty-year recruitment and training programme: the contrary is actually the case, as the advent of additional qualified staff increases the pool from which officers can be seconded to the Training Centre as instructors. There is much development work to be done before forestry education in New Zealand, both professional and vocational, can claim to have achieved the objectives sought, but solid foundations have undoubtedly been laid, and it is the duty of posterity to ensure that continuity—that corner-stone of sound forestry—is preserved.

3. *Research*.—With a few marked exceptions, research, in the true sense of gleaning fundamental knowledge, has been sporadic over most of the history of the Forest Service, owing solely to the inadequacy of technical staff. Understandingly, with most of the technical staff compelled to carry some executive responsibilities, the emphasis has tended to rest on forestry as an art and not as a science. The accession of a large number of technical officers in 1939 had been planned to correct the serious deficiency in research work, but the advent of the war and the infringement of timber control upon the normal activities of the Department prevented the attainment of this objective and resulted in less pure research than ever before. Only with the current reorganization of the Department and the assignment of all research—both pure and applied—to the Development Division, and its centralization at the Forest Experiment Station, Whakarewarewa State Forest, Rotorua, where it is associated with the Forest Service Training Centre, has it proved practicable to develop and initiate a programme of research commensurate with the importance of the national forest effort.

Having regard to the limited personnel available, the quality and quantity of research undertaken cannot be regarded as unsatisfactory. The basic defect has been the relatively poor grounding in both natural and pure sciences, including mathematics, possessed by most technical officers, and from this stems the departmental decision to favour higher forestry education of the post-graduate type. A very much deeper knowledge of the biological sciences, together with some improvement in higher mathematics and statistical analysis, is essential to the development of research workers in New Zealand forestry, and achievement of this objective appears to be in sight as a result of general agreement on the desirability of post-graduate education in forestry.

Some research both in forest botany, silviculture, &c., and in utilization has been carried out in co-operation with the staffs and students of the University of New Zealand. Special acknowledgment is due to the one-time Faculties of Forestry at Auckland and Canterbury, similarly to the Engineering Schools of the same colleges and also to the Faculty of Biology at the Victoria University College. Even with the centralization of research work at the Rotorua Forest Experiment Station, many opportunities will still exist for co-operative research projects at the various University colleges.

Over the early years of its development many sample plots of diverse character were established by the Forest Service, but owing to the loss of technical staff during the depression period of the early "thirties" most of these fell into disuse. Originally scheduled for overhaul after the appointment of additional technical officers in 1939–40, the plan was interrupted by the war, and only with the recent assignment of special technical staff to the Rotorua Forest Experiment Station had it been possible to reinstate research work on these plots, all of which are being examined with a view to determining their future status. Many, it is anticipated, must be abandoned. Virtually the only fundamental research projects carried on during the war were those of a long-term nature covering the reporting of seed crops, the growth cycles of both indigenous and exotic species, and the viability of seed.

In contrast with the comparative paucity of pure research, a very large volume of applied research has been undertaken, particularly in the field of forest utilization. What is even more important, the results have been incorporated into everyday wood-using technique and practices. The development of national grading rules for building

timbers and the extensive employment of kiln-drying schedules evolved by the Forest Service are outstanding achievements in the field of applied research. Most of the wartime research on timber utilization was confined to the development of containers for the packaging of munitions and foodstuffs.

The assignment of new staff and the centralization of research at the Rotorua Forest Experiment Station, set, as it is, in the midst of the enormous exotic resources of the Bay of Plenty and adjacent to the great indigenous forests of the Mamaku Plateau and of the Urewera country, should correct all previous deficiencies and usher in a new era of forestry research.

4. *Indigenous Forest Resource.*—Prior to the inception of the Forest Service, only wild guesses as to the extent of the Dominion's forest resources were available. The first physical stocktaking of the country's timber resources took place in 1923. It was done in the early days of the Department with a technique that is now outmoded and by a staff who were not sufficiently experienced in the types of problems involved. It made no attempt to differentiate between accessible and inaccessible forests and its results, therefore, were of little practical use. It suffered from a lack of accurate maps, and therefore reliable area figures could not be obtained; and it had the further and greater disadvantage that it was entirely without modern benefit of air photographs. By the nature of the methods employed it was quite impossible to assess the probable accuracy of the results, and this again detracted greatly from its value.

The 1923 inventory gave the estimated total volume of merchantable timber as 62,000,000,000 board feet. Subsequent attempts have been made to revise this figure, not by further organized field work, but by the collation of information obtained by forest officers during the course of their duties. Such revised estimates, for the accessible merchantable forest, vary from 16,000,000,000 board feet to 42,000,000,000 board feet. Even taking into account the facts that sawn-timber production since 1923 has totalled 6,000,000,000 board feet and that the original estimate included inaccessible as well as accessible forest, it is obvious that the 1923 figure failed to give an accurate picture of the country's forest estate. It is equally obvious that little reliance can be placed on the varying estimates provided by recent revisions, and that, in fact, even the approximate extent of the forest resource is still unknown.

The 1923 inventory concerned itself solely with the volume of standing timber and did not attempt any widespread botanical or ecological survey. Since then, much valuable information on the ecology of New Zealand's forests has been accumulated. The information, however, is fragmentary and is largely uncollated. It has not been systematically collected and it leaves large gaps in essential knowledge. Locally it has sometimes been adequate for the institution of experimental silvicultural work over restricted areas; nationally it is quite insufficient to form a basis for the sound management of indigenous forests.

There is an urgent need, therefore, for a comprehensive and scientific stocktaking, both to provide up-to-date information on the extent of existing timber-supplies and to amass the salient ecological facts upon which New Zealand's long-term indigenous forest policy must be based. The national forest survey is a major fact-finding project designed to meet this need. The means by which this project is being carried out have been evolved after a close study of forest survey methods in other countries and after a period of experimentation to determine the system best suited to New Zealand conditions. Using, as it does, the two techniques of aerial photograph interpretation and statistical analysis, the method chosen embraces the most recent developments in forest survey design. Every effort is being made to control all possible sources of error so that the results, which cannot possibly be completely accurate, will at least be of known and acceptable accuracy.

If successfully completed along the rather ambitious lines at present followed, the forest survey should provide the most important document in the history of New Zealand's timber-use economy for the next fifty years; of more lasting value, the

ecological information gathered should help towards the formulation of a policy which will have reference not only to fifty but to five hundred or even one thousand years ahead.

5. *Indigenous Management and Silviculture.*—The management of the indigenous forest after logging would be an easy matter if no regard need be paid to the succeeding composition and structure of the regenerated areas. The forester, however, is faced with the problem of regenerating his used forest to the same forest as before; or, if possible, to a richer and more utilizable forest than the original one. To examine the physical possibilities of such a procedure, each type of commercial forest must be considered separately, for it is almost self-evident that no single finding is likely to be applicable to all the numerous species that constitute New Zealand's commercial indigenous forests. The simplest analysis of these various forests is by species, for, although nearly all of them are mixed stands, there is in each a dominant species or species mixture which gives to each forest its individuality.

Kahikatea Forests: These forests stood in the main on swampy lowlands or good rich land which has now been converted into dairy-farms. The species is not transferable, as significant forest stands, to the poorer-quality lands now devoted to forestry. The problem is a simple one, therefore. It is merely dairy-farming versus white-pine forestry; and there can be little doubt about the decision. Dairy-farming demands such land in the national interests, and commercial kahikatea forests are therefore impossible.

Matai Forests: Here again is a species that prefers better-class soils. There may be small exceptional areas in Taranaki and in the central North Island where matai forest is on non-pastoral soil, but, broadly speaking, the species gives place to farming and cannot be transferred to less-fertile areas.

Totara Forests: Again the best totara was on rich farming-land, notably on alluvial flats. It cannot be permitted to retain such land. There are, however, totara forests of the mountain type that grew on poorer land; and there was a distinct range of the species (using the term in the broad sense to include all timbers called totara) from very good to comparatively poor land. There have always been well-known areas where it regenerates and persists in quite remarkable fashion, and it is very amenable to artificial handling in youth. There is therefore a distinct possibility that it could be retained as a minor constituent of some forests on a very long rotation. It is even then, however, very doubtful whether it will ever attain a significant place in any future forestry.

Rimu Forests: Rimu is the problem species of New Zealand forestry. In nature it occurs or has occurred from the farthest North to the farthest South; from sea-level to 2,500 ft. altitude; on good soils and on poor soils; as almost pure stands and as components of various mixtures in which at different places each or several of the other commercial species accompanies it; and in these mixtures it occurs at all places on the frequency scale, from dominance to rarity. This ubiquity of the species has been a basis for the argument that its silviculture must be simple and results certain. Unfortunately, this has not proved to be the case. The silviculture of rimu is not simple. Rimu forests, except in a few specially favoured localities, are not tolerant of the axe and the saw; and the factors underlying the intolerance are still obscure. It is not improbable that one of the keys to the difficulty is the rarity of seed years and the comparative paucity of seed even in a good year. Another, undoubtedly, is the great gap between intolerance of the seedling to light and drought and the tolerance of the adult to the same climatic factors.

All that can be said at the moment is that there are definitely hopeful localities and conditions. There may in the future be a form of silviculture evolved for rimu. Its nature is not yet clear, but it must depend upon some local adaptation of the selection system; and there are certain natural types of mixtures in which rimu occurs where regeneration and seedling and sapling growth of rimu is constant and very encouraging.

The present policy must be ultra-conservative recognition and selection of the optimum remaining localities, careful and even uneconomical exploitation of species that accompany rimu in those localities, and slow, painstaking observation of every symptom indicative of improved rimu growth in infancy and adolescence. As with kahikatea and matai, much of the originally best rimu forest has been turned to pasture and must remain in pasture; but extensive tracts still remain where rimu is thrifty and healthy, and in some of these large areas a permanent rimu forest is undoubtedly a possibility.

Kauri Forests: The silvicultural possibilities of kauri within its natural climatic and soil limits are clear. There can be no doubt whatsoever that large tracts of kauri forest can and will be held as kauri forest in perpetuity. Already a large acreage has been brought under working plan and is being added to by purchase of privately owned lands carrying young and advanced growth.

Beech Forests: This is a "portmanteau" description covering many types of forests in which one or more of the five different species of indigenous *Nothofagus* occur. It is frequently said that beech occurs throughout New Zealand, but this statement, whilst broadly correct, does not connote the same degree of ubiquity of a species as has been noted above in rimu. Five species are involved, instead of one; each of these has its own preferences in the matter of range and habitat; each species tends towards (though it does not insist upon) purity in its stands. Most helpful of all to the forester, all of the species cling to poorer soils, which are not sought after by the agriculturist. These forests, therefore, present the greatest opportunity of indigenous silviculture on a large scale; and, as a group, they will be the mainstay of the protection, anti-erosion forests of the mountainous core of both Islands. Economically, they will have a value far beyond that; and an intensive silviculture concentrated upon each species in the optimum areas of its natural range will give results that should place New Zealand beech forests in the forefront of the managed hardwood forests of the world.

Miscellaneous: The preceding paragraphs deal with the principal commercial forest species in indigenous forests as they exist at present. Minor forests that can and will be reproduced silviculturally are *silver pine* and *kaikawaka*. These are species which have, so to say, taken natural refuge in very poor sites unacceptable to the other forest species. They will reproduce there, and the sites are not suited for either agriculture or better forest species. Their continuance is certain by dint of careful fire protection; their assistance by this and by cheap silvicultural methods is desirable.

In addition to these, it is possible that certain secondary forests of a type unknown in Nature, but consisting of indigenous species, may have a national value sufficient to warrant their protection and even in cases their deliberate establishment. Chief of these is the manuka forest, which is so frequently the first result of man's demolition of the mature indigenous forest. It is not usually a natural climax forest. It is Nature's substitute for a ruined forest, and her foster-mother for a climax forest of the future. However, there are cases where the perpetuation of such a forest may have a very real money value, and the economic manuka forest, or at least manuka compartments in a forest, must be regarded as a distinct probability in the future in many parts of the country.

6. *Exotic Forest Management and Resources*.—Among the basic factual data which must be ascertained before a management policy and working plan can be formulated for any forest are data relating to the areas actually stocked with tree crops and the condition of the crop as to vigour, density, volume of standing timber, and rate of growth. Data concerning tree species and age are available in the exotic forest stock maps, where they have always been recorded during the year in which the trees were planted. The types of information first mentioned and without which sound prescriptions for thinning, clear-felling, and other forest works cannot be drawn up are collected in the field, compartment by compartment. These investigations, termed "assessments of the growing stock," have been prosecuted as rapidly as possible with the staff available,

and the adoption of a simplified method during the past year has resulted in the same field parties doubling the area assessed. One-fourth of the total area of State exotic forest has now been assessed.

Assessments are comparable with the national forest survey, but are on a more intensive scale and carried out over smaller unit areas, the forest compartment, rather than the whole forest, being the unit. For both investigations aerial maps are of very great assistance if not indispensable, and it is unfortunate that the assessment of certain forests must be postponed owing to aerial photographs being as yet unavailable.

7. *Exotic Silviculture*.—It is again stressed, as in annual reports of recent years, that the thinning of the very large areas requiring this improvement work cannot be delayed indefinitely. Neglect of thinning involves loss of increment, danger of disease and fire, loss of timber in the trees which die instead of being removed and utilized, and also dangerous and difficult conditions for logging workmen, when the stand is ultimately clear-felled, owing to the presence of numerous dead standing trees (up to 450 per acre in some instances). During the war years the average annual area thinned was 800 acres, and during the two post-war years this has only very slightly increased to 815 acres. The reason for this is, of course, that additional workers required for thinning projects are not offering. It is of interest to record that the wartime clear-felling rate of 170 acres annually has increased in the past two years to 270 acres. Almost the whole of the clear-felled areas had received no thinning treatment, but the one compartment which had been properly thinned at the appropriate period yielded 50 per cent. more timber per acre than the unthinned compartment. The extent of the loss of increment owing to neglect of thinning is obvious, while the quality of timber also suffers.

8. *Land Acquisition*.—In view of the small numbers of forest workers offering for employment, the recent slow progress in acquirement of sub-marginal land areas for consolidation of existing State forests, for extension of young kauri areas, or for establishment of new exotic forests in timberless regions will not in itself retard the post-war forest expansion programme. The policy of ensuring that land suitable for farming is not acquired for forestry was closely adhered to. One large area was interdepartmentally inspected, and several further areas are awaiting inspection. This policy embraces not only open lands for planting but provisional State forests under consideration for permanent forest dedication.

9. *Water and Soil Conservation and Forest-fire Prevention*.—During the year the closest collaboration has been maintained between the Soil Conservation and Rivers Control Council and the State Forest Service, and a member of the State Forest Service was appointed to the post of Forestry Liaison Officer.

The appointment of this officer marks the increasing emphasis which is being placed by the State on soil-conservation measures of which a significant part is the acquisition and management of large areas of sub-marginal land as "protection forest" by the State Forest Service and the continued protection and management of State forests with due regard to soil conservation. The State Forest Service controls several millions of acres of protection forests, and reference to past annual reports—more especially those of about fifteen years ago—will show to the inquiring reader that the Dominion forest policy has for many years been abreast of that of older countries, which have long regarded the preservation and management of "protection forests" as one of the most significant contributions of a Forest Service to the well-being of the community.

It is intended that the Forestry Liaison Officer will keep the Soil Conservation Council constantly in touch with forest policy in so far as it affects soil conservation, and that the joint inspection of land for acquisition as State forest by all interested Departments may be considerably facilitated. The bodies interested in such inspections

are the Departments of Lands and Survey, Scientific and Industrial Research, Agriculture, the Soil Conservation and Rivers Control Council, the State Forest Service, and Catchment Boards.

A sound forest policy on soil conservation is felt at three points: firstly, the protection of the vegetation on steep sub-marginal country as a measure of flood control; secondly, the utilization of cleared marginal land for afforestation and the future supply of softwoods and the maintenance of indigenous forest cover on similar uncleared sites for the production of hardwoods under a permanent working plan; and lastly, the maintenance of forest cover on water catchments as a measure of the regulation and conservation of water-supplies.

The importance of the protection of exotic forests from fire is now firmly established, but the same appreciation is unfortunately not held in respect of indigenous forests, particularly milled forest and forest which is principally of protection value. There are many examples where repeated burning has completely destroyed the fertility of the soil, with the result that landslides are frequent and erosion is inevitable.

The forest fire laws are, however, limited in their application to the State forests and other forests, certain flax and gum lands, sand-dunes, &c., protected by fire districts; but an extensive territory equally in need of soil conservation and forest protection is unaffected, and it is in these lands that the greatest damage is done by burning, either deliberately or through carelessness; and on account of lack of organization and through the indifference of the occupiers, fires are allowed to burn themselves out.

In many instances where the land will not now hold grass or other vegetation, it is recognized that indiscriminate burning has been the agent which has impoverished the soil and caused the land to become derelict. The 1946 fire season demonstrated the inadequacy of the present fire prevention and control organization in the Dominion and the limitations of the existing law. With a view to remedying these deficiencies, steps were taken to review the whole position and to determine what legislative authority was necessary to deal with forest and rural fire prevention and control on a Dominion-wide basis. Proposals in this connection are embodied in a proposed Bill called the "Forest and Rural Fires Bill." These proposals have been examined by the forest-owners and other interests affected and dealt with in detail at two conferences held in Wellington. In all cases the principles of the proposals found unanimity, and modifications in detail only appear to be necessary to provide a measure which will be acceptable; and it is hoped that the proposals will form a Bill for consideration by Parliament during the 1947 session. In principle the proposals retain the provisions of the present law regarding the constitution of fire districts for the protection of the forest land or other land for which protection is required, but the control of each fire district will be under a committee called the "Fire Authority" appointed or elected by the owners of the property to be protected. In areas other than fire districts, soil conservation districts, and State forests, local authorities are authorized to take control, and provision is made for joint action and by arrangement for the exercise of the Fire Authorities' powers by a Catchment Board or other properly constituted organizations.

The extended fire control and enlightened land utilization by the State Forest Service, coupled with the improved conservation practices on farms as sponsored by the Soil Conservation Council, represent a major step towards the elimination of soil erosion from New Zealand.

10. *Forest Utilization.*—Before the inception of the Forest Service the country's timber resources were being recklessly exploited. Payment for standing timber was on a sawn-measure basis, so that only the best trees were logged and little incentive existed in the sawmills for the reduction of slab waste to a minimum. Special-use timbers such as kauri and white-pine were used for general purposes as well as for export. Consuming agencies further aggravated the position by imposing restrictive measures on the use of low grades and sap qualities of all building timbers so that much was wasted.

Such conditions were but the reflection of the country's first eighty years of land development, during which period probably only one-tenth of the merchantable timber carried by the land cleared for settlement was usefully converted into sawn timber. The remainder was burnt.

By the early "twenties" the deteriorated-lands problem had become so acute in Taranaki and elsewhere that emphasis on land development shifted sharply away from the clearing of heavily timbered hill country to the cultivation and manuring of the easy rolling pumice lands. While this served to arrest reckless clearing, the real harm had already been done. It took but a cursory examination of the country's timber resources to demonstrate that these were quite insufficient to maintain in perpetuity either the then current or the potential future demand of an expanding economy. To conserve them by wise use a timber-sales policy was instituted under which all utilizable standing timber on a demarcated area was measured and sold for an overall or block price on the assumption that all merchantable and not merely the best trees would be logged and that they would be converted into sawn timber with a reasonable minimum of waste. This reform in timber-sales policy has undoubtedly been the greatest administrative achievement of the Forest Service. Conservatively estimated, the country's revenue has benefited to the extent of at least £500,000, but, what is even more important, over 500,000,000 board feet of sawn timber has been saved over the period under review.

The exotic forests established, as already referred to in this statement, as a supplementary capital resource to conserve the diminishing supplies of high-grade indigenous timbers have already commenced to function to a significant degree. With the exotic softwood cut now on the 100,000,000 board feet level, representing almost 30 per cent. of the total sawn timber, production users are becoming increasingly appreciative of the intrinsic values of the various woods as well as of the accurately sawn, well-merchandised products now available from log-gang mills. The basic problem now confronting the Dominion is the further early expansion of production to the immediate potential annual increment of exotics amounting to over 300,000,000 board feet as estimated even on a really conservative basis.

Whilst there is little doubt—as evidenced by the conclusions of the fifth British Empire Forestry Conference, just concluded (July, 1947) in London—that the world shortage of sawn timber is very large and much graver than that of pulp, and is likely to continue so for an indeterminate period, there is much apprehension over the price position and the inability of many countries to purchase even current production owing to financial difficulties between soft and hard currency areas. This condition of affairs undoubtedly favours the development of the Australian market as the handiest and most logical outlet for any New Zealand production surplus to domestic requirements, seeing that the Commonwealth's only alternative sources of softwood supply—primarily North America and secondarily Scandinavian countries—are necessitating payment in hard currencies.

Nevertheless, the fact cannot be ignored that so great is the pent-up demand for timber—more particularly in the war-devastated countries of Europe, although still significantly large in most other countries—that immediate planning for the expansion of production must be proceeded with in anticipation that international financial problems will be solved. Some seven years of accumulated arrears of new capital construction as well as of repairs and maintenance can hardly be overtaken in a similar period, and it is not improbable that demand will exceed supply for ten years. The necessity for a considerable expansion of production has been recognized by the Empire Conference, which has passed a relevant resolution that, if at all feasible, overcutting of the annual yield should be allowed for the next five years, with the proviso, however, that compensatory reductions in cut should be instituted at some later date.

Discussions at the recent British Empire Forestry Conference confirm that the future of world timber prices is highly speculative. Much uneasiness exists amongst

some major producing countries in the Northern Hemisphere due to the accumulation of excessive inventories, especially in the lower grades, but there is little doubt that much of this timber would move into consumption if the labour-cost element in building-work were stabilized at reasonable levels. While the net effect naturally has been to depress prices slightly in these countries, elsewhere there has been little alteration, although it is the general consensus of opinion that the peak of timber prices has been passed. On the other hand, it is far from impossible that once currency difficulties are overcome and building-labour costs reduced by an improvement in the supply of both man-power and raw materials the full force of the pent-up demand will send prices higher still.

Not until supply comes into balance with demand in about ten years' time is any marked stability in prices likely to be attained. Recent estimates as to the level of such prices range from 30 per cent. to 50 per cent. above pre-war f.o.b. values, with shipping freights from 50 per cent. to 100 per cent. above pre-war figures. Meantime, prices are estimated to remain at fairly high levels, and there is little doubt that over this period New Zealand exotic softwoods should be strongly competitive on the Australian and Eastern markets. It is even conceivable that if demand does develop to the high level anticipated, and particularly if currency difficulties persist, New Zealand timber could be sold on the British markets.

The forward shortage in respect to world pulp and paper supplies does not appear to be nearly so acute. This was the finding of both FAO and the fifth British Empire Forestry Conference, and it is an inescapable conclusion that any establishment or expansion of the pulp and paper industry in New Zealand for other than domestic consumption should be approached much more cautiously than the expansion of the exotic softwood industry for general export. Of paramount interest to the Dominion is the great importance attached by the fifth British Empire Forestry Conference to the principle of integrating the various forest products industries—sawmill, veneer, pulp, and paper mills, &c.—so as to use the whole of the raw forest material to maximum economic effect.

The task of utilizing the huge exotic forest resource calls for a bold and audacious attack. All previous conceptions of logging, sawmilling, and other means of utilizing either the indigenous or exotic forest resources must be abandoned. The immensity of the task, as measured both by the output and by the operating economy which must be achieved, makes it virtually impossible for the rugged individualism of the *laissez-faire* period to be any longer capable either physically or financially of adequately coping with the problem. A new class of organization with the character of a public corporation, in which private enterprise and Government shall be associated, is suggested as the best means of developing the sawmilling and pulp and paper industry on a scale and to a standard commensurate with the resources and markets available. The present and the immediate future offer an unparalleled opportunity of development and constitute a challenge to the enterprise and resourcefulness of the Dominion. Forest products, in fact, have greater potentialities than any other product—either primary or secondary—for improving the country's external trade balance, particularly with Australia, and this advantage, combined with that of high employment, promises a substantial contribution to New Zealand's social and economic progress.

11. *Forest Finance.*—The financial concept of the Forests Act is undoubtedly the poorest of all the provisions of the enabling legislation. Under its provisions all activities of the Forest Service have been financed by loans in so far as revenue has been insufficient to meet full costs, and this regardless of the fact that projects may or may not have been proper investments for loan-moneys. Revenue from the exploitation of indigenous forests has been treated as a fund for meeting the general administrative expenses and for assisting General Government and local-body finance, and the financial responsibility for replacing the exploited forests has never been recognized

in fact. Up to 1933, interest was paid by the State Forest Account (in effect by the raising of new loans). Since 1933, interest payments have been met by the Consolidated Fund, but are being carried in the General Government accounts as a liability, as also are the amounts due on loans, regardless of the fact that the possibility of eventual repayment of the loans from the State Forest Accounts is very dubious.

The long-term objective of forest finance, as of forestry itself, must be to place future generations in the place where we, as inheritors of a once adequately forested country, *should* stand to-day. If a realistic view is to be taken of our problems, one must admit that revenue from the forests is being exploited just as ruthlessly as were the forests themselves in the early and not-so-early stages of settlement of the Dominion. To find full support for this statement one has to consider only, in the case of private forests, the serious lack of much financial provision towards perpetuating the forests and, in the case of State forests, the material subventions of revenue which have received comment in annual reports for some years past.

We must aim firstly at having our forests free of financial encumbrance at maturity of the first crop and secondly at securing sufficient revenue from the harvesting of each crop not only to meet the costs of regeneration and maintenance of the following crops, but also to provide a surplus. If this surplus can be realized from our State forests, it could properly be appropriated as General Government revenue, but, before appropriation, it must be realized and cannot be pledged in anticipation. It is proposed that, in future, the utilization of loan-moneys should be restricted to the commercial or semi-commercial activities of the Service. The building-up of State forests (a comparatively short-term function of the State Forest Service) should be financed out of General Government funds.

12. *Rehabilitation and Post-war Planning.*—As events have turned out, labour, post-war, has developed an acute shortage in place of an anticipated surplus. So far as it is possible to judge, this shortage is likely to remain significant for many years, particularly in respect to the more skilled occupations. The factor which appears to have been neglected in previous judgment of the forward position has been that of physical wastage in industry, the annual rate of which, amounting as it does to between 3 per cent. and 7 per cent. according to industry, gives a total wastage of between 20 per cent. and 49 per cent. over the seven years of war. Meantime, also, the population has been expanding, with industries wanting more workers than ever before. The establishment of new industries, some of them reconverted war industries, brought about by shortages of manufactured goods from overseas and therefore essential for the time being, still further accentuates the man-power shortage.

Under the impact of these developments, forest works suffer for want of essential labour and apparently must continue to suffer. Some silvicultural works should be carried out at certain periods in the life of the forest or otherwise irremediable harm is done and much of the tending work must be abandoned for all time, to the serious detriment of the stand. This makes it more imperative than ever before that such labour as may be available shall be used on the most important forest works and its energy not dissipated over too wide a field.

For the immediate future, forestry can make its greatest contribution to rehabilitation by training and developing skilled workers for the logging industry. This section of the trade remains the bottleneck of production, and with the need for homes still desperate forestry must strain every nerve to expand production. With adequate timber-supplies not only will workers in many other industries be able to function more efficiently, but eventually the housing shortage itself will be reduced to proportions allowing the acceleration of immigration and the gain to national man-power so essential to the future adequate staffing of forest works.

The measures initiated by the Government for the improvement of sawmill housing are already bearing fruit by attracting a good class of worker into the industry, and it is confidently anticipated that within two years the production objective rate of

400,000,000 board feet per annum will be attained. Similar improvements in forest workers' accommodation and the creation of model village communities are having the same effect of building up an efficient departmental labour force.

Until numbers are adequate to overall current requirements, full effect cannot be given to the original post-war programmes of forest works more fully reported upon in previous reports, but wherever local labour supplies are good every effort possible is being made to proceed with the establishment of new exotic forests in timberless districts.

CHAPTER II.—ADMINISTRATION

13. *Permanent and Temporary Staff*.—Permanent, 325 (309); temporary, 225 (201); total 550 (510).

The number of officers still with the Forces is now only 7, 4 of whom are with the J Force. Returned servicemen on leave without pay total 32, of whom 9 are taking full-time study courses at the Universities. The total staff figures quoted include men with the Forces and on leave without pay.

Recruitment during the year was mainly through special courses for junior field officers and the usual intake of technical trainees. The competition for technical-trainee appointments is exceptionally keen, but, as in other Departments, much difficulty has been experienced in securing clerical cadets.

The reorganization of the State Forest Service actually commenced during the year. A large number of transfers is involved, and recruitment of foresters is essential to meet the requirements of the service. Overseas advertisements for technical staff have been made and suitable officers are now being selected from among the applicants.

14 *Military Service*.—Army, 7 (15); R.N.Z.A.F., nil (5); Navy, nil (2); making a total of 7 (22).

15. *Casual Staff*.—Average for year, 1,513 (1,108). The number employed at 31st March, 1947, was 1,631, an increase of 332 over the number employed twelve months ago. There was a steady increase of 40 men each four-weekly period till November, after which numbers have remained constant no doubt through casual workers accepting seasonal work such as harvesting, shearing, &c.

16. *Honorary Staff*.—Honorary forest rangers, 260 (245). New appointments and reappointments numbering 25 were made, and there were 10 resignations or appointments expired due to effluxion of time or removal of the appointee from district.

17. *Health of Staff*.—Concern is still felt at the retention of older officers on the more arduous field duties. The policy of recruiting timber-measures, however, is having an appreciable effect on the position and was, in fact, an essential advance step to facilitate the general reorganization.

Much difficulty is being experienced in securing increased office accommodation, which is vital for general health and efficiency. Some improvements have been effected by temporary buildings, and building extensions in two cases have been approved.

18 *Safety of Employees*.—Total accidents, 382 (259), made up as follows: cuts, 96 (67); strains, 96 (59); fractures, 11 (10); crushes and bruises, 95 (76); septic wounds, 37 (13); eye injuries, 20 (12); miscellaneous, 27 (20). No fatal accident occurred this year. There has, however, been an increase in the number of accidents, but this can be accounted for by the increase of employees following an expansion of activities.

19. *Compensation to Employees*.—

Year.			Total Payments.	Total Wages.	Compensation per Centum of Wages (Approximately).
			£	£	£ s. d.
1945-46	..	..	5,548	349,863	1 11 9
1946-47	..	..	8,708	497,615	1 15 0

20. *Recruitment.*—During the year two courses in timber-measuring were completed and one commenced at the Rotorua Forest Training Centre with the object of giving workmen the opportunity of qualifying for higher positions. Two of the courses covered mensuration work in indigenous forests and the other dealt with exotic forests. As a result of their efforts, 11 men attending the completed courses, including 9 ex-servicemen, were successful in securing appointments.

The recruitment of young ex-servicemen and schoolboys for training under the technical-trainee scheme was continued. Fifteen appointments were made under this category, 6 of the appointees being ex-servicemen and 2 B.Sc. graduates. The total number of technical trainees is now 99, of whom 51 have had service with the Armed Forces.

21. *Training.*—Technical trainees studying for a science degree number 34, compared with 32 last year. Certain trainees have revealed themselves more suited to field duties and are not continuing with their degree work, which has kept the number studying for a degree comparatively stable. Of these 34 undergraduates, 14 are ex-servicemen on full-time rehabilitation bursaries. In addition to these trainees, two officers are studying for forestry degrees at Edinburgh and Aberdeen Universities respectively with rehabilitation assistance.

A number of men not appointed to the staff are also studying for science degrees with a view to taking up forestry as a future career. Fourteen of these are ex-servicemen studying with rehabilitation assistance for a B.Sc. degree in New Zealand, and 5 others for forestry degrees in the United Kingdom.

Sixty-five other technical trainees are engaged in training under a schedule of field duties, and for these a system of grading has been introduced. The position with these trainees has been complicated by the return of ex-servicemen, who for the most part have to commence their forestry education from fundamentals. The system of progressive courses which has become the basis of the grading has materially contributed to accelerating the training of ex-servicemen.

During the year all technical trainees holding appointments attended a preliminary course for the purpose of grading. Seven were classified as senior grade, 12 as intermediate grade, and the remainder as junior grade. Additional courses will be held to assist trainees in the lower grades to qualify for a higher grade. Special precautions are taken at all courses to safeguard the interests of ex-servicemen.

The Rotorua Forest Training Centre undertook during the year a very full programme for the instruction of all staff categories. Courses were held in timber-measuring, cruising methods, working plans, fire-prevention, and tool-maintenance, and additional courses were conducted for clerical officers (refresher), potential leading hands, and technical trainees studying at University. The saw-doctor's school was discontinued and instruction in tool-maintenance substituted. In all, thirteen courses of varying duration were completed and one commenced.

At the Tapanui Forest Vocational School, which is smaller than the Rotorua Forest Training Centre, five courses were conducted, three for the instruction of potential leading hands, one for the grading of trainees, and one for trainees studying at University.

Particulars of the courses are shown in Appendix XI.

22. *Examinations.*—Two technical trainees completed the B.Sc. degree during the year and one clerical officer completed the B.Com degree. One clerical officer was successful in completing the Professional Examination in Accountancy and another the examination of the Australasian Institute of Secretaries.

23. *Allocation of Duties.*—As part of the general staff reorganization, an appointment was made to the position of Assistant Director of Forestry. This officer's duties will include the co-ordination of the activities of each of the divisions of the Forest Service. Inspectors in charge of the divisions have also been appointed, and these

Inspectors will be responsible for the activities of, and must also organize, their respective divisions. The reorganization is still proceeding, and it is obvious that additional senior officers, both technical and clerical, will be required.

The demand for building-timber, which is as acute as it was during the war period, necessitates the continuation of many timber-control functions, and the duties attached to these must be assigned to senior officers.

24. *Field and Office Inspections.*—The reorganization effected in Head Office, referred to in the previous paragraph, has retarded field inspections. Timber-control activities have been supervised by visits to each centre, and commercial schemes conducted by the Forest Service have been subject to regular field reviews. Assistance has been given other Departments in special inspections with respect to land use, nasella tussock control, erosion control, and other matters.

The appointment towards the end of the year of a full-time office examiner will allow the regular review of each conservancy office, and the newly appointed investigational staff has permitted special investigation, particularly of the costing of commercial and Service activities.

25. *Conservancy Organization.*—Progress in the setting-up of minor territorial charges within conservancies has been deferred until next year, but actual charge positions have been advertised through the usual channels. Staff-training activities are playing a foremost part in developing sufficient young officers to replace older officers who have been promoted or to fill new positions.

26. *Inter-departmental Co-operation.*—It has been found vital to the development of the Forest Service that greater attention be given to publicity and promulgation of Forest Service policy to other Departments. To cope with the demands of expanding activities, increases in both finance and staff are required, and Treasury, the Public Service Commission, and the Commissioner of Works have all interested themselves in the new projects, as well as in a general review of existing projects. Commercial relations with other Departments have remained on an excellent footing.

CHAPTER III.—CONSTITUTION OF STATE FORESTS

27. *Changes in Area.*—The area set apart as permanent and provisional State forest during the year was 45,028 acres and the area withdrawn from reservation was 3,637 acres, a net increase of 41,391 acres. The area under State forest reservation now totals 9,167,609 acres, representing 13·81 per cent. of the total land area of the Dominion. Of this area, 6,204,757 acres, being 67·69 per cent. of the total State forest area, are permanently reserved. A withdrawal of 14,600 acres for scenic purposes in 1945, previously unrecorded, and a discrepancy in last year's figures of 49,000 acres have reduced the aggregate area under reservation by these amounts (see Appendix I).

28. *Changes in Status.*—Of the total area withdrawn from State forest reservation, 644 acres were required for scenic purposes, and the remainder, 2,993 acres, for settlement.

CHAPTER IV.—FOREST MANAGEMENT

29. *Surveys.*—Topographical surveys were carried out over 3,140 acres and forest-type surveys over 843 acres. In connection with timber appraisals, boundary surveys of 169 areas, totalling 19,430 acres, were completed; and for the reconnaissance of timber resources, 11 areas, comprising 14,495 acres, were surveyed. Six hundred acres of managed forest were subdivided into compartments. Engineering surveys for the purposes of village and housing sites were made on 12 areas.

The large programme of aerial surveys being undertaken for the purpose of the national forest survey, assessment surveys, &c., has not progressed as satisfactorily as could be desired as, owing mainly to unfavourable weather conditions, the contractor

was unable to complete the photography of as large an area as was expected. Seven mosaic copies and 2,330 prints were added to the library, and 10 mosaic copies were obtained for use in conservancy offices. Forty-nine mosaics are now held in the Forest Service library of aerial photographs.

30. *Mapping*.—Owing to the continued shortage of draughting staff, work under this heading was again mainly confined to the preparation of plans and maps in connection with current operations. One new stock map was prepared and 3 stock maps and 1 indigenous forest record map were redrawn. Twenty-one forest atlas sheets were renewed and 47 new plans recorded.

31. *Forest Management Staff*.—A forest graduate was appointed to the forest management staff during the year and was later seconded to the Soil Conservation and Rivers Control Council. Another forest graduate returned from military service overseas, but resigned later in the year. Despite the fact that the professional staff directly concerned with forest management consists of only eight officers, whose present supplementary duties in connection with timber control, rehabilitation, recruitment, and training leave insufficient time for forest planning as expressed in working plans, fair progress has been made with assessment and the completion of some plans.

A working-plans refresher course held at the Rotorua Forest Training Centre was attended by fifteen foresters and assistant foresters and by three forest rangers engaged on assessment duties. Lectures were given on working-plan assessments, volume tables, yield tables, and working plans, including fundamental forest records, and the lectures were followed by questions and answers.

32. *Forest Working Plans*.—Two new working plans and two revisions of existing plans were completed during the year. One of the new plans, that for Hanmer Forest, has been approved by the Commissioner of State Forests, and the other, for Whakarewarewa Forest, has been submitted for approval. The five year revision of the plan for the kauri working circle has also been submitted for approval. Working plans for Herekino, Woodlaw, and Maramarua Forests are under preparation. General proposals for felling and silviculture have been prepared for the Tapanui forests and also for the Naseby, Maramarua, and Puhipuhi Forests. Resubdivision into compartments of manageable size has been completed for Marumaru, Waitapu, and Dusky Forests. An ecological survey and report was made on Woodlaw (silver beech) Forest.

Assessments of growing stock in 256 compartments covering 65,900 acres were completed during the year. The forests concerned are Kaingaroa, 45,500 acres; Rotoheu, 4,700 acres; Maramarua, 4,000 acres; Hanmer, 4,300 acres; Balmoral, 6,100 acres; Dusky, 1,000 acres; and Woodlaw, 300 acres. The strip-plot method was used over most of the forests, but line (rectangular) plots were experimented with on Maramarua, Dusky, and Woodlaw Forests. On Kaingaroa and Dusky Forests, volume tables were used instead of sample-tree measurements, and on the former forest the area assessed was double that of last year as a result of the saving in field-work.

CHAPTER V.—SILVICULTURE

33. *General*.—Owing not only to shortage of labour, but also to accommodation difficulties, particularly for married men, the programme of silvicultural operations fell short of that planned. There was, however, a little more labour available than the previous year, and the area thinned and pruned was slightly increased in consequence. There was also an increase from 553 acres to 834 acres in the new areas planted. Statistics appear in Appendix II.

34. *Natural Regeneration*.—Two extremely dry summers in succession have taken heavy toll of kauri regeneration that has been fully exposed to the sun. Elsewhere regeneration has been satisfactory in regard to both quantity and establishment. In Canterbury, where insignis-pine stands were wind-thrown in 1945, regeneration is now showing in some areas that have been salvaged and cleared.

35. *Interplanting Indigenous Forests*.—Five acres only of worked indigenous forest were interplanted, the species used being hoop pine (4 acres) and kauri (1 acre).

36. *Afforestation*.—New planting on open land totalled 834 acres, 685 acres were blanked, and 925 acres were replanted. Tree seed amounting to 3,284 lb. (including 69 lb. of indigenous species) was collected, a considerable portion of it being sold overseas.

37. *Nursery Operations*.—The sowing of 2,312 lb. of seed resulted in a nursery stock of 13,963,000 seedlings. Trees lifted for planting totalled 3,442,000, and 2,969,000 trees were lined out. At the close of the year, nurseries held a total of 21,343,000 trees, compared with 11,985,000 at the end of the previous year.

In the Rotorua Conservancy, Douglas fir reproduces abundantly and many natural seedlings of advanced growth are now lifted from the forest and lined out in the nursery for future planting stock. This operation has proved successful. At Reefton a break of red-beech wildings was lined out similarly for a year's hardening off under nursery conditions.

38. *Tending of Indigenous Forests*.—A total of 185 acres was treated, the work including the cutting-out of competing scrub in order to release kauri saplings and the thinning and cutting-out of over-mature and diseased trees in silver- and red-beech forest. Produce from the silver-beech operation was sold as mine props. In addition, 26 acres of exotic trees interplanted in indigenous forest were freed from competing scrub and undergrowth. Owing to shortage of labour, work had to be curtailed, but in several instances camps and access ways were established preparatory to commencing work on a larger scale during the present year.

39. *Tending of Exotic Forests*.—Release cuttings covered 677 acres, low pruning 6,556 acres, and high pruning 932 acres. A total of 1,055 acres were thinned and 412 acres were clear-felled. In addition, salvage and extraction were carried out over 189 acres of wind-thrown and snow-damaged stands.

40. *Silvicultural Investigations*.—A layout plan was prepared and initial plantings were made towards the establishment of a northern arboretum at Waipoua. In all, 2,220 trees were planted, consisting of kauri raised in the nursery from New Zealand seed and from Queensland and Dutch East Indies seed, *Araucaria* from New South Wales, tanekaha (locally collected wildings), and slash pine for shelter belt.

41. *Experimental Plots and Statistical*.—The development of kauri natural seeding on experimental plots in the Auckland Conservancy was closely watched. The seedling density continues on the increase. In 1941 the density averaged 11.4 per square yard, and now shows an average of 24.7. Many of the seedlings will not survive, but it is satisfactory to record that natural seedlings on one plot over 6 in. in height increased from nil in 1941 to 2,500 per acre in 1947. Seedlings of that size and bearing secondary leaves can be deemed to be established. Remeasurement of insignis-pine study plots in this conservancy was also continued.

In the Wellington Conservancy, investigations were continued concerning the natural regeneration of red-beech forests under varying conditions of shade and ground cover.

In the Rotorua Conservancy, natural regeneration studies were continued on clear-felled insignis-pine areas. A further 23 plots were established during 1946, making a total of 68 study plots in all. Counts of these plots show good regeneration. On an area burnt out in 1944, seedlings now exceed 50,000 to the acre. *Macrocarpa* cypress underplanted several years ago under a eucalyptus stand now show a height of 17 ft. under light cover, compared with a height of 4 ft. under heavy cover.

42. *Forest Botany*.—The collection and summarizing of data relating to current phenological projects for the main exotic and indigenous forest tree species have continued as part of a long-term investigation.

CHAPTER VI.—FOREST PROTECTION

43. *Fire Damage*.—The number of recorded fires occurring in State forests during the year was 44, involving an area of over 1,700 acres, of which 40 acres were exotic forest and the remainder mainly tussock, scrub, and fern country.

Recorded fires outside State forests numbered 88, involving over 2,700 acres. Most of these were in milled bush, tussock, and scrub country, but one fire near Mangapeehi entered State forest and scorched 1,000,000 board feet of millable timber which will, however, be salvaged without significant loss.

During the year fire destroyed 5 (12) sawmills, as follows :—

Kaitaia Timber Co., Ltd., Kaitaia (Auckland Conservancy).

Bowen and Wilkinson, Te Puke (Rotorua Conservancy).

Wilson Timber Mills, Ltd., Te Whaiti (Rotorua Conservancy).

Curry Bros., Rotorua (Rotorua Conservancy).

Waipawa Cases, Ltd., Waipawa (Wellington Conservancy).

44. *Fire Detection and Control*.—Fire-hazard prediction in the Rotorua-Taupo district has been facilitated by the introduction during the year of radio telephonic communication with Wellington through the Forest Service control station at Kaingaroa and the Post and Telegraph Department's Makara receiving station. Readings from eight stations recording fire-hazard data are analysed twice daily, and the hazard rating is graphed to provide a cumulative index of conditions. Increased public awareness of the recurring fire danger in that area, assisted by radio warnings, has undoubtedly played its part, along with the improved suppression measures, in reducing major outbreaks.

Weather conditions during February and March were moderately hazardous in forest areas near Taupo, in North Auckland, and in the King-country and National Park, westwards into Taranaki and southwards to the Tararua Ranges. The dry spell was longer in the Nelson, Marlborough, and Buller districts, with a localized maximum in the Takaka-Collingwood area of more than three months. Under such conditions and with high winds very serious hazard developed rapidly in the central North Island, necessitating the closing-down for a brief period of steam-operated equipment in the forests of that district. The need for additional fire-hazard recording stations in the King-country was again emphasized, and equipment now coming to hand will be installed at Pureora, some sixteen miles east of Mangapeehi. In some Nelson areas, also, milling operations were curtailed owing to the extreme fire hazard. The co-operation of the Weather Office and the National Broadcasting Service in providing special forecasts and in issuing broadcast warnings respectively has been very helpful.

A new lookout station, providing a good view for fire-detection purposes, was erected on the side of Gordon's Knob, Golden Downs Forest, during the year. At Eyrewell Forest arrangements are being made for the erection of another 100 ft. tower, the data from which, together with those from the tower erected last year, will permit the location of fires by means of resection of bearings as well as by direct observation.

The aerial fire patrol operating from Rotorua Airfield was again brought into use at the beginning of the fire season, but owing to the loss of a machine in a fire at Rongotai Aerodrome some delay occurred in providing aircraft fitted with radio. In all, 54 patrol flights were made from Rotorua over all parts of the conservancy except the Gisborne district, and including the Mangapeehi forests, in the Auckland Conservancy; 4 flights were made from Whenuapai over the Coromandel and Main Trunk forests, Auckland Conservancy; and 2 flights were made from Ohakea over the King-country and Taranaki forests. The assistance and co-operation of the Air Department and Air Force personnel are gratefully acknowledged.

The 28 Desert Mule 800-gallon water-tankers referred to in last year's report were completed and are now stationed in strategic forest locations. A further 9 fire-engines

of the type which gave such satisfactory performance last year are in course of construction and will be completed in time for the next fire season. Three hose-layers built on the same type of chassis as the fire-engines and water-tankers and fitted with E.P.S. fire-pump units were completed, making a total of 7.

During the dry period of February, temporary radio communication was provided for the King-country portion of the Auckland Conservancy with equipment and personnel from Kaingaroa. The establishment of a permanent network of radio stations in the Auckland Conservancy with the control station at Riverhead Forest has been commenced.

45. *Fire Districts*.—Seventy-six fire districts, containing in all 5,193,578 acres, have now been constituted under section 27 of the Forests Act, 1921–22, as amended by section 5 of the Forests Amendment Act, 1925. These fire districts comprise (a) 46 (total area, 4,059,435 acres) constituted for the protection of State forests; (b) 7 (total area, 149,950 acres) for the protection of national parks, scenic reserves, &c., administered by other Government Departments and by Boards; (c) 13 (total area, 149,554 acres) for the protection of forests administered by local bodies; and (d) 10 (total area, 534,639 acres) constituted on the application of private forest-owners, including afforestation companies, for the protection of their forests.

Four new fire districts were constituted during the year, comprising (a) 4,600 acres for the protection of forest on sand-dune areas on the west coast of the North Island near Waiuku; (b) 83,000 acres for the protection of a forest owned by a local body at Hunua; (c) 16,500 acres for the protection of a privately owned exotic forest near Putaruru; and (d) 29,700 acres for the protection of a State forest in the vicinity of the Whirinaki River, in the Te Whaiti district.

Three fire districts were amended, the Pelorus Fire District being increased to cover an area found to present a dangerous fire hazard, and the boundaries of the Whakatane and the Kaingaroa-Rotorua Fire Districts being adjusted as a consequence of the constitution of a new fire district.

Upon the constitution of a fire district, no person may light a fire in such district during the closed season except in pursuance of a written permit of a forest officer and subject to taking such precautions as may be prescribed. The granting of permits to burn is not at any time unreasonably withheld, but the number of offences committed during the last fire season indicates that many still do not regard the preservation of forest as a matter particularly concerning them, and in many cases only the vigilance of State Forest Service officers has prevented serious loss.

46. *Forest (Fire-prevention) Regulations 1940 (Reprint) (Serial number 1946/171)*.—No amendment was made during the year to the Forest (Fire-prevention) Regulations 1940 (Serial number 1940/246), as amended in 1943 (Serial number 1943/31); but the regulations were reprinted, with the amendments incorporated, as sanctioned by section 7 of the Regulations Act, 1936, and are now referred to as the Forest (Fire-prevention) Regulations 1940 (Reprint) (Serial number 1946/171).

The Forest Service continued its publicity campaign directing attention to the obligations imposed by the regulations. While the majority of operators and workers in State forests and fire districts co-operate with forest officers in their duty of administering the regulations, there are still some who do not view their responsibility under the law seriously.

The provisions of the regulations include the requirement that no engine of any description shall be used in any State forest or fire district from the 1st August in any year to the 30th April in the year following unless any such engine is provided with safe and efficient means for preventing the escape of dangerous sparks or flame from funnel or exhaust and for preventing the escape of live coals or fire from ash-pan or fire-box; and also the requirement that every person in a State forest or in a fire district or in a privately owned forest shall cease work and endeavour to suppress any

fire which comes under his notice, and shall forthwith arrange for the nearest forest officer to be notified. These provisions, which are self-explanatory, are not unduly onerous, and strict adherence to them would go far in removing the menace of fire to our forests, particularly in less-frequented localities. It will be appreciated that supervision of the extensive and widely spread State forests present a formidable task to the normal Forest Service staff, and the co-operation of the public and of users of the forest in the observance of the regulations is imperative if our forests are to receive the maximum possible protection.

During February an extremely high fire hazard was experienced in the central North Island and the use of steam haulers and locomotives was prohibited for a short period by notice under the provisions of Regulation 7 of the regulations.

47. *Animal Damage*.—Damage continues from deer, opossums, goats, rabbits, and other animals. Although rabbits are still the main problem, opossums are becoming more abundant in many places, particularly in Nelson, Westland, and Southland. Opossums frequently eat soft bark of several exotic pines, especially ponderosa pine, and, by breakage of tree crowns, damage poplars and other soft-wooded broad-leaved trees.

48. *Animals destroyed*.—The following are the recorded numbers of animals killed in State forests during the year: rabbits and hares, 34,532 (30,500); deer (all species), 1,534 (923); pigs, 1,538 (1,367); goats, 238 (266); opossums, 4,329 (15,528).

49. *Insect Damage*.—The past year does not appear to have been favourable for insect development and no significant damage to exotic or indigenous forests has been reported. So far New Zealand has been singularly fortunate in escaping any serious insect epidemic, but provision must be made to deal with any emergency in this connection that may arise. At present it would not be possible, owing to shortage of equipment and trained staff, to institute counter-measures without some delay, which could allow sufficient time for insects to become acclimatized and spread. With the concentration of all pathological work at the Rotorua Forest Experiment Station, it is intended that staff and equipment shall be brought up to suitable strength to meet any emergency that may develop.

Of insects attacking forest products, *Pachycotes peregrinus* (syn. *P. ventralis*) caused damage to peeled pulpwood of insignis pine intended for shipment to Australia, necessitating the treatment of some thirty cords. *Callidium violaceum* introduced from Sweden in packing-cases has been recovered at Whakarewarewa and Conical Hill Forests, indicating that another insect has become established.

Hylastes ater has continued to spread and is now found south of Dunedin and at Conical Hill Forest. The occupation of this new territory means that the insect is now found throughout the Dominion.

Inspection of imported timber was continued, particular care being taken to prevent the introduction of termites in Australian hardwoods.

50. *Damage by Fungi*.—There was no serious outbreak of fungous disease in any forest during the year.

Investigation of *Poria xantha*, previously known only from kauri at Waipoua, revealed that it was the cause of serious decay in kauri ships at Auckland. The fungus was also found on larch, Douglas fir, and toatoa in the Rotorua district. A characteristic brown cubical rot is caused by this fungus, which very quickly renders the timber useless.

A start was made on the programme for the investigation of all fungi associated with each tree species, and silver beech was selected for initial study. The recognition of over forty fungi, many not hitherto recorded in New Zealand and of which at least two are undescribed, marks the beginning of a new and very worth-while phase in forest mycology as related to silviculture. The parasite *Cyttaria gunnii* was studied, together with two new and undescribed species of *Cyttaria*. Twelve species of the genera *Fomes*, *Polyporus*, and *Poria* were found to cause heart rot in living silver beech. Numerous

saprophytic species were also investigated. Although this study will take many years to complete, the results so far achieved mean a very real advance in our knowledge of the pathology of this species.

Advantage was taken of research on the genus *Poria*, carried out by the Plant Diseases Division of the Department of Scientific and Industrial Research, to have specimens in the State Forest herbarium named. The lack of authentic names has been a great handicap in the past and the completion of an up-to-date work on the Polyporaceae would be a great boon to forest mycology.

As with entomology, the transfer to the new laboratory at Rotorua will facilitate research work in mycology.

51. *Damage from Natural Causes.*—As compared with the preceding year, the year 1946–47 provided climatic conditions unmarked by extremes. The mild, hazardous autumn weather described in the last report carried on well into the winter months, which in most districts provided neither hail, nor rain, nor snow. The winter in the extreme South was remarkable for its mild and sunny weather; there are neither flood losses nor wind losses to record for that period. The late winter and spring, however, were very wet and inclement and nursery work was impeded, principally because of the impossibility of working the soil for timeous seed-sowing. Milton and Ashley, two southerly nurseries, suffered particularly in this respect, fine weather being delayed until mid-January. About this date, Ashley again experienced a hailstorm of some severity, although it did not lie as directly in the path of the main storm as it did those of the two Decembers referred to in the two previous reports.

Ashley Forest appears to be in a belt particularly prone to experience occasional violent hailstorms, and the evil effect is not confined, as was previously thought, to destruction of nursery stock. Young compartments of insignis pine still show the marks of stem and foliage damage from the storm of three years ago. On the windward side the bark has not completely reformed over the countless small cicatrices caused by hailstones on young leaders, and deformities and foliage stripping are still in evidence. This is a type of minor damage which, while not lethal, is very unsightly and retardant of growth.

In the North, Waipoua State Forest maintained its steady place of nearly the minimum for hours of recorded sunshine. This situation has never recorded the fewest hours of sunshine for the Dominion; but it is frequently the lowest but one, and there can be little doubt that this seldom-considered factor is one of some significance in the ecology of this forest.

The fire season of early 1947 came and went without weather of extreme hazard. From mid-January to late March there was certainly a period of rainless weather which caused in the Dominion generally much inconvenience through scarcity of water and low levels in both rivers and lakes; but nowhere did it create the conditions of fire hazard which characterized the corresponding period of the previous year. This was largely due to the fact that winds of even medium velocity were markedly absent from most districts during the autumn period; and the relative humidity of the atmosphere, though frequently lower during the days, always rose from late afternoon onwards. The conditions this year, therefore, were truly temperate, though with a very few periods of localized extremes of almost catastrophic intensity.

The principal extreme phenomenon, apart from the southern hailstorm in January, was a violent southerly gale that traversed the southern portion of the North Island late in February. This caused damage in places on a scale comparable with that caused by the similar gale of February, 1936. As is usual with wind damage, the path of the gale was quite erratic and comparatively narrow, or, rather, it appeared to have several narrow paths of maximum incidence. In State forest its greatest damage was caused in Gwavas Nursery where a whole crop of Douglas fir seedlings just opened up from coverings for hardening off was ruined by the sudden violent wind and cold. Curiously

enough, the evil effect was not fully visible for three or four days after the gale. Outside of State forest there was sporadic breakage of pine stands, one of the worst cases being an area of 35 acres of planted dune at Tangimoana, where a twenty-year-old stand of insignis pine caught the full coastal force of the gale. Thinning operations were actually in progress when this occurred and both wind-throw and wind-break were, in consequence, only to be expected. This area has now only a salvage value. Elsewhere in the same locality, private plantations suffered comparatively narrow swathes. Windfalls in remnants of indigenous forest were numerous.

52. *Forest Offences*.—Convictions for offences against the forest laws during the year numbered 49 (39), of which 39 were obtained under the penal sections of the Forests Act, 1921–22, 9 under the provisions of the Forest (Fire-prevention) Regulations 1940, and 1 under the Firearms Act, 1920. Fines imposed totalled £125 (£281), loss or damage recovered in addition to the penalty imposed as a fine amounted to £342 2s. 2d. (£541 19s. 1d.), and total Court costs and fees were £100 12s. 9d. (£62 19s. 6d.). Particulars of these offences are given in Appendix IX.

Though the convictions were more numerous than usual, the offences for the most part were of a minor nature. The heaviest fine imposed was £17 10s., whereas in the previous year one fine was £100. The sum recovered for unlawful cutting or for damage done by fire or otherwise was less than in the previous year, but in that year the total included an amount of £471 17s. in a single case (timber unlawfully cut and removed). Fire-suppression costs incurred were claimed under the Act in all cases of unlawfully lighting fires, and were seldom disputed or, if disputed, reduced. The largest amount so recovered was £93 14s. 8d. in connection with a fire that spread from an adjoining property into the Whirinaki State Forest (Te Whaiti).

There was a sharp increase in offences under the headings of unlawful lighting of fires. Twenty-six of the convictions were under the fire-prevention provisions of the forest laws, whereas in the previous year only 9 of the convictions were for fire offences. There was also an increase in the offence of unlawful cutting and removal of forest produce, but in no instance was the quantity cut or removed before discovery large: contrasted with the previous year's £471 17s. in a single case, the largest sum recovered on one information was £70 2s. The number of cases of unlawfully entering or hunting in State forests dropped to exactly one-half of the previous year's total. In all the cases where prosecution was undertaken, convictions were secured.

CHAPTER VII.—FOREST ENGINEERING

53. *General*.—Existing roads, bridges, and buildings and general engineering services have been satisfactorily maintained. Suitable labour continues to be in short supply.

54. *Roads and Bridges*.—Construction of new roads and bridges has been continued to assist the development of both exotic and indigenous forests. Work included under this heading comprises new roads formed, 80 miles 76 chains (of which approximately 36 miles were metalled); roads maintained, 959 miles; new tracks formed, 13 miles 43 chains; tracks maintained, 46 miles 66 chains; new culverts, 65; culverts repaired, 31; new bridges, 5; bridges repaired, 27. The work of stabilizing the foundations of the Motueka River Bridge was carried out under the direction of the Public Works Department, which also did 6 miles 54 chains of the new road-formation included in the total under that heading above.

55. *Construction Equipment*.—Equipment in use by the Forest Service includes 264 trucks, 81 tractors, 2 carryalls, and 270 items of miscellaneous plant, most of which is used for construction purposes. Other vehicles are 26 cars and station wagons and 94 fire-engines. As much of this plant was second-hand from the Armed Forces surplus equipment, the task of maintaining it in working-order presents some difficulty. It will be necessary to replace much worn-out equipment and acquire additional plant as soon as new machines become available.

56. *Buildings*.—Shortage of labour and materials has prevented the erection of many new dwellings and industrial buildings required. As far as possible, surplus buildings from Army, Navy, and Air Force camps have been acquired, removed, and re-erected to meet, at least temporarily, the needs of the Forest Service. Huts and dwellings acquired in this manner will provide temporary accommodation for at least 250 single employees and 42 married employees. Other new camps established will accommodate 100 single men. In addition, the complete detention camps at Riverhead and Maramarua State Forests have been taken over. A further 15 houses were purchased, 12 at Omahuta from a sawmilling firm whose mill was destroyed by fire and the other 3 in different localities. Major alterations and renovations were made to 12 dwellings and 4 other buildings. Camp establishments required the construction (in most cases out of surplus buildings acquired from the War Assets Realization Board) of 8 kitchen and mess blocks, 9 ablution blocks, 1 fire lookout, and 33 miscellaneous buildings. Contracts for dwellings reported in last year's report as having been let by the Housing Division of the Public Works Department have resulted in the completion of 31 dwellings, and with further contracts there are now an additional 25 in progress.

57. *Water-supply and Drainage*.—This year's contribution to the improvement in water-supply for fire-fighting has consisted principally of the provision of several small earth dams and of the opening-up of access roads to streams and rivers. The shortage of cement and steel has prevented the extension of the system of concrete tanks at strategic locations, but this work will be continued when material becomes available. For industrial and domestic supplies, bores have been put down at Kaingaroa, Murapara, Balmoral, and Ashley (in progress). In all the new camps and villages now being established in State forests where the water-supply is adequate, water-borne sewerage systems and septic tanks are being installed, resulting in a very desirable improvement in living conditions.

58. *Utilization Plant*.—The kiln capacity of the Waipa Sawmill is being increased by the construction of two new kilns. Steam requirements for these kilns, as well as for the electric-power requirements (at present purchased from the Department of Tourist and Health Resorts, the local power supply authority), will be met by the two boilers now being installed in an extension to the boiler-house. These boilers will not only reduce or entirely eliminate the dumping of waste, but will also enable better maintenance to be given to all boilers and probably allow a greater quantity of surplus power to be sold back to that Department.

A big saving has been effected in the return-running costs of logging-vehicles by the construction of a loading-rig, which enables empty trailers to be loaded on to the truck. To expedite the unloading of logs from logging-vehicles, a contract has been let for the erection of an overhead travelling crane, which also will permit the loading of empty trailers on to the logging-trucks. A further improvement of logging-vehicles is a safety stake which has been developed by a State Forest officer.

Other plant improvements and additions in progress include the extension of the sprinkler system to reduce fire risk, and the erection of a cafeteria.

A new sawmill is being erected at Kaingaroa and for the time being will be driven by Diesel and Diesel-electric engines. The erection of a boiler and power-house will be deferred until the available water-supply has been proved.

59. *Transportation*.—The demand for additional transport to replace worn-out vehicles and to meet increasing log and sawn-timber cartage still remains acute. Forty vehicles were purchased during the year from the War Assets Realization Board and added to the State Forest Service fleet. Four went to Auckland, 22 to Rotorua, 4 to Nelson, 2 to Westland, 4 to Canterbury, and 4 to Southland. These vehicles have in part replaced worn-out vehicles which were disposed of during the year, so that the actual increase in fleet strength is relatively small.

From plant and equipment purchased by the Government in the Pacific this Service has received 16 tractors, 1 tractor-transporter, 2 logging-arches, 2 loading-cranes, 8 winches, and 5 road-graders. In addition, 2 new tractors that had been on order for some time came to hand. This equipment has been distributed as follows: Auckland, 4 tractors, 3 winches, 1 road-grader; Rotorua, 11 tractors, 3 winches, 3 road-graders, the tractor-transformer, logging-arches, and loading-cranes; Wellington, 1 tractor; Nelson, 1 tractor, 1 road-grader; Westland, 1 tractor; Southland, 2 winches.

60. *Communications*.—Eight miles of new telephone lines were erected and 2 miles of existing line were converted from earth-working circuit to metallic circuit during the year, making an aggregate length of 469 miles, of which 174 miles are of metallic circuit. A total of 260 instruments is now installed. The 14-mile Benneydale-Pureora line is almost complete and will shortly provide an important amenity to the Pureora logging scheme and village settlement. Forty portable telephones—United States Army pattern—were acquired for field use.

The installation of a radio-telephone network was commenced in the Auckland Conservancy, the control station to be at the Riverhead Forest and other stations at Kaikohe, Waipoua, Great Barrier Island, Te Kuiti, and Pureora, with extensions to other managed forests to follow. The allocation of a separate frequency for this network to avoid interference with the Rotorua stations is under consideration by the Post and Telegraph Department.

In the Rotorua Conservancy two private afforestation companies have provided radio stations at Tokoroa and Matahina to receive fire-weather reports from Kaingaroa and for emergency two-way communication, these stations using the frequency 2,760 kc./s. and forming part of the Forest Service network. The transmission of fire-weather reports from Kaingaroa to Head Office, Wellington, was effected by radio telephone via the Makara receiving-station on the frequency 5,990 kc./s. and proved a much more rapid method than that provided by telegraph.

Radio equipment is being obtained from War Assets Realization Board as it becomes available, and is altered, if necessary, for Forest Service requirements. The modification of a light-weight Army model is being carried out, and preliminary tests encourage the view that it will be suitable for use over short distances in rough country.

61. *Community Planning*.—Owing to shortage of labour and materials, not as much progress as desired has been made with the development of the communities referred to in last year's report, although a certain amount of work has been done, mainly at Kaingaroa and Pureora, where 20 houses and 10 houses respectively have been completed.

Officers of the Housing Division continue to give assistance in the planning of these forest villages.

CHAPTER VIII.—EXTRACTION AND COMMERCIAL DEVELOPMENT

62. *State Forest Block Sales and Permits*.—During the year 170 (173) appraisals were completed, the quantity of timber measured being 168,020,000 board feet (146,867,000). Of these appraisals, 129 (143) were in State forests, and the balance, affecting 51,323,000 board feet (40,312,000), were for other Departments and private (principally Maori) owners. For the approximate estimation of timber stands, 10 (8) reconnaissances were carried out over areas totalling 14,495 acres (21,194), the quantity of timber on these areas amounting to 107,943,000 board feet (217,415,000). Check cruises were carried out only from Conservators' offices and tested the accuracy of 25 (27) cruises.

Exclusive of log sales, the quantity of indigenous timber sold from State forests was 109,941,000 board feet (75,529,000), made up as follows: rimu and miro, 84,615,000 (53,043,000); kahikatea, 8,461,000 (7,074,000); matai, 6,910,000 (4,189,000); totara, 5,154,000 (2,967,000); tawa, 2,088,000 (1,925,000); beech, 1,910,000 (5,608,000); and others, 803,000 (723,000) board feet. The total value was £190,153 (£104,239).

The production of indigenous timber under licence and permit from State forests totalled 112,216,000 board feet (100,443,000). Minor indigenous forest produce removed under permit comprised the following: poles, 5,003 (2,258); strainers, 17,626 (13,992); posts and stakes, 357,605 (313,618); stays, 7,288 (6,491); sleepers, 17,049 (2,406); house and pole blocks, 5,881 (1,295); mining timber, pieces, 54,569 (34,972); battens, 982,775 (501,600); bridge stringers, 165 (nil); and firewood, cords, 360 (352).

The production of exotic forest produce under licence and permit was as follows: sawlogs, cubic feet, 7,339 (nil); battens, nil (2,100); mining timber, pieces, 3,700 (42,600); posts, 16,000 (nil); sleepers, 8,400 (nil); strainers, 100 (nil); stays, 90 (nil); and firewood, cords, 260 (259).

63. *State Forest Log Sales.*—In indigenous State forests in the Auckland and Rotorua Conservancies the State Forest Service continued its logging operations and produced 1,173,677 cubic feet (1,588,000) of logs, valued at £57,349 (£66,193). Minor forest produce extracted at the same time comprised the following: poles, 251 (nil); posts, 7,474 (8,312); strainers, 569 (173); battens, 71,431 (60,000); rails, 366 (nil); house blocks, lineal feet, 4,450 (nil); mining timber, pieces, 3,100 (nil); and firewood, cords 11 (40).

In exotic State forests logging operations by the Forest Service resulted in the production of 2,872,550 cubic feet (2,503,000), mainly for the Waipa Sawmill. Minor forest produce from exotic State forests extracted at the same time was as follows: poles, 1,905 (620); posts, 645 (2,933); rails, 1,430 (2,883); mining timber, pieces, 117,700 (117,656); round timber for crosoting, cubic feet, 7,815 (7,815); pulpwood, cords, 481 (nil); and firewood, cords, 5,238 (6,340).

64. *Indigenous Timber Disposal.*—An increase in the amount of cruising work completed during the year has been secured by the addition to the field staff of men trained in the timber-measurers' courses conducted by the State Forest Service, and further improvement can be expected as these men gain field experience. As a result of the year's work it has been possible in a few cases to prepare sale proposals ahead of sawmillers' requirements, and it now appears certain that the objective of keeping two years ahead will shortly be achieved, in spite of increased sales. A still further improvement in the timber-cruising position is anticipated as a result of the adoption of the sampling method, by which there is an appreciable saving of time and a consequent greater coverage by cruising parties.

Instances, usually affecting Maori-owned forests, still occur in which it becomes necessary to disorganize the cruising programme in order to undertake the measurement of areas required urgently to keep mills in operation. Such disorganization may be avoided by the industry making early application for the timber.

The quantity of sawn timber produced from indigenous State forests, together with that from Forest Service indigenous logging operations, amounted to approximately 120,000,000 board feet, which represents 33 per cent. of the total cut of all timbers and 49 per cent. of the indigenous timbers. Registered sawmills obtaining supplies from indigenous State forests during the year totalled 123, being 23 per cent. of all registered sawmills and 35 per cent. of those cutting principally indigenous timbers.

Further information on this and allied matters will be found in paragraph 109.

65. *Rotorua Exotic Forest Log Production.*—The cutting of the increased log-supply needed to maintain maximum production in the Waipa Sawmill necessitated the working of a forty-eight-hour week in the forests feeding this plant, a total of 2,582,138 cubic feet (2,254,734) being supplied. Deliveries from the Whakarewarewa Forest totalled 1,484,544 cubic feet (2,005,262), including 967,153 cubic feet (1,454,394) of insignis pine; from Waiotapu Forest, 242,418 cubic feet (205,393), including 133,471 cubic feet (184,783) of insignis pine; and from north-western Kaingaroa, 855,176 cubic feet (44,079) of insignis pine. Kaingaroa Forest will for some years be the principal source of

log-supply for the Waipa Mill. From the Whakarewarewa and Waiotapu Forests, 192,587 cubic feet of logs (244,214) unsuitable for sawing were sold as mine props or delivered to the creosoting plant for production of treated fencing-posts.

The wage-incentive plan was continued during the year in the Whakarewarewa Forest, three clear-felling and five thinning gangs participating. During the year a clear-felling gang commenced operations under the plan at Kaingaroa Forest, and, as at Whakarewarewa, the scheme has proved very successful. A total of £1,681 (£1,804) in bonuses was distributed, representing an average increase in wages of 6·8 per cent. (7).

66. *Waipa Milling Operations.*—Overtime working has continued at the Waipa Sawmill throughout the year. The four log-frames operated on 259 days and produced 12,368,000 board feet of sawn timber, and the circular rig, which operated a normal shift on 259 days and a night shift on 212 days, produced 3,771,000 board feet. The total quantity of timber cut at the plant amounted to 16,139,000 board feet (13,757,000), a new record not only for this plant, but for all sawmills in New Zealand. Logs received for sawing comprised insignis pine, 76 per cent. (75); Corsican pine, 16 per cent. (17); and other species, 8 per cent. (8).

The circular rig continued to concentrate upon the sawing of the larger and rougher insignis-pine logs, the overriding objective being the production of scantling for the building industry. The total production in widths under 6 in. amounted to 86 per cent. (47) and in widths over 9 in. to 4 per cent. (20). In the log-frame mill, which aims at cutting a maximum of wide timber for the box factory, the production in widths up to 6 in. wide was 55 per cent. (46), and only 9 per cent. (16) was sawn in widths exceeding 9 in. The increasing proportion of timber cut in widths under 6 in. is due to the fall in the average diameter of logs sawn. This in turn is due to the fact that as the older Whakarewarewa areas are cut out the mill has to rely more and more upon the younger Kaingaroa stands.

After the needs of the box-factory had been met, 7,814,000 board feet (4,968,000) of timber was sold to merchants and wood-users. Although much of the timber was disposed of in the Auckland Province, sales were made on an increased scale in the Wellington, Hawke's Bay, and Taranaki Provinces in order to demonstrate to users the quality of timber which could be supplied by careful adherence to good sawing, grading, and seasoning practices. Sales thus again recorded a substantial increase—this year 57 per cent. above last year's sales—and comprised green timber, 5,398,000 board feet (3,851,000); kiln-dried timber, 2,208,000 board feet (982,000); and air-dried timber, 208,000 board feet (135,000). Because of a slight improvement in space on trans-Tasman vessels, it was found possible to export 911,000 board feet (537,000) of kiln-dried timber to Australia, an appreciable contribution towards the quota of soft-woods which it is necessary to ship to the Commonwealth in order to assure New Zealand of its essential hardwood requirements.

Timber stocks held at the 31st March, 1947, totalled 2,987,000 board feet (2,804,000). Difficulties were experienced periodically throughout the year in obtaining an adequate and regular supply of railway trucks and on a number of occasions it was found expedient to load special trains during week-ends to relieve yard congestion. Since the mill reopened in January, continual difficulty has been experienced in this respect, and up till March the mill had been able to secure sufficient railway trucks to transport only half its current production. As similar difficulties were being experienced by other sawmills, the Government approved the use of subsidized road transport to carry timber in cases where the New Zealand Railways were unable to provide railway trucks. The efforts made by the Railways Department to provide an adequate supply of railway trucks in difficult circumstances are fully appreciated by the State Forest Service.

Timber filleted for kiln-drying totalled 7,126,000 board feet (7,355,000) and for air-drying 3,167,000 board feet (2,486,000). The balance of 5,846,000 board feet (3,916,000) produced was sold or used in a green condition. The kilns dried 8,246,000

board feet (7,827,000), of which 7,525,000 board feet (7,077,000) consisted of green timber and 721,000 board feet (750,000) partially air-seasoned stock. Based on the assumption that the plant is capable of drying for 335 days of twenty-four hours, the kiln-operating factor for the year was 91 per cent. (91). The quantity of timber dried per kiln hour amounted to 263 board feet (267). The profit from the sawmill and dry kilns amounted to £14,000 (£21,576).

67. *Waipa Box-factory and Planing-mill.*—It was found necessary, in order to cope with demand, to operate the box-factory on a forty-eight-hour week throughout the year, and in addition to work extra overtime in some sections of the factory. The expectations that demand for the factory's products would decline did not prove correct. As explained in other sections, the factory accepted substantially increased orders for fruit-cases and cheese-crates owing to the reluctance or inability of boxmakers who had customarily made these containers to maintain their former scale of production, and, in addition, increased orders were accepted for other types of containers the usual suppliers of which were no longer able to cut or secure sufficient timber for their manufacture.

The box-factory's output of case shooks used a gross total of 7,468,000 board feet of rough-sawn timber (8,691,000). Sales of dressed timber during the year amounted to 862,000 board feet (459,000). At the present time the box-factory is producing more box shooks and dressed timber than any other single factory in the Dominion.

Demand from Australia for box shooks was exceptionally heavy; but unfortunately, after essential domestic demand was met, remaining boxmaking capacity enabled orders utilizing only 339,000 board feet of rough-sawn timber to be fulfilled. It is hoped that it will be possible to secure a general increase in box-manufacture throughout New Zealand, which will enable a worth-while supply of box shooks to be offered to Australian buyers in 1948.

Profit from the box-factory operations amounted to £8,303 (£19,142). The decline in profit earned was due to increased manufacture of fruit-cases and cheese-crates, the production of which is not sufficiently economical at current approved prices. A shortage in supply of these types of containers for the 1947-48 season is probable unless higher prices are approved.

68. *Departmental Wood-preserving Activities.*—As forecast, there has been a substantial decrease during the year in the amount of produce creosoted. Unfortunately it was not possible to allocate sufficient labour to cut produce for seasoning in advance of creosoting at Waipa, so that creosoting operations there will continue to be seriously retarded. However, it is expected that the cutting of round produce will shortly be resumed, which will permit creosoting in the year following seasoning. At Conical Hill, mainly fencing-material for departmental use was treated. At Hammer, lack of seasoned produce retarded creosoting operations, which were confined to a small quantity of poles.

69. *Exotic Forest Exploitation.*—Throughout the Dominion, demand for the steadily increasing production from exotic forests continues unabated. Market conditions have been chiefly responsible for this, as many industries would never have considered the use of exotic timbers if adequate supplies of rimu had been available. However, on account of the acute shortage of rimu, wood-users, by changes of design and manufacturing processes, have successfully substituted knotty insignis pine for clear rimu to an extent that had never previously been contemplated or considered practical.

It is believed to be unfortunate that demand is so heavy, as it has encouraged the expansion of exotic-timber cutting by small, poorly financed sawmillers whose equipment does not permit the production of accurately sawn timber and who take little care to see that the timber is marketed in the best condition. The subsequent failure in use of timber thus poorly sawn, graded, and seasoned may well prejudice the future utilization of insignis pine.

The standards adopted by the State Forest Service in seasoning and grading elicit high praise from timber-merchants, builders, and furniture-manufacturers, both in Australia and New Zealand, and the Forest Service loses no opportunity of stressing to sawmillers the desirability of introducing these standards in the interests of securing the maximum long-term return from the exploitation of the exotic forests.

CHAPTER IX.—TIMBER TRADE

70. *Production of Sawn Timber.*—Under the Sawmill Registration Regulations 1942, 527 (445) sawmills were registered for the year ended 31st March, 1947. A list of those registered at 31st August, 1946, was published in the *Gazette*, 1946, at page 1555. The total output of the 82 additional sawmills (not all of which came into production) amounted to 17,000,000 board feet for the year; but offsetting this figure there were 26 mills with an overall output the previous year of 14,000,000 board feet which produced no timber during the year under review.

The total production of sawn timber recorded by registered sawmills for the year ended 31st March, 1947, was 357,000,000 board feet, an increase of 13,000,000 board feet, or 4 per cent., on the previous year's output. This is an all-time record, the previous peak production being 353,000,000 board feet in 1925–26. However, it is worthy of mention that the increase in timber-production is greater than would appear from a *prima facie* comparison of the two figures, for in 1925–26 manufacture of plywood in New Zealand was negligible, whereas during the past year the log equivalent of an additional 7,000,000 board feet of sawn timber was converted into veneers and plywood. It is true that the Royal Commission on the timber and timber-building industries in 1909 reported the annual timber output for 1906–7 as 432,000,000 board feet, but as an investigation at a later date made it clear that the basis of computation was log measure, not sawn measure, those figures may not be used in comparative analyses. (The actual sawn measure equivalent of the 1906–7 output would be little more than 300,000,000 board feet.)

71. *Species cut.*—The most significant feature in the year's production was the increase in the cut of exotic species from 99,000,000 board feet to 115,000,000 board feet, equal to 32 per cent. of the year's total production. Insignis pine, with small quantities of other pine species, accounted for 113,000,000 board feet, the balance comprising mainly eucalyptus and poplar. With the exception of tawa, the indigenous species showed either no perceptible changes or else a small decrease. For instance, rimu declined by 3,000,000 board feet, kahikatea by 4,000,000 board feet, and totara by 1,000,000 board feet, while matai, relatively stable for the past five years at 18,000,000 board feet, maintained its output at the same level. Tawa-production has been steadily increasing ever since 1939, when imports of special-purpose timbers for furniture, &c., virtually ceased, and production last year almost reached 8,000,000 board feet, as against 5,000,000 board feet the previous year.

The whole of the overall increase in production of 13,000,000 board feet was due to increased cutting of exotic species, mainly in the Rotorua and Canterbury Conservancies. In Rotorua the increase is indicative of a trend which will continue for some years and which, as the large areas of exotic forest come more and more into production, will make the Rotorua Conservancy the principal timber-producing district of New Zealand. In Canterbury the increase is temporary, being mainly the result of operations directed at salvaging the timber blown down in the 1945 gale.

72. *Man-power.*—The sawmilling industry continued during the year to operate under difficult labour conditions, and, in spite of improvements in wages and in working conditions, the losses through natural and other causes have in most districts exceeded the gains that the industry, in common with other fields of labour, had previously experienced as the result of the further demobilization of the Armed Forces. The number of ex-servicemen returning to or taking up employment at the sawmills has been much

short of expectations, a result that has undoubtedly been brought about by the keen demand for labour in all other forms of enterprise, particularly in the centres of population, and also by the general shortage of satisfactory accommodation at the sawmills. The estimated excess of losses over gains is 150 to 200 men. Last year's estimate of a requirement of 1,500 to 2,000 additional men before the desired production can be attained is still applicable, but it is expected that new labour will be attracted to the industry as a result of improved accommodation that will become available as a result of the legislation passed last year (see paragraph 101).

The production for the year must be regarded as very satisfactory when the difficult man-power situation is taken into consideration, and sawmillers are to be congratulated on the way in which their output has been increased. (Additional reference to man-power will be found in paragraph 102.)

73. *Equipment for Timber and Allied Industries.*—Because of the heavy wear-and-tear on sawmilling equipment, sawmillers have been seriously inconvenienced by the current shortages of parts and replacements. Maintenance of vehicles and tractors particularly caused much concern, and it was only the timely arrival of equipment from the Pacific and new machines from the United States that enabled production to be maintained. Even so, the number of machines which could be made available was insufficient to meet requirements.

Present indications for the supply of additional new equipment and parts from overseas are not encouraging, but every effort is being made to expedite delivery of orders already placed. Some sawing equipment has been obtained from the Pacific islands, although not complete sawmills, and will, after sorting, be made available to the industry.

Owing to the heavy demand for tractors, trucks, and roadmaking machinery by many industries, Timber Control officers have been busily occupied in deciding priorities and it is desired to record appreciation of the co-operation of other Departments concerned, particularly the War Assets Realization Board, the Ministry of Works, and the Public Works and Transport Departments.

74. *Domestic Markets.*—The difficulties described at some length under this heading in last year's report appear to have increased, despite the fact that timber-production has expanded.

In the North Island, where the timber shortage is in every respect more severe than in the South Island, frequent and widespread appeals were made to the State Forest Service for assistance in locating timber-supplies. In all zones there were periodic or continued shortages of finishing grades for flooring, weatherboarding, and furniture and in some zones the shortages covered practically the entire range of building grades.

This continued shortage of timber has served to consolidate the substitution of exotic species for indigenous timbers over a wide field of timber usage, and the use of insignis pine has expanded enormously. In door-manufacture, for example, there has been wide acceptance of the flush-type door, permitting the use of low-grade knotty insignis pine as core material and at the same time achieving the desirable feature of lightness. Again, in shoe-heel manufacture it has been found that, by using the clear timber between knots, exotic timbers can satisfactorily replace indigenous woods.

For house-building and furniture-manufacture, which have been the two principal uses of rimu, the application of insignis pine continues to expand steadily. That still larger quantities were not used in these industries can be attributed more to a shortage of insignis pine than to other reasons. However, the acceptance of exotic timbers for finishing purposes in house-building and the wider use for exposed parts of furniture now depends upon the establishment of grading and seasoning standards appropriate to such uses. The State Forest Service at its Waipa Sawmill carried out considerable pioneer work during the year in the production of acceptable grades for flooring, weather-

boarding, and furniture-manufacture. For furniture a grade guaranteeing at least 6 lineal feet of clean timber per board, in cuttings of 2 ft. or longer, found much favour among manufacturers, and demand for this tentative grade exceeded production.

As could be expected under conditions of such demand, wood-users urgently needing supplies were prepared to accept and use timber in grades and under conditions which in normal times would have received scant consideration. Owing to the fact that kiln facilities are inadequate in many urban areas and in most bush areas, the use of green and partially air-seasoned timber for finishing purposes was all too common. In some areas without kilns a policy was adopted of forwarding timber for drying as far away as one hundred and fifty miles rather than allowing the use of green timber for flooring and weatherboarding. Although this involved additional charges of as much as £1 per 100 board feet for transport and drying, the Forest Service believes that the practice was fully justified, for future maintenance charges will be much less than if green timber had been used.

Despite the fact that the production of indigenous finishing grades was much below current demand, no serious or realistic approach to a revision of standards for flooring and weatherboarding was made by builders or architects. In Australia, where shipments of 6½ in. by 1 in. kiln-dried first- and pith-grade insignis pine for flooring from the Waiparua Mill have received very favourable comment, the use of knotty insignis pine for flooring, weatherboarding, and linings is widely accepted. In New Zealand, on the other hand, house-building authorities will not permit the use of such grades for flooring, and, what is considered still more unrealistic, have shown no inclination to use knotty grades of rimu or matai for that purpose. It appears difficult to drive home the fact that henceforth the production of rimu and matai must steadily decline, as remaining bush resources are no longer adequate to sustain pre-war level of cutting. Whilst, by accelerating the cutting of all economically accessible stands, the production of rimu and matai might possibly be slightly increased for a few years, it now appears certain that, unless requirements greatly decrease, the supply of these timbers will never again overtake demand. In the future, therefore, the use of a lower grade of rimu and matai and the acceptance of insignis pine for such purposes as flooring and weatherboarding cannot be avoided, and house-building authorities should take cognizance of this fact.

The year served to demonstrate clearly that, in the interests of securing maximum production, distribution control of indigenous timber must take account of the tendency to integration in sawmilling and merchandising activities. Many sawmillers who have hitherto confined themselves to production are now establishing retail yards through which their timber will henceforth be sold. This trend, combined with the withdrawal of other sawmillers from the industry on exhaustion of their bush resources, has taken away timber-supplies upon which many merchants rely to maintain their yards in operation, and as a result increasing numbers of merchants are now seeking to engage in sawmilling so that they can remain in business as distributors.

The significance of these developments in both maintaining and increasing indigenous-timber production cannot be ignored. As increased production alone can overcome the difficulties facing wood-users, it has been found expedient in distribution control to confine directions to fairly wide geographical zones, leaving sawmillers free to distribute timber to whom they wish within the zone, provided that the directed total quota assessed for each zone is delivered.

Manufacturers and primary producers found greater difficulty in securing a satisfactory supply of boxes than at any period during the war years. Owing to the steady expansion of secondary industries and an acute world scarcity of fibre board, the demand for wooden boxes has become very heavy. Boxes that are particularly affected are fruit-cases and cheese-crates, for which the overall demand totals the large figure of 4,500,000 containers, requiring 27,000,000 board feet of timber in their manufacture. As a result of the decline in production of containers by other boxmakers,

particularly cheese-crates and fruit-cases, the Waipa Box-factory undertook the supply of increased quantities of these lines (see also paragraph 67).

75. *Timber Imports*.—As shown in Appendix IV, the importation of timber in 1946 was between 4,000,000 board feet and 5,000,000 board feet greater than during any of the three previous years. The 22,000,000 board feet of timber imported bears no relation to demand, but simply represents the total that it was found possible to purchase in and ship from other countries and is approximately half the pre-war quantity.

The procurement in 1946 of 7,276,000 board feet of Douglas fir (3,750,000) brought much-needed relief to builders engaged in the erection of factories, public buildings, schools, &c. After many years of acute shortage, stocks of Douglas fir, although still small, are once again held at the main ports and to a limited extent in the principal inland towns. The acquisition of this timber must be largely attributed to the visit of a trade and a Government representative to North America early last year.

Since January, 1946, owing to prolonged industrial trouble in the mills no redwood has been shipped from California, and at the close of the period covered by this report there was still no sign of any settlement in the dispute. To a slight extent the shortage of joinery timber occasioned by the small supply of redwood was relieved by purchases of western red cedar.

Although the receipt of almost 14,000,000 board feet of Australian hardwoods represents only half of our pre-war requirements of these timbers, the Dominion is extremely grateful for such supply. The Commonwealth faces an internal timber shortage just as acute as that which exists in New Zealand, which has led to its inevitable decision to restrict exports. The Australian Government agreed, however, to meet our demand for hardwoods where the end-use could be classed as truly essential, provided that New Zealand supplied 12,000,000 board feet of softwoods and silver beech annually in return. As explained in paragraph 76, only half of this supply was made in 1946 owing to shipping shortages, and it was not wholly unexpected when the Commonwealth Government advised that it was forced to consider further reductions in export of hardwoods to New Zealand. As such an action would have an extremely serious effect on many local activities, particularly railway transport and electricity distribution, every effort is being made to avert it.

76. *Timber Exports*.—Limitations of shipping space continued to restrict the export of timber during the year. Although some improvement in export was secured by backloading charter vessels, ships engaged regularly in the trans-Tasman service are able to make space available for about one-third only of the 12,000,000 board feet which the Dominion is committed to supply to Australia in return for hardwoods.

In the circumstances it was possible to secure space for only 6,500,000 board feet (see Appendix V), and much of this had to be shipped from ports which, on account of cost or local demand, would not in normal times be considered as suitable for export purposes. Before the war most of the timber exported was shipped from Greymouth, and failure during 1946 to secure a single vessel for loading at this port was the principal cause of the smaller quantity exported.

The export of insignis pine in the form of sawn timber and box shooks totalled 4,117,000 board feet (1,824,000). The Waipa Sawmill shipped about one-third of this quantity through Auckland, and most of the balance was supplied by Canterbury sawmills and boxmakers through Lyttelton and Dunedin. The production of insignis pine is expanding rapidly in the Rotorua district, and as more shipping becomes available it can be expected that the export of this timber through Auckland, and later Tauranga, will steadily grow.

CHAPTER X.—UTILIZATION TECHNOLOGY

77. *General*.—The timber-using industries are beginning to realize that they must accept more exotic coniferous woods to compensate for deficiencies in supplies of indigenous softwoods. Better supplies of some softwoods, especially those which are required for special purposes, are being received from overseas. Certain hardwood deficiencies are being met by the extensive use of tawa and other indigenous hardwoods, which are now filling an important role in the timber economy of the Dominion.

78. *Grading of Timber*.—Insignis pine has been recommended for inclusion among permissible framing timbers in the grades "No. 1 Dimension" and "No. 2 Dimension" in the standard specification for "Light Timber Construction" (part of the New Zealand Standard Code of Building By-laws). No. 2 Dimension is recommended for studding of non-bearing walls, but may be used in roof-framing, subject to a decrease in length of unsupported span. A necessary stipulation is made that insignis-pine framing timber requires to be of 25 per cent. moisture content or less before sheathing is applied. The need for careful stacking to avoid warping and sapstain after arrival on the building-site is also recognized. With proper preservative treatment the uses to which insignis pine may be put are naturally more extensive.

Grading rules for insignis pine and Corsican pine flooring for permanent housing have not yet been established, but trial lots of these timbers have demonstrated their suitability for such purpose. The use of pine timbers for weatherboarding has been commenced.

79. *Specifications for Finished Products*.—Finality has not yet been reached with the manufacture of templates for the profiles of weatherboarding, flooring, and match-lining, for which the standard specifications have been fairly generally accepted as satisfactory, nor with the manufacture of templates for standard joinery and moulding profiles, also covered by specifications prepared by the Standards Institute Committee.

Slight modifications made to the "Commercial Plywood" standard specification appear to have improved the product and made it more acceptable to furniture-manufacturers. A number of changes in the "Household Furniture" specification, especially a reduction in finished thickness requirements to $\frac{3}{8}$ inch out of 1 inch stock, should result in more extensive production of furniture conforming to that specification.

The Forest Service has been active on other Standards Institutes Committees concerned with "Timber Ladders" and "Glues."

80. *Structural Utilization*.—Insignis pine is now making a useful contribution to the building programme, especially for wall and roof framing. The anticipated inclusion of this timber in the revised "Light Timber Construction" specification should dispel any doubts as to its suitability for framing when properly graded and seasoned. Several instances of the use of insignis pine for heavier structural members also are on record.

81. *Mill Studies*.—In conjunction with a study to assist in establishing volume tables for tawa, grading of the sawn product was carried out according to both the grading rules now in use and those proposed by the State Forest Service in the drafted "Hardwood Grading Rules." Analyses are not yet completed.

82. *Utilization of Minor Timbers*.—The increasing use of the minor indigenous and exotic timbers indicated in the last report has been sustained. Tawa is now established as one of the most important timbers for furniture and for handles and other turned products. This timber has increased in use also in flooring and interior finish for houses, for which purposes some of it has been pressure-impregnated with water-soluble preservatives or dip-treated in oil-soluble preservatives. In the absence of facilities for carrying out either of these treatments with tawa, taraire, and other hardwoods subject to attack by the powder-post borer, a reasonable degree of immunity may be secured by voluntary hygiene in furniture-factories in destroying any infested timber in the racks, by quick turnover of timber stocks received from drying-kilns, by using only

kiln-dried timber, and by the application of or sealing filling coats (shellac, paraffin wax polish, &c.), to *all* surfaces of furniture parts so as to prevent the powder-post borers from laying their eggs.

More attention is being given to the durable beech species, apart from their uses for sleepers, fence-posts, bridge timbers, poles, and pole blocks. Small quantities of red beech have been going into housing and, in a few instances into industrial and house flooring.

A number of other industrial inquiries have been concerned with kaikawaka for boat planking and fireproof doors, silver beech for bobbins and flooring, manuka for smokers' pipes, imported teak for churns, tawa for skewers, and substitute timbers for kauri for numerous applications.

83. *Timber Mechanics*.—Tests on air-dry material of thirty-year-old loblolly pine, ranging from 12 in. to 18 in. D.B.H., were completed, and a report prepared on the physical and mechanical properties of green material. It has been ascertained that the variation of strength properties with height in tree is less than with insignis pine of similar age.

Green values for some properties of the two species are compared, as follows:—

	Insignis Pine, C. and D. Bolts (Five Trees).	Loblolly Pine C. and D. Bolts (Three Trees).
Growth rings, per inch	2 $\frac{3}{4}$	3 $\frac{3}{4}$
Specific gravity (weight oven dry, volume green)	0.385	0.314
Shrinkage (green to oven dry) (percentage based on green dimensions):—		
Volumetric	9.8	16.9
Radial	3.0	2.5
Tangential	6.0	5.6
Modulus of rupture in bending (pounds per square inch) ..	5,870	4,530
Modulus of elasticity in bending (1,000 lb. per square inch) ..	1,060	860
Maximum compressive stress parallel to grain (pounds per square inch)	2,590	2,060

Testing was continued with the Denison toughness machine on both indigenous and exotic timbers.

84. *Box-testing*.—Specifications have been completed for nine local-trade fruit-cases. In approving these cases for general use, the Fruit Case Committee has taken into consideration their re-use value and stock timber sizes from which the shooks can be cut with least wastage.

85. *Wood Technology*.—A further study of the New Zealand beech species is in progress, as the extending use of these timbers has resulted in the submission of samples for identification from localities not covered by previous studies. Substantial variation in specific gravity, as well as in anatomical features, frequently makes differentiation of the species difficult. A suggestion made by the Railways Department that timber of the durable species may be distinguished by a simple chemical test is being investigated.

A key for the identification of the New Zealand *Dacrydium* species on the basis of microscopic features was published during the year.

Miscellaneous studies have covered the physical properties of material from exotic conifers and hardwoods from several localities, the equilibrium moisture content of thick veneers of several species, improved methods for the preparation of fire-hazard indication sticks, and ring counts of sections in connection with botanical investigations. Routine identifications of sixty specimens and numerous moisture-content tests for wood-using industries have been carried out. The identity of several of the Solomon Islands woods included in the collection made for the State Forest Service by the R.N.Z.A.F. has been tentatively established by the Division of Forest Products in Melbourne working in collaboration with field officers in the islands.

86. *The Drying of Timber.*—Several new kiln units were inspected and assistance with schedules and measurements of circulation was given to operators.

Experimental lots of several eucalypts grown in the Whakarewarewa State Forest were kiln-dried with reasonably good results at the Waipa Mill after preliminary air seasoning.

Additions to the Waipa kiln installation now approaching completion will embody automatic ventilation. On one kiln such ventilation has already been provided and is working satisfactorily.

Data on the design of heated storage rooms for final conditioning of furniture stock have been supplied to manufacturers.

87. *Wood Preservation.*—Test specimens exposed to marine borer attack in Auckland Harbour were again examined during the year. After four years' exposure, creosoted control specimens of exotic species were still sound, although the incidence of teredo attack showed a slight advance on the previous year, whereas untreated control specimens of the same species were either completely destroyed or very severely attacked. It was also observed that where creosoted wood had been attacked the development of the teredo was retarded, the holes visible being much smaller than in untreated specimens. Of the untreated indigenous species (all heart timber) installed at the same time, kauri, miro, tawa, and taraire were either completely destroyed or severely damaged, but totara continued to show marked resistance to teredo attack, although extensive attack by *Limnoria*, which causes much less destruction, was evident. In 1945, additional indigenous species (untreated) containing both heartwood and sapwood were installed. These had been exposed for two and a quarter years when examined. Northern kauri was found to be completely destroyed, southern kauri severely attacked and practically destroyed, and northern and southern totara both slightly attacked, principally by *Limnoria*. After three and a quarter years' exposure, round bolts of tawa, taraire, and miro installed with bark intact were extensively attacked in places where the bark had become detached while in the water.

In 1941 a pontoon built of creosoted insignis-pine timber was launched for use as a landing-stage at the flying-boat base, Mechanic's Bay, Auckland. The pontoon, which is 50 ft. long by 20 ft. wide and 5 ft. deep, consists essentially of an interior trussed framework to which 2-in.-thick planking is spiked, with the bottom, sides, and ends covered with sheathing one inch thick. Except for turpentine corner pieces and hardwood bollards, all of the timber used was insignis pine and was prefabricated and creosoted at the Waipa Mill. After six years' service the pontoon was recently slipped for inspection and overhaul and the timber was found to be in excellent condition, being entirely free from decay and having suffered only minor attack by teredo. Teredo attack was observed at two places in the sheathing where it had been damaged by crushing, but the teredo holes were very small and the organisms had apparently died at an early stage. Had the customary northern totara sheathing been used, equivalent or greater damage by marine borers could have been expected.

Preliminary investigations have been made of the dipping of kiln-dried insignis-pine timber in an oil-solvent preservative immediately after withdrawal from the kiln and before appreciable cooling of the timber had occurred. The investigation so far has been confined to short lengths of five inch by one inch and four inch by two inch, with times of immersion varying from ten minutes to thirty minutes. Good absorptions and penetrations of preservative were obtained, and the work is now being extended to include 8 ft. lengths of timber. The preservative chemical used was pentachlorophenol, but analogous results may be anticipated for other preservatives in oil solutions.

88. *Painting of Woods.*—The need for service tests of paint coats for insignis pine is being emphasized by the increasing use of that timber for weatherboarding. A useful guide is provided by the Wallaceville paint test fence panels, on which lead primers and subsequent coats of standard type have been giving satisfactory service, provided that knot-sealers are applied over the priming coat. An extension to this test series is

being provided in Auckland by a private company, with which the Forest Service is co-operating, and new knot-sealers and controlled-penetration primers will figure in comprehensive tests on insignis pine.

Three paint test fences have been erected during the current year by the Inter-departmental Paint Committee, with which the Forest Service is actively associated. In addition to the wood factors, these tests are intended to cover paint formulation problems. Regular inspections of test panels on houses have been included in the activities of the Committee.

89. *Plywood Manufacture*.—An improvement in plywood quality has resulted from the deliberations of the Standards Institute Plywood Committee, which has been revising the "Commercial Plywood" standard specification. Increasing quantities of resin-bonded plywood are now being used in secondary wood-using industries. Further studies have been made of coreboard used by the printing trade. With respect to stereo blocks, it appears unnecessary to consider the replacement of the pine core with a wood having greater compressive strength perpendicular to the grain, as the inert qualities of the pine core outweigh most advantages which other timbers would provide. An alternative for coreboard is tanekaka, which is preferred for solid blocks, but supplies of this timber are very limited.

90. *Pulp and Paper Production*.—The laboratory work on the pulping of insignis pine grown in New Zealand was completed by Australian Paper Manufacturers, Ltd., and was followed by pilot-mill tests to confirm the results obtained. With the shipment of wood for the full mill-scale demonstration completed, an opportunity which will not unduly interfere with the normal operation of the Australian mills is now being awaited for carrying out this work. The production arranged is 165 tons of unbleached, semi-bleached, and bleached sulphate pulp for conversion, with added groundwood, into various classes of paper and board in both Australian and New Zealand paper-mills, as follows: 40 tons of multi-wall bag paper, 25 tons of fine printings and writings, 100 tons of newsprint, and 40 tons of pulp for conversion in New Zealand mills.

The co-operation of Australian Paper Manufacturers, Ltd., Australian Newsprint Mills Pty., Ltd., and Associated Pulp and Paper Mills, Ltd., in these tests is gratefully acknowledged.

During the year a British paper-machinery expert visited New Zealand and the opportunity was taken of obtaining his advice regarding the establishment of the sulphate pulp and paper industry in New Zealand.

91. *Charcoal Production*.—No charcoal-burning was undertaken during the year. Stocks are now exhausted, the residual stock of 8 tons carried over from last year having been sold.

CHAPTER XI.—MISCELLANEOUS

92. *Legislation*.—No amendments to the Forests Act, 1921–22, were made during the year, nor were there any amendments to the regulations under the Act.

Under section 3 of the Soil Conservation and Rivers Control Amendment Act, 1946, the Director of Forestry is appointed a member of the Soil Conservation and Rivers Control Council.

Part III of the Finance Act (No. 2), 1946 (timber-workers' housing) provides for the construction and improvement of accommodation for timber-workers (see also paragraph 100, which gives details).

Section 4 of the Reserves and other Lands Disposal Act, 1946 (a) cancels the reservation as endowments for primary education over an area containing 66 acres 3 roods 16 perches, being the north-western portion of Allotment 58, Hikurangi Parish, North Auckland Land District, and an area containing 281 acres 3 roods 33 perches, being Section 1, Block IX, and Section 12, Block X, Clarendon Survey District, Otago Land District; (b) cancels the reservation as endowments for secondary education over an area containing 74 acres 2 roods 16 perches, being the south-western portion of

Allotment 65, Hikurangi Parish, North Auckland Land District, and an area containing 145 acres 2 roods 4 perches, being Section 1, Block VIII, Akatore Survey District, Otago Land District; and (c) sets all four of these areas apart as permanent State forests under and subject to the Forests Act.

Section 23 of the Reserves and other Lands Disposal Act, 1946, cancels the State forest reservation over an area containing 644 acres, being part of Section 48, Block VII, Pohangina Survey District, Wellington Land District, and declares the land to be a recreation reserve and to be set apart under Part II of the Public Reserves, Domains, and National Park Act, 1928, as part of the Pohangina Valley Domain.

93. *Finance*.—Appendix VI of this report summarizes the receipts into and payments out of the State Forest Account during the year ended 31st March, 1947, together with those of the three previous years. The complete departmental accounts are set out in parliamentary paper B.-1 [Pt. IV].

Reference to Appendix VI will show that, compared with the previous year, payments for 1946-47 increased by approximately £470,000, whereas total receipts show little variation.

The increased payments were occasioned by the increased labour complement, salaried personnel, accommodation, plant, &c., necessary for the establishment and maintenance of new projects and for the accumulated maintenance of established forest projects.

Itemized receipts warranting special comment are an increase of approximately £35,000 for sawn-timber sales, this being due to increased timber-production; and a decrease of approximately £47,000 for sales of box shooks, this being due to the change-over from wartime to peacetime orders.

94. *Subventions to Local Bodies, &c.*—The extent to which subventions of forest revenue to the Consolidated Fund and local bodies have necessitated the raising of additional loan-moneys over the past three years in order to provide the necessary finance for forest activities is shown in the following table:—

Year.				Consolidated Fund (under Section 39 of Forests Act, 1921-22).	Local Authorities (under Section 17 of Finance Act, 1924).	Local Authorities (under Sections 6 and 7 of Forests Amendment Act, 1923).	Total.
				£	£	£	£
1944-45	..	..	..	16,196	12,799	6,057	35,052
1945-46	..	..	..	14,235	17,114	6,230	37,579
1946-47	..	..	..	16,023	25,750	6,033	47,806
Totals	..	..	..	46,454	55,663	18,320	120,437
Percentage of indigenous forests receipts				8.63	13.88	3.26	25.77

The relationship which the above subventions of revenue bear to the amounts of loans raised is as follows:—

—				1944-45.	1945-46.	1946-47.
				£	£	£
Total loans raised	..	..	..	110,000	300,000	750,000
Subventions	..	..	..	35,052	37,579	47,806
Percentage of loans	..	..	..	31.87	12.53	6.37

95. *Recreation in State Forests.*—The popularity of State forests for general recreational purposes was maintained during the year. Members of tramping clubs and similar organizations are the main visitors, but deer-stalking also drew a large number, doubtless in a measure due to the favourable market price for deer-skins.

Waipoua Forest was again a centre of attraction, and local officers of the Service gave assistance in facilitating tours of inspection by interested parties. The control of a popular forest known as Totara Reserve, in the Pohangina Valley, about twenty miles from Palmerston North, was vested in the Palmerston North City Council during the year and will be developed by that body for recreation purposes and form part of the Pohangina Valley Domain.

Other suitable State forests in various parts of the Dominion were visited by picnickers and campers during the holiday season, but inclement weather in the South during that period somewhat restricted their numbers and confined them largely to the forest edge.

During the holidays all the more popular State forests were under continuous patrol by the Forest Service staff and no fires or serious damage to State forest were reported.

96. *Forest Privileges.*—(a) *Grazing Privileges:* Grazing licences and leases now number 222. Twenty-five new licences were granted, 16 surrendered, and 6 transferred.

(b) *Mining Privileges:* Thirty-nine applications for mining privileges in State forests under the Mining Act, 1926, and 4 applications for coal-mining rights under the Coal-mines Act, 1925, were granted by the Mining Warden. Although these rights and privileges are not granted under the Forests Act, 1921–22, the holders are subject to the same obligations as the holders of State forest privileges with respect to the protection of State forests, and in all cases the attention of applicants is directed to the provisions of the Forest (Fire-prevention) Regulations 1940 and amendments.

97. *Library.*—During the year 350 books and pamphlets were added to the Head Office library, bringing the total holdings to 9,814. The provision of additional shelving space has enabled a start to be made on a complete reorganization of the library and index.

98. *Post-war Development and Expansion.*—Further areas acquired during the year for new exotic forests or managed indigenous forests totalled 12,500 acres, bringing the area acquired since 1940 to 85,600 acres. Areas under negotiation for purchase at the end of the year amounted to 56,800 acres. Inclusive of the latter, 110,000 acres are still required to complete consolidation of existing State forests and to provide new exotic forests in timberless districts, thus bringing the total productive managed forest area up to 870,000 acres, as provided for in the post-war plans.

During the year basic reports on 55 managed forests were prepared. These reports crystallize the broad intention and policy regarding each managed forest and form the basis of the State Forest Service projects under the regional plans announced by the Ministry of Works.

Progress of land acquisition has been slower than was anticipated under the plans, but this has proved of little moment, because, even on established forest, silvicultural and other works could not be commenced on a large scale owing to the dearth of labour offering. When the post-war plans were drawn up, it was anticipated that large numbers of returned servicemen could be absorbed into forest employment, but this did not eventuate. The average number of employees required under the plans is 3,500 for the first five years up to March, 1951, but at the recent rate of engagement this average number will not be reached until about 1953. The number of employees at the close of the year was 1,630, as compared with 1,300 at the end of March, 1946, and 1,000 in March, 1945.

The provision of further accommodation for married and for single employees received attention during the year and considerable progress was made, details being set out in paragraph 56.

A list of the forests on which expansion has been planned is annexed (Appendix X).

99. *Export Butter-box and Cheese-crate Pools.*—During the year ended the 31st March, 1947, the deliveries of timber to North Island boxmakers licensed under the Export Butter-box and Cheese-crate Pool Regulations 1941 amounted to only 4,169,000 board feet (8,704,000). North Island sawmills supplied 2,446,000 board feet of white-pine and 149,000 board feet of rimu, the balance, consisting of 733,000 board feet of white-pine and 841,000 board feet of rimu, having been shipped from the west coast ports of the South Island.

The total supply from the west coast ports—viz., 1,574,000 board feet (5,249,000)—was the lowest received since the pool was commenced in 1936. While shortage of shipping was essentially the cause, it is pertinent to record that even if more vessels had been available the shipping of white-pine would not have increased. White-pine production has fallen to so low a level in Westland that industries that have been using this timber for purposes previously regarded as essential will not in the future be able to satisfy their full needs with respect to it.

During the year, North Island dairy companies were supplied with 4,449,000 (5,013,000) export butter-boxes, comprising 926,000 (1,366,000) standard wooden boxes, 1,242,000 (814,000) “Saranac” type boxes (fibre-board sides, tops, and bottoms and cleated wooden ends), 549,000 (1,336,000) corrugated fibre-board cartons made in New Zealand from Canadian liner, and 1,732,000 (1,497,000) solid fibre-board cartons (the bulk of which were imported).

At the close of the year, stocks of butter-boxes of all types held by dairy factories totalled 615,000 (934,000). Although this stock is below normal, there appear to be reasonable prospects of satisfactory quantities being shortly received of fibre boxes ordered by the New Zealand Dairy Board. It is accordingly expected that the dairying industry will have an adequate supply of butter-boxes by the time the 1947–48 season’s demand is felt.

During the year, 1,168,000 (1,236,000) cheese-crates were supplied to dairy factories, North Island boxmakers contributing 987,000 (1,074,000) and South Island boxmakers 181,000 (162,000). Both cheese-crates and apple-cases at current controlled prices are not sufficiently economical to produce in most box-factories, and increases in price are probably necessary to ensure adequate supplies for next season.

CHAPTER XII.—TIMBER CONTROL

100. *Timber Production Advisory Committee.*—The Timber Production Advisory Committee, under the chairmanship of the Commissioner of State Forests, held three meetings during 1946–47. The membership of the Committee remained unchanged.

Timber Workers’ Housing.—The main work of the Committee during the year was to continue its investigations into methods of effecting improvements in the standard of accommodation at bush sawmills, resulting in the Government’s acceptance of recommendations which were substantially embodied in legislation under Part III of the Finance Act (No. 2), 1946. This legislation, which is administered by the State Advances Corporation, provides for the construction and erection of standard demountable houses and for the disposal of these houses by the Corporation to sawmillers in bush areas by way of sale or by way of hire-purchase covering a period of twenty years. It also gives the Corporation power to make advances not exceeding £200 in each case for the purpose of enabling sawmillers to bring existing houses up to the desired standard.

The finance to cover the cost of building and erecting the houses, the advances on existing dwellings, and administrative expenses is being provided by a levy of 6d. per

100 board feet on all indigenous and exotic sawn timber milled in the Dominion, including timber cut by the Crown for sale. The levy is payable to the State Advances Corporation in quarterly instalments, and it will be placed in an account known as the "Timber Workers' Housing Pool Account." While the pool is building up, advances will be made from the Corporation's own Housing Account in order to permit the Act to have immediately effective operation, but such advances will eventually be repaid, with interest from the pool. The amount of the levy is reimbursed to sawmillers by an equivalent increase in the sale price of sawn timber.

Priority in providing houses or granting advances will go to new units cutting in indigenous forest and to existing units which can be expected with such help to make an effective contribution towards increased indigenous-timber production. The dwellings so constructed or renovated shall not be used for any purpose except the accommodation of timber-workers, unless consent is first obtained from the Corporation. The houses will have all the usual modern amenities. Their rent is not to exceed 15s. a week for a dwelling containing two bedrooms or 17s. 6d. a week for a dwelling of three bedrooms. The rental of houses renovated will be decided in each case by the Corporation. As mills cut out, houses constructed and erected under the Act may be transferred to new sites.

Although this part of the Act is administered by the State Advances Corporation, the Timber Production Advisory Committee functions in a consultative capacity and investigates all applications for houses and improvements before any action is taken by the Corporation. Up to the 31st March, the Committee had received and dealt with 35 applications for 140 houses, as follows :—

Committee's Decision.	Applications.	Houses.
(1) Recommended to receive houses ..	27	112
(2) Deferred pending satisfaction of priority claims	6	18
(3) Declined as not eligible under the Act ..	2	10

A further 32 applications for 116 houses were under action at that date.

When the year closed, a demonstration house had been erected by the Housing Division of the Public Works Department and authority granted for the immediate calling of tenders for 300 houses.

101. *Declaration of Timber Industry as Essential.*—No declarations of essential undertakings under the Industrial Man-power Regulations 1944 were made subsequent to the 31st January, 1946, and all controls of man-power were revoked as from the 30th June, 1946, being the date upon which the Industrial Man-power Emergency Regulations were revoked by the Emergency Regulations Revocation Order No. 3 (Statutory Regulations, Serial number 1946/101).

102. *Industrial Man-power.*—Man-power gains in the timber industry as a result of the demobilization of the Armed Forces were not as large as expected. This was due mainly to the remote localities in which most operations are being conducted and to the accommodation position at so many mills. It is hoped, however, that a considerable improvement will take place when houses are provided under the timber-workers' housing scheme which has now become law. (See paragraph 100.)

Revocation of the declaration of sawmilling as an essential undertaking was delayed as long as possible, as it was certain that a large number of the men engaged in the industry would seek less arduous work once the restrictions were removed. Immediately following the revocation, a considerable movement of employees took place, older men

retiring or seeking less strenuous employment and others transferring from one mill to another. A further small but steady loss of man-power has been brought about by the general shortage of labour throughout the country and by the tendency for men to seek the most attractive working conditions offering. This position is likely to continue until working conditions, both in the bush and at mills, have been materially improved. To maintain production under such circumstances it has been necessary to continue working extended hours, particularly in the bush, and some bush mill operations have accordingly been working forty-eight hours a week, but the average in the industry is about forty-four hours a week.

The working of extended hours by sawmills, which was previously subsidized from the War Expenses Account, has this year been subsidized from the Consolidated Fund, vote "Stabilization," on the same basis as before—viz., 80 per cent. of the extra cost for overtime at time and a half rates worked during the week and on Saturday mornings and 100 per cent. of the extra cost of overtime at double rates worked on Saturday afternoons. The Forest Service continued to check all claims from the industry, and during the year has passed for payment amounts totalling £98,166 (£120,129). The estimated additional production achieved as the result of this subsidy is 25,000,000 board feet (32,000,000).

103. *Petrol and Tire Conservation and Vehicle and Tractor Supplies.*—Owing to the removal of the restrictions governing the sale of petrol, no further action is being taken by the State Forest Service in its advisory capacity to and on behalf of the Commissioner of Transport and the Oil Fuel Controller.

The tire position, however, calls for close attention and, by arrangement with the Rubber Controller, all applications by private operators in the timber industry are submitted to the local Conservator of Forests, whose recommendations are taken into consideration by the Tire Controller when reviewing the application. The control over tractors having been removed and the supplying of motor-vehicles through the War Assets Realization Board having virtually ceased, assistance is no longer necessary regarding allocation to the industry. The Forest Service has, nevertheless, served the industry usefully by arranging for the supply of urgent materials and spare parts.

104. *Essential Supplies.*—Last year the controls on saws, wire ropes, corrugated fasteners, hoop steel, &c., were removed, as the stocks held were deemed sufficient to maintain production until further deliveries were received. For various reasons, including strikes, lack of shipping, and excessive demands from other countries, the deliveries have not been as large as desirable and stocks, particularly certain individual items, have become precariously low. Constant efforts have been maintained to obtain early fulfilment of the large orders placed overseas, and sufficient deliveries of the most essential materials under this head to effect an improvement in the general position are expected to be made in the immediate future.

105. *Timber Purchases for Defence Works.*—Activity under this heading has been confined to an endeavour to complete the reconciliation of timber quantity schedules compiled from purchase records in the Timber Controller's Office with those prepared from the contractors' records. This work has been practically concluded and there now remains only one large contract in which finality has not been reached.

106. *Timber Control Notices.*—Changes in Timber Control Notices effected during the year were as follows :—

- (a) The Second-hand Fruit-case Control Notice (No. 2) 1943 was revoked and replaced by the Second-hand Fruit-case Control Notice 1946 (Serial number 1946/159), which came into force on the 1st October, 1946. The main result was to remove the restrictions from the use of certain types of cases.

- (b) The following Timber Control Notices were revoked by a Notice dated the 13th May, 1946 :—

Export of Kauri and Insignis Pine Notice, published in *Gazette*, 1940, page 1724.

Timber Control Notice No. 33 (Binding Wire), published in *Gazette*, 1941, page 3959.

Timber Control Notice No. 44 (Wire Ropes), published in *Gazette*, 1942, page 1121.

Timber Control Notice No. 51 (Cutting, Sale, or Use of Insignis Pine Timber except for the Manufacture of Wooden Containers), published in *Gazette*, 1942, page 2825.

Timber Control Notice No. 52 (Timber Materials), published in *Gazette*, 1942, page 2844.

- (c) Timber Control Notice No. 50 (Use of Oregon or Douglas Fir), published in *Gazette*, 1942, page 2561, was revoked by a Notice dated the 3rd April, 1947, published in *Gazette*, 1947, page 447.

- (d) Delegation of Powers by Timber Controller : By Notice dated the 10th June, 1946, issued pursuant to Regulation 4 of the Supply Control Emergency Regulations 1939, the Timber Controller delegated to Wynfred Vincent Kelsall, of Auckland, power to act for the Timber Controller, as directed, in controlling the sale, supply, and disposal of rimu, miro, matai, and totara timber. This Notice came into force on the 1st July, 1946.

107. *Removal and Erection of Sawmills.*—The Removal and Erection of Sawmills Notice 1941 (Serial number 1941/236) was revoked by a Notice dated 26th July, 1946. Between 1st April, 1946, and the date of the coming into force of the revocation, consent for the removal and for the erection of sawmills under the Notice was granted in 34 cases, 26 of which were for erections and 8 for removals.

There is now no particular restriction on the erection of sawmills, but attention is directed to the Sawmill Registration Regulations 1942 (Serial number 1942/330), which provide that every person who commences to operate a sawmill is required within one week to make application for registration of the sawmill, and operating sawmills are required to re-register annually.

108. *Sale and Purchase of Forests.*—(a) *Privately Owned Forests :* During the year, 198 (424) consents to the sale and purchase of privately owned forests were granted under the provisions of Regulation 3 of the Timber Emergency Regulations 1939 (Serial number 1939/148). These comprise 87 consents for the sale and purchase of indigenous forest and 111 in respect of exotic forest. The reduced number of consents granted during the year is accounted for by the smaller number of transactions in respect of small lots of standing timber.

(b) *Maori-owned Forests :* During the year no notices were issued pursuant to Regulation 3 of the Timber Emergency Regulations 1939 as amended by Regulation 2 of Amendment No. 1 (Serial number 1943/106), which authorizes the Timber Controller to require Maori owners of forests to sell their interests to such proprietors as he may nominate. Two licences for sale of forests were granted following notices issued during the preceding year, and in one case it was necessary to issue an authorization prior to the granting of the licence. All sales of Maori-owned forest require the consent of the Commissioner of State Forests in terms of section 35 (2) of the Forests Act, 1921–22, and in all cases a cruise and valuation of the timber in the area are made by the Forest Service before consent is given. The same procedure is followed in sales under the Timber Emergency Regulations, and such sales are also subject to confirmation of the Native Land Court, consequently the owners are assured of receiving full value for the timber sold and their interests are fully protected.

In effect, the Timber Emergency Regulations enable the State Forest Service through the Timber Controller, to act as agent for Maori owners in arranging for the sale of their timber and provide a short cut to the normal procedure under the Native Land Act, 1931. In no case is this power now exercised except upon the request or with the written consent of Maori owners concerned. Written requests have been received from Maori owners of two blocks to arrange the sale of the forest on their behalf, and notices dealing with these forests will shortly be issued. Such a notice is sent to the Maori Land Board, which is authorized to accept the notice on behalf of Maori owners, and is required to take such steps as it thinks desirable and expedient to advise the owners of the giving of the notice.

It has been demonstrated that the machinery of the Timber Emergency Regulations 1939, while performing a useful national purpose during the period of emergency, is now recognized as establishing a valuable liaison between the Maori owners and the Forest Service which is not otherwise provided for by law, and consequently it is desirable that provision should be made in the permanent law for the continuance of this service to Maori owners of forests.

(c) *Exotic Forests (Commercial)*: Four consents for the sale and purchase of exotic forests established for commercial timber-production by afforestation companies were granted during the year. Three of these consents were given subject to the usual conditions requiring the forest-owner to submit for approval a working plan setting out fully proposals for silvicultural management, progressive re-establishment of cut-over areas, and forest-fire prevention and control.

Of three working plans received during the year, one was approved and the others are at present under examination.

The wider recognition given to the suitability of exotic-pine timber in wood-using industries is reflected in the increasing interest taken by well-established sawmilling firms in areas of exotic forest grown for commercial purposes and in establishing suitable modern sawmilling equipment. As an added danger to the safety of exotic forests is inevitable with sawmilling operations, it is clearly to the interests of the sawmiller and forest-owner to co-operate and provide the best possible means for the protection of the forests from fire and ensure their continued productivity.

109. *The Timber Position.*—As it was still not possible for normal quantities of timber to be shipped out of Westland and Nelson ports during the year, the North Island continued to feel a timber shortage more than the South Island. In pre-war years between 25,000,000 board feet and 30,000,000 board feet of timber were regularly shipped from Greymouth and Westport to the North Island and to Australia; last year shipping for less than 7,000,000 board feet was available for these ports. Although receiving less than a normal supply of timber from the South Island, the North Island, on account of the shipping position, was required to supply half the timber exported to the Commonwealth.

The maintenance of zone quotas during the year in the North Island presented considerable difficulty. The North Island Sawmillers' Distributing Association was responsible for this work in fifteen of the seventeen zones and carried out the task effectively. The distribution of the timber within the zones was also fraught with difficulties, not the least of which was the maintenance of an equitable allocation between the building industry and other timber-using industries. Another problem was in meeting the demand for finishing-timbers in zones where no dry-kiln facilities are available. As demand has for many years nullified all efforts to improve timber stocks, many wood-users are now forced either to use green timber for finishing purposes or pay the added cost of having the timber transported and dried in kilns often located as far as one hundred and fifty miles away.

The principal sawmilling groups in the South Island continued during the year to apportion deliveries, thus ensuring that each district received an equitable share of production, and so it did not become necessary to introduce the intensive zoning and end-use control that it has been essential to maintain in the North Island.

Apart from boxmaking requirements, the principal indigenous timbers used prior to the recent war were rimu, matai, and totara and such imported woods as Douglas fir, redwood, and western red cedar. For the year ended 31st March, 1946, the quantity of all these timbers available for domestic consumption amounted to 211,000,000 board feet, and for the year ended 31st March, 1947, the quantity is estimated to have totalled 207,000,000 board feet. These figures compare unfavourably with the average of 259,000,000 board feet available during the years 1924, 1925, and 1926 and the 243,000,000 board feet available during 1939. When it is considered that in 1939 stocks amounted to more than 100,000,000 board feet, as compared with less than 30,000,000 board feet at present, it becomes clear that wood-using industries to-day have neither the stocks nor the current supply of former years. As the demand for timber during the year was considerably above pre-war levels, the extent to which essential work requiring timber could be undertaken depended principally upon two factors—viz., (a) the effectiveness of the restraint placed on the use and sale of indigenous and imported building-timbers for work which could be deferred or classified as non-essential, and (b) the extent to which exotic timbers might replace indigenous and imported timbers. Control of timber-distribution during the year aimed, through the End-use Committees, at restricting the use and sale of timber to work essential in the public interest and at using the species of timber and grades available for purposes to which they were best suited.

110. *Timber Prices.*—Economic surveys of the sawmilling industry were commenced in 1945, and as the result of a survey during the year under review increased prices were granted by the Price Tribunal to South Island sawmillers. The increase in price was allowed to enable the sawmillers to be placed in the same earning position as they were in 1939. In the West Coast - Nelson - Marlborough area the increase was 1s. per 100 board feet, and in the Southland area it was 2s. 6d. per 100 board feet.

During the year the Government removed the sales tax from timber, which resulted in lower prices to consumers, but the introduction of the timber-worker's housing levy has added 6d. per 100 board feet to the prices so lowered.

As from February, 1947, timber-workers' awards throughout New Zealand were revised to allow increased rates of pay. In order to compensate sawmillers for these increases, the Price Tribunal authorized small increases in the selling-prices of timber in all areas.

In continuation of its policy of establishing fixed price points for sales of timber, the Price Tribunal has authorized the sale of insignis pine in the Southland and Otago area based on the price point at Edievale. The increased demand for insignis pine as a building-timber has resulted in the establishment of authorized maximum prices for merchants' sales of this timber.

111. *Timber-production.*—The granting of the economic price increase to the indigenous-timber section of the North Island sawmilling industry last year was followed by prompt investment of fresh capital for the establishment of new sawmills. Whereas the State Forest Service in 1945 received no bids when tenders for the purchase of saw-logs at Te Whaiti were called, a number of tenders were received when the sales were readvertised after the economic increase was granted. As a result, the establishment of three new sawmills is now well advanced at Te Whaiti, and all are expected to be in full production before the present year ends. Similar progress can be recorded in other parts of the Dominion, as is shown by the fact that applications were received during the year for the registration of fifty-four new sawmills intended entirely or principally for the cutting of indigenous timbers.

In all indigenous-timber-producing districts the life remaining to most sawmills is limited to a few years only, and the maintenance of current production depends upon the establishment of increasing numbers of sawmills in what can be termed "remote areas"—locations situated forty-five to seventy miles from the nearest railway-station. To produce the increased supplies needed in the immediate future, a substantial investment for the exploitation of bush resources in these districts will be required.

Over-production of indigenous timber occurred during many of the years between 1923 and 1939 and timber prices generally permitted a satisfactory profit to be earned by only the most favourably situated sawmills. Few sawmills were situated more than twenty miles from the railhead, as this distance represented the limit at which an efficient sawmill could cover production costs. When price control was introduced in the timber industry in 1936, current price-lists adopted as the basis for such controlled prices generally enabled a satisfactory profit to be secured by an average efficient sawmill situated not more than eight miles from the railway-line. The 1946 economic price increase was granted because the North Island industry could no longer maintain production on the 1936 basis and still meet the increased costs in wages and supplies since that year. The Forest Service feels it must stress that the future basis for price in indigenous milling throughout New Zealand must be the operating costs of sawmills situated fifty to sixty miles from rail transport in the North Island and twenty-five to forty miles in the Westland area. Such a basis is prerequisite to the increase in production required to permit the timber servicing of the country's post-war programme.

Because current demand far exceeds indigenous-timber supply, a tendency has developed for builders to compete for log-supplies, and transport them from one hundred and fifty to two hundred miles for sawing in urban areas. The effect of this policy is to give the builders concerned a favoured supply of timber, though at a price much above approved levels, because of the high cost associated with long-distance log transportation. As this policy threatens the life of sawmills upon which the Dominion must always rely for much of its timber-supplies, and is an indirect means of defeating price control of timber, the State Forest Service is confining its sales of bush areas and saw-logs to sawmills already operating in the area and to buyers who are not participating in the undesirable practice described. Concern, however, is felt at the tendency of some Maori owners of forests to engage in such trade, and it is hoped that such owners will follow the Forest Service's policy in this respect. Under present conditions, the transport of saw-logs by rail is a wasteful use of trucks. It is usually in the public interest that the sawing of logs should be undertaken, wherever possible, by sawmills situated near the forests.

APPENDIX I

AREAS OF STATE FORESTS AS AT 31ST MARCH, 1947

Conservancy.	Permanent State Forest.		Provisional State Forest.		Totals.	Percentages of Land Area under State Forest Reservation.
	Ordinary.	National Endowment.	Ordinary.	National Endowment.		
	Acres.	Acres.	Acres.	Acres.	Acres.	
Auckland	416,530	87,789	138,983	14,006	659,308	7.67
Rotorua	698,197	286,760	159,357	63,108	1,207,422	15.29
Wellington	1,020,116	41,135	33,807	3,808	1,098,866	9.08
Nelson	1,080,384	216,076	786,171	526,001	2,608,632	37.22
Westland	916,926	354,030	363,287	227,315	1,861,558	48.18
Canterbury	486,748	3,647	..	..	490,395	4.93
Southland	538,185	56,234	633,269	13,740	1,241,428	7.3
	5,157,086	1,047,671	2,114,874	847,978	9,167,609	13.81
	6,204,757		2,962,852			

APPENDIX II

SUMMARY OF PLANTING AND SILVICULTURAL OPERATIONS IN STATE FORESTS AS AT 31ST MARCH, 1947

Forest.	Year of Commencement.	Gross Area of Forest.	Total Net Area planted.	New Area planted, 1946.	Area treated, 1946-47.			
					Low-pruned.	High-pruned.	Thinned.	Clear-felled.
		Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.
Mangonui ..	1944	8,927	3	..	..	..	..	..
Waipoua ..	1925	12,600	4,042	62	328	..	108	..
Puhipuhi ..	1904	1,565	1,209	..	4	24	..	..
Glenbervie ..	1945	5,072	7	..	..	..	..	..
Riverhead ..	1926	11,965	10,593	..	436	..	..	..
Tairua ..	1930	48,510	13,515	63	306	..	8	..
Kauaeranga ..	1940	4,000	609	..	39	..	..	..
Maramarua ..	1928	14,087	12,311	..	418	..	..	..
Rotoehu ..	1937	35,559	5,156	..	510	..	..	..
Whakarewarewa ..	1898	10,065	7,332	101	105	10	158	168
Waiotapu ..	1901	7,974	6,894	..	44	8	123	31
Kaingaroa ..	1913	344,397	258,659	71	1,217	..	14	110
Tongariro ..	1937	4,500	2,300	..	..	..	..	..
Erua ..	1930	6,648	4,390	..	107	..	..	..
Karioi ..	1927	25,869	16,922	..	217	57	1	..
Gwavas ..	1944	8,584	15	6	..	..	..	..
Ngaumu ..	1942	5,243	17	2	..	..	..	..
Golden Downs ..	1927	41,140	23,079	1	304	..	..	..
Rimu ..	1922	5,839	3,090	..	156	..	..	..
Hanmer ..	1901	10,661	7,684	..	374	..	58	..
Balmoral ..	1916	24,141	21,208	..	201	..	..	60
Eyrewell ..	1928	19,266	17,343	..	377	..	..	40
Ashley ..	1939	5,099	1,942	220	135	..	..	..
Naseby ..	1900	4,032	3,095	..	41	..	16	..
Herbert ..	*	3,269	..	..	..	..	..	..
Berwick ..	1946	5,752	23	23	..	..	..	..
Allanton ..	*	1,676	..	..	..	..	..	..
Akatore ..	*	3,136	..	..	..	..	..	..
Dusky ..	1898	6,866	4,430	..	719	434	129	..
Conical Hill ..	1903	4,903	4,211	48	72	80	129	1
Blue Mountains ..	1925	10,058	8,887	..	231	173	198	2
Pebble Hills ..	1930	5,330	4,355	6	122	140	113	..
Minor Areas ..	1875-1946	14,715	3,602	236	93	6	..	..
		721,448	446,923	839†	6,556	932	1,055	412

* New projects.

† Includes 5 acres interplanted in indigenous forest.

APPENDIX III

CREOSOTED FOREST PRODUCE

	Year ended 31st March, 1946.				Year ended 31st March, 1947.			
	Posts and Strainers.	Poles.	Other Produce.	Total Quantity of Produce.	Posts and Strainers.	Poles.	Other Produce.	Total Quantity of Produce.
	Number.	Number.	Cu. ft.	Cu. ft.	Number.	Number.	Cu. ft.	Cu. ft.
Produce creosoted ..	54,678	11,971	7,146	124,870	56,439	138	14,808	67,609
Sales ..	45,635	6,678	5,944	87,498	43,208	3,632	4,413	74,895
Creosoted produce used by State Forest Service	3,523	1,004	1,979	9,307	4,642	2,440	3,738	22,270
Creosoted stocks at end of year	41,435	7,497	7,819	92,304	42,175	3,330	12,414	67,321
Untreated stocks at end of year	58,687	1,124	2,425	57,176	322	892	1,015	8,103
	Gallons.	Gallons.	Gallons.	Gallons.	Gallons.	Gallons.	Gallons.	Gallons.
Creosote used..	41,137	63,449	9,634	114,229	37,545	433	17,165	55,143

APPENDIX IV

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, 1944, 1945, and 1946. Value represents value in country of export, plus 10 per cent., expressed in terms of New Zealand currency. The figures for 1945 and 1946 are subject to confirmation when final figures are published by the Customs Department.)

Item.	1944.		1945.		1946.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
	Bd. ft.	£	Bd. ft.	£	Bd. ft.	£
Hardwoods—						
Sleepers ..	3,781,000	63,100	3,253,000	69,500	6,836,000	141,200
Australian hardwoods ..	6,472,000	151,200	6,451,000	176,400	7,123,000	185,100
Total ..	10,253,000	214,300	9,704,000	245,900	13,959,000	326,300
Softwoods—						
Douglas fir ..	3,798,000	60,000	3,750,000	51,500	7,276,000	115,200
Redwood ..	1,205,000	35,200	2,552,000	75,100	274,000	8,000
Total ..	5,003,000	95,200	6,302,000	126,600	7,550,000	123,200
Other ..	40,000	3,000	778,000	22,900	410,000	20,000
Grand total ..	15,296,000	312,500	16,784,000	395,400	21,919,000	469,500
Shingles ..	..	59	..	..	..	65
	Tons.		Tons.		Tons.	
Tanning-bark ..	56	768	186	2,860	69	980
Wood-pulp ..	12,492	269,700	9,300	231,100	10,700	302,900

APPENDIX V

EXPORT OF SAWN TIMBERS AND OTHER FOREST PRODUCE

(From information supplied by the Comptroller of Customs. All figures refer to the years ended 31st December, 1944, 1945, and 1946. Figures for 1945 and 1946 are subject to confirmation when final figures are published by the Customs Department.)

Item.	1944.		1945.		1946.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
	Bd. ft.	£	Bd. ft.	£	Bd. ft.	£
White-pine	206,000	2,500	38,000	530	50,000	600
Rimu	2,422,000	28,400	690,000	10,220	1,196,000	40,800
Beech	994,000	15,400	927,000	16,230	650,000	15,200
Matai	30,000	600	75,000	1,070	362,000	5,700
Kauri	9,000	400	19,000	870	24,000	1,100
Insignis pine—						
Sawn	63,000	1,000	575,000	8,920	1,535,000	26,500
Box shooks	509,000	10,900	1,249,000*	32,990	2,582,000*	73,100
Other	19,000	400	560,000	14,900	133,000	2,100
Total	4,252,000	59,600	4,133,000	85,730	6,532,000	165,100
	Tons.		Tons.		Tons.	
Kauri-gum	1,130	74,420	1,190	94,290	230	22,770

* Includes a small percentage of beech.

APPENDIX VI

PAYMENTS AND RECEIPTS FOR THE YEAR ENDED 31ST MARCH, 1947

Item.	1943-44.	1944-45.	1945-46.	1946-47.
<i>Payments</i>				
Allocation of revenue—	£	£	£	£
Consolidated Fund (portion of revenue from national endowment forests)	17,455	16,196	14,235	*
Working Railways Account (section 24 (1), Finance Act, 1936)	549	..	..	3,539
Local bodies	12,928	12,799	17,114	25,750
General management charges—				
Salaries	89,332	110,317	137,984	187,714
General expenses	41,254	56,019	102,275	130,770
Land purchase	11,687	38,957	30,098	18,296
Forestry projects under direct management—				
Exotic	248,705	346,743	377,910	710,376
Indigenous	30,521	41,912	58,808	79,023
Utilization : Sawmill, creosote, plant, &c.	104,826	125,931	133,677	174,379
Pulp and paper making	..	..	..	12,369
Totals	557,257	748,874	872,101	1,342,216
<i>Receipts</i>				
Indigenous forests receipts—				
Timber sales	114,553	121,603	135,913	155,208
Timber royalties and trespass	8,588	9,250	13,451	11,481
Leases, grazing	1,402	1,611	2,865	2,229
Sawmill sites, industrial, &c.	247	308	672	359
Miscellaneous	6,895	9,124	8,960	16,419
Log sales from managed forests	73,317	54,716	67,053	62,432
Exotic forests : Poles, posts, firewood, &c.	51,952	45,938	38,643	39,975
Utilization projects—				
Sawn timber	16,180	22,529	63,451	98,703
Creosoted products	15,964	45,918	17,305	17,889
Box shooks	136,600	129,126	182,187	134,839
Miscellaneous	2,663	9,875	9,532	12,840
Miscellaneous credits	16,942	10,802	48,292	37,953
Totals	445,303	460,800	588,324	590,327
Receipts from national endowment indigenous forests (included in above)	46,654	47,426	47,157	37,366

* Amount accrued in period, £16,023, has subsequently been paid.

APPENDIX VII
SAWMILLING AND SASH AND DOOR MANUFACTURING, 1945-46

Provincial District.	Number of Mills or Establishments.	Character of Organization.						Persons engaged in connection with													
		Individual.	Partnership.	Registered Company.		Co-operative and Miscellaneous.	Government.	Proprietors actively engaged.	Managers, Overseers, &c.	Felling, Hauling, &c.			Total.	Production of Sawm Timber from Logs.							
				Public.	Private.					Accountants, Clerks, &c.	Wage-earners.	Contract.		Proprietors actively engaged.	Managers, Overseers, &c.	Accountants, Clerks, &c.	Wage-earners.	Contract.	Total.		
																			M.	M.	M.
Auckland ..	165	32	30	30	70	1	2	22	46	5	721	107	901	53	101	64	29	1,449	7	1,674	29
Hawke's Bay ..	21	2	3	3	13	..	..	..	6	..	44	20	70	2	11	6	..	103	..	122	..
Taranaki ..	23	6	..	3	13	1	..	1	1	..	114	30	146	2	10	3	3	150	..	165	3
Wellington ..	59	2	4	6	41	..	..	3	14	1	269	10	297	10	32	15	10	340	1	398	10
Marlborough ..	10	5	3	..	2	..	..	3	1	1	9	2	13	8	1	1	2	18	..	28	2
Nelson ..	58	11	13	2	32	..	..	15	6	..	237	2	260	21	22	5	2	213	1	262	2
Westland ..	33	3	3	1	26	..	..	3	11	2	280	23	319	4	20	13	1	313	6	356	1
Canterbury ..	42	14	7	2	19	..	..	6	4	..	27	30	67	18	10	4	2	157	4	193	2
Otago—																					
Otago portion ..	24	5	3	4	11	1	..	2	6	..	57	..	65	9	7	3	1	89	..	108	1
Southland portion	34	3	6	..	25	..	..	7	10	1	166	15	199	8	18	11	5	241	..	278	5
Totals, 1945-46	469	89	72	51	252	3	2	62	105	10	1,924	239	2,340	135	232	125	55	3,073	19	3,584	55
„ 1944-45	447	80	60	53	249	3	2	49	99	11	2,034	176	2,369	108	212	123	57	2,893	72	3,408	57
„ 1943-44	453	81	72	51	244	3	2	66	103	9	1,947	174	2,299	97	235	119	60	2,999	93	3,543	60

Provincial District.	Persons engaged in connection with																Salaries and Wages paid to Persons engaged in connection with								
	Resawing, Dressing, &c.								Total.								Felling, Hauling, &c.	Production of Sawn Timber from Logs.	Resawing, Dressing, &c.				Total.		
	Proprietors actively engaged.	Managers, Overseers, &c.	Accountants, Clerks, &c.	Wage-earners.	Contract.	Total.	Proprietors actively engaged.	Managers, Overseers, &c.	Accountants, Clerks, &c.	Wage-earners.	Contract.	Total.	Felling, Hauling, &c.	Production of Sawn Timber from Logs.	Resawing, Dressing, &c.	Total.									
M.	M.	M.	F.	M.	F.	M.	M.	F.	M.	M.	M.	F.	M.	F.	M.	M.	F.	M.	M.	F.	M.	F.	M.	F.	
Auckland ..	4	49	50	32	642	30	2	747	62	79	196	119	61	2,812	30	116	3,322	91	£ 366,911	£ 615,552	£ 5,433	£ 272,492	£ 11,658	£ 1,254,955	£ 17,091
Hawke's Bay ..	1	3	5	1	55	..	..	64	1	3	20	11	1	202	..	20	256	1	27,227	45,116	..	20,349	98	92,692	98
Taranaki ..	1	6	4	8	101	..	..	112	8	4	17	7	11	365	..	30	423	11	57,133	61,943	218	38,264	1,377	157,340	1,595
Wellington ..	4	20	15	12	244	..	..	283	12	17	66	31	22	853	..	11	978	22	119,372	148,533	1,567	93,310	2,273	361,215	3,840
Marlborough ..	..	3	..	1	12	..	..	15	1	11	5	2	3	39	..	2	59	3	4,889	9,289	250	4,724	100	18,902	350
Nelson ..	..	8	4	2	80	3	1	93	5	36	36	9	4	530	3	4	615	7	104,179	98,540	478	28,804	580	231,523	1,058
Westland ..	..	1	..	2	7	1	..	8	3	7	32	15	3	600	1	29	683	4	134,527	143,263	306	2,539	431	280,329	737
Canterbury ..	5	14	19	7	228	..	..	266	7	29	28	23	9	412	..	34	526	9	25,264	67,724	234	88,979	1,342	181,967	1,576
Otago—																									
Otago portion ..	..	10	8	7	134	1	..	152	8	11	23	11	8	280	1	..	325	9	23,928	39,755	45	48,081	1,377	111,764	1,422
Southland portion	1	4	2	2	42	..	..	49	2	16	32	14	7	449	..	15	526	7	74,920	93,790	712	16,194	215	184,904	927
Totals, 1945-46	16	118	107	74	1,545	35	3	1,789	109	213	455	242	129	6,542	35	261	7,713	164	938,350	1,323,505	9,243	613,736	19,451	2,875,591	28,694
„ 1944-45	12	131	88	77	1,582	40	1	1,814	117	169	442	222	134	6,509	40	249	7,591	174	878,562	1,176,457	8,246	588,999	18,763	2,644,018	27,009
„ 1943-44	15	123	89	81	1,566	25	5	1,798	106	178	461	217	141	6,512	25	272	7,640	166	826,268	1,177,697	8,402	575,988	17,185	2,579,953	25,587

APPENDIX VII—continued
SAWMILLING AND SASH AND DOOR MANUFACTURING, 1945-46—continued

Provincial District.	Expenses of Operation, other than Salaries and Wages and Cost of Materials.																					Cost of Materials used or operated upon.						
	Production of Logs at Mill.							Production of Sawn Timber from Logs.							Resawing, Dressing, and Manufacturing from Sawn Timber.							Stampage.	Logs purchased.	Rough-sawn Timber purchased and other Materials.	Total.			
	Rent.	Cost of Power.	Fire and Accident Insurance (Premiums).	Depreciation.	Repairs.	Other Expenses.	Total.	Rent.	Cost of Power.	Fire and Accident Insurance (Premiums).	Depreciation.	Repairs.	Other Expenses.	Total.	Rent.	Cost of Power.	Fire and Accident Insurance (Premiums).	Depreciation.	Repairs.	Other Expenses.	Total.							
	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£
Auckland ..	878	54,679	18,297	46,010	125,656	34,376	279,896	4,547	21,956	32,877	45,767	96,737	65,087	266,971	5,433	13,409	18,303	24,376	39,802	33,693	135,016	210,290	342,467	1,116,917	1,669,674			
Hawke's Bay ..	5	3,160	1,483	1,296	3,417	618	9,979	86	945	2,828	2,093	5,465	7,329	18,746	181	740	1,272	898	2,482	1,367	6,940	14,655	9,024	79,297	102,976			
Taranaki ..	45	5,863	2,264	8,562	9,868	989	27,391	284	2,165	3,232	2,749	7,831	5,191	21,452	410	1,450	1,560	1,745	2,180	1,914	9,259	14,645	23,228	48,841	86,711			
Wellington ..	245	9,598	5,487	9,649	31,478	7,115	63,602	924	5,743	8,619	7,024	23,333	10,689	56,332	1,210	3,667	4,784	5,523	7,425	7,588	30,197	53,182	33,869	351,631	438,682			
Marlborough ..	..	1,282	232	962	845	227	3,548	24	1,166	610	749	1,080	457	4,086	..	492	374	380	333	837	2,416	3,288	5,852	11,223	20,363			
Nelson ..	256	7,265	4,154	7,122	17,606	2,929	39,332	1,581	4,627	4,729	6,670	14,616	3,890	36,113	508	1,242	844	1,425	1,862	1,802	7,683	23,777	4,164	106,150	134,091			
Westland ..	1,032	8,491	6,085	5,722	20,211	7,389	49,130	1,170	5,255	7,790	6,752	20,306	8,512	49,785	95	197	133	524	279	158	1,386	34,516	2,782	12,608	49,906			
Canterbury ..	10	3,261	1,387	1,147	2,063	1,433	14,304	630	5,359	3,182	2,802	6,980	6,044	24,997	968	3,403	4,968	4,976	8,852	5,671	28,838	16,186	53,428	249,151	318,765			
Otago—																												
Otago portion ..	29	1,783	1,251	878	6,542	1,348	11,831	255	1,235	2,130	1,513	6,256	3,319	14,708	2,050	2,482	2,323	2,983	3,595	5,991	19,424	8,204	9,617	149,708	167,529			
Southland portion	104	3,970	3,654	4,232	12,684	5,906	30,550	420	619	4,226	4,044	11,252	4,852	25,413	145	1,104	1,516	1,846	2,886	903	8,400	26,085	4,147	68,911	99,143			
Totals, 1945-46	2,604	104,355	44,294	85,580	230,370	62,560	529,763	9,921	49,070	70,223	80,163	193,856	115,370	518,603	11,060	28,186	36,077	44,676	69,696	59,924	249,559	404,828	488,578	2,194,437	3,087,843			
" 1944-45	2,549	85,601	39,093	85,410	191,841	88,625	503,119	8,892	40,637	60,700	70,269	171,928	92,592	445,018	11,243	26,937	31,712	35,907	64,546	54,548	224,893	384,838	366,500	2,021,378	2,772,716			
" 1943-44	2,946	72,566	39,858	81,703	183,583	91,886	472,542	9,908	39,187	61,444	65,644	153,585	109,692	439,460	12,054	26,294	32,994	33,864	58,611	55,556	219,373	368,006	403,964	2,010,628	2,782,598			

Provincial District.	Total Costs of Operation (including Salaries and Wages).					Products.													
	Felling, Hauling, and Delivering Logs at Mill.	Production of Sawn Timber from Logs.	Resawing, Dressing, and Manufacturing from Sawn Timber.	Total.	Log Sawmill Products.					Resawing and Planing-mill Products.								Total Value of all Products	
					Rough-sawn Timber.		*Other Products.	Total.	Planed Flooring, Skirting, Moulding, &c.		Sashes and Doors.	Joinery.	Butter-boxes.	Cheese-crates.	Fruit-cases.	Other Products.	Total.		
					Quantity.	Value.			Quantity.	Value.									
	£	£	£	£	Ft. B.M.	£	£	£	Ft. B.M.	£	£	£	£	£	£	£	£	£	
Auckland	959,404	1,128,436	1,535,763	3,623,603	151,548,223	2,103,549	116,156	2,219,705	28,246,044	839,888	144,522	162,905	89,883	78,207	46,232	301,143	1,653,780	3,873,485	
Hawke's Bay	54,958	69,789	106,684	231,431	11,842,356	143,967	1,642	145,609	1,963,391	46,870	4,271	2,562	..	7,432	35,800	15,016	111,951	257,560	
Taranaki	105,778	100,437	97,741	303,951	18,287,052	227,528	683	228,211	1,663,026	36,880	12,464	29,239	..	21,447	..	17,932	117,962	346,173	
Wellington	243,632	232,825	477,411	953,868	35,805,233	469,323	26,967	496,290	11,535,307	288,104	18,434	40,100	17,092	50,530	501	87,419	502,180	998,470	
Marlborough	13,370	17,832	18,463	49,665	2,055,297	27,553	3,321	30,874	93,415	3,333	2,226	4,330	..	..	10,488	..	20,377	51,251	
Nelson	170,287	136,296	143,217	449,800	29,019,485	323,954	2,832	326,786	636,026	13,569	475	14,819	5,439	2,142	83,805	28,427	148,676	475,462	
Westland	216,794	197,515	16,961	431,273	43,794,531	477,685	1,779	479,464	742,512	12,459	..	..	3,014	76	..	281	15,830	495,294	
Canterbury	59,470	142,667	368,310	570,447	19,290,022	217,662	3,927	221,589	7,735,580	198,797	12,881	58,469	4,161	3,570	42,218	85,779	405,875	627,464	
Otago—																			
Otago portion ..	42,763	65,325	218,590	326,678	10,433,081	123,665	452	124,117	5,370,632	142,831	29,324	21,118	..	3,931	11,766	22,978	231,948	356,065	
Southland portion	132,878	122,739	93,720	349,337	22,647,809	274,188	208	274,396	1,766,186	36,566	..	..	245	11,326	2,612	55,347	106,096	380,492	
Totals, 1945-46 ..	1,999,329	2,213,861	3,076,863	7,290,053	344,723,089	4,389,074	157,967	4,547,041	59,752,119	1,610,297	224,597	333,542	*119,834	*178,661	*233,422	614,322	3,314,675	7,861,716	
„ 1944-45	1,841,592	1,921,291	2,853,890	6,616,773	340,133,099	3,801,199	163,503	3,964,702	52,267,036	1,375,505	174,607	307,189	154,494	147,506	206,372	663,119	3,028,792	6,993,494	
„ 1943-44	1,709,299	1,987,046	2,823,174	6,519,513	350,747,629	3,810,083	155,857	3,965,942	57,973,145	1,293,909	161,184	271,392	217,138	125,404	171,825	728,908	2,969,760	6,935,702	

* Butter-boxes made numbered 1,172,819; cheese-crates, 1,088,982; fruit-cases, 4,297,965.

† Laths, posts, waste products, etc.

APPENDIX VII—continued

SAWMILLING AND SASH AND DOOR MANUFACTURING, 1945-46—continued

Provincial District.	Motive Power used for															Approximate Value.															
	Hauling and Delivering.					Production of Sawn Timber from Logs.					Resawing, Dressing, and Manufacturing from Sawn Timber.					Sawmill.					Planing and Resawing Mill.				Total Value.						
	Kind of Engine.					Kind of Engine.					Kind of Engine.					Land and Buildings.	Tram-ways and Tram Plant.	Logging and Hauling Equipment.	Other Machinery	Total.	Land and Buildings.	Tram-ways.	Other Machinery	Total.							
	Steam.	Gas.	Petrol and Light Oil.	Oil (Heavy).	Electric.	Water.	Total.	Total Horse-power available.	Steam.	Gas.	Petrol and Light Oil.	Oil (Heavy).	Electric.	Water.	Total.											Total Horse-power available.	Steam.	Gas.	Petrol and Light Oil.	Oil (Heavy).	Electric.
Auckland ..	64	142	77	1	284	11,260	101	38	21	283	2	445	12,736	10	1	2	628	641	7,122	336,904	99,815	261,075	351,036	1,048,830	279,256	20	236,728	516,004	1,564,834		
Hawke's Bay ..	6	16	7	29	719	7	2	31	836	3	1	53	57	563	19,581	1,345	12,912	15,084	48,922	11,983	850	10,205	23,038	71,960							
Taranaki ..	14	13	8	35	942	18	3	31	1,215	2	1	101	107	874	14,697	24,522	13,084	19,522	71,825	13,201	16,086	29,287	101,112								
Wellington ..	32	51	28	114	3,258	25	17	7	47	98	2,280	7	220	229	2,597	41,745	27,417	67,585	62,978	199,725	52,085	49	57,468	109,602	309,327						
Marlborough ..	1	12	2	15	397	4	4	1	13	351	24	24	130	3,019	100	3,034	7,763	13,916	5,100	20	4,450	9,570	23,486								
Nelson ..	40	71	9	122	3,848	35	1	6	8	39	2	91	2,863	3	57	1	61	527	36,159	31,466	49,917	62,030	179,572	14,282	9,910	24,192	203,764				
Westland ..	56	52	3	116	2,656	27	5	9	27	68	2,359	1	4	6	104	43,698	57,513	31,722	39,217	172,150	1,234	1,491	2,725	174,875							
Canterbury ..	8	30	1	47	894	6	10	1	55	72	1,429	4	258	262	2,127	18,911	25	11,881	18,675	49,492	45,285	30,277	75,562	125,054							
Otago—																															
Otago portion ..	13	12	25	472	13	14	27	577	2	105	107	1,111	7,654	2,406	8,110	10,103	28,273	27,672	22,521	50,193	78,466										
Southland portion ..	36	24	62	1,022	31	5	36	597	5	2	33	40	562	19,560	19,794	15,270	24,222	78,846	7,761	649	11,365	19,775	98,621								
Totals—																															
1945-46 ..	270	423	137	17	2	849	25,408	267	1	85	55	524	6	938	25,243	37	5	5	1486	11534	15,717	541,928	264,403	474,590	610,630	1,891,551	457,859	1,588	400,501	859,948	2,751,499
1944-45 ..	283	392	119	11	3	808	24,026	257	1	77	59	432	5	831	23,578	42	13	3	1404	11463	15,354	465,564	333,282	432,173	613,235	1,844,254	428,054	1,566	386,097	815,717	2,659,971
1943-44 ..	296	2308	101	19	3	729	21,091	262	4	86	52	423	3	830	22,390	47	13	2	1255	21319	14,572	410,698	348,472	377,395	517,076	1,653,641	372,321	963	315,663	688,952	2,342,593

Provincial District.	Number of Log-sawmills.	Approximate Sawm Output of various Kinds of Timber at Log-sawmills during the Year 1945-46.												Total.	Average Mill Output.	Maximum Daily Capacity of Mills (8 Hours).	Area Cut.
		Kauri.	Rimu.	Kahikatea.	Matai.	Totara.	Beech.	Tawa.	Miro.	Insignis Pine.	Other and Unspecified.						
		Ft. B.M.	Ft. B.M.	Ft. B.M.	Ft. B.M.	Ft. B.M.	Ft. B.M.	Ft. B.M.	Ft. B.M.	Ft. B.M.	Ft. B.M.	Ft. B.M.	Ft. B.M.	Ft. B.M.	Ft. B.M.	Ft. B.M.	
Auckland ..	134	2,801,391	68,346,120	7,312,828	9,762,973	7,343,439	375,980	5,285,312	386,982	47,537,634	2,395,564	151,548,223	1,130,957	992,851	12,074		
Hawke's Bay ..	15	5,201,428	710,822	9,695	178,074	4,820	30,467	149,635	4,081,399	105,630	18,287,052	1,142,941	85,466	959			
Taranaki ..	16	9,364,706	1,293,756	1,802,154	1,454,485	11,267	281,156	7,721,851	430,792	35,805,233	832,680	211,300	3,658				
Wellington ..	43	18,251,064	1,459,641	5,478,096	1,584,677	586,689	11,267	281,156	7,721,851	430,792	35,805,233	832,680	211,300	3,658			
Marlborough ..	10	656,181	43,207	20,425	51,618	27,699	49	1,170,371	85,747	2,055,297	205,530	18,200	55				
Nelson ..	56	17,498,103	990,245	259,745	12,234	2,872,105	11,924	7,322,373	52,756	29,019,485	518,205	254,995	2,563				
Westland ..	32	38,789,561	4,713,024	191,909	11,075	83,972	4,990	43,794,531	1,368,579	260,800	2,664						
Canterbury ..	26	..	..	..	..	..	..	18,249,541	1,040,481	19,290,022	741,924	107,500	247				
Otago—																	
Otago portion ..	16	5,419,198	2,773	16,910	3,130	923,216	..	3,767,657	300,197	10,433,081	652,068	56,400	366				
Southland portion ..	31	11,598,710	516,764	56,434	90,957	7,070,308	..	9,743	3,303,827	1,066	22,647,809	730,575	130,056	1,140			
Totals, 1945-46 ..	379	2,801,391	175,125,071	17,043,060	18,834,568	10,561,310	12,122,863	5,327,046	839,489	96,819,028	5,249,263	344,723,089	909,560	2,191,568	24,224		
„ 1944-45 ..	357	2,877,669	181,931,369	17,990,073	19,180,641	11,252,614	11,074,170	4,135,508	849,511	85,713,439	5,128,105	340,133,099	952,754	2,037,602	29,498		
„ 1943-44 ..	361	4,308,495	190,316,027	20,930,928	18,372,976	11,161,056	12,333,193	2,801,404	1,270,943	83,229,174	6,023,433	350,747,629	971,600	1,969,110	28,707		

* Details for 1945-46 include eucalypts, 2,170,895 ft. b.m.; poplar, 1,043,664 ft. b.m.; taraire, 434,558 ft. b.m.; rata, 340,664 ft. b.m.; macrocarpa, 267,397 ft. b.m.; mangeo, 202,222 ft. b.m.; pukatea, 154,014 ft. b.m.; rewarewa 113,274 ft. b.m.; tanekaha, 75,163 ft. b.m.; hinau, 35,664 ft. b.m.; other and unspecified, 409,748 ft. b.m.

APPENDIX VIII

SAWMILLS REGISTERED UNDER THE SAWMILL REGISTRATION REGULATIONS 1942

Conservancy.	Number of Sawmills registered as at 31st March, 1947.	Sawmills cutting mainly Indigenous Timber.	Sawmills cutting mainly Exotic Timber.
Auckland	133	92	41
Rotorua	72	53	19
Wellington	89	49	40
Nelson	72	50	22
Westland	54	54	..
Canterbury	44	4	40
Southland	63	49	14
Totals	527	351	176

APPENDIX IX

FOREST OFFENCES, 1946-47

Offence.	Law under which Proceedings were taken.	Number of Convictions.	Fines.	Costs and Damages.
Presenting firearm ..	Section 13, Firearms Act, 1920	1	£ s. d.	£ s. d.
Threatening to intimidate forest officer	Section 41 (a), Forests Act, 1921-22	2	..	0 10 0
Unlawful cutting and removal of forest	Section 43, Forests Act, 1921-22	9	5 0 0	159 1 3
Lighting fire without lawful authority in State forest	Section 44 (1) (a), Forests Act, 1921-22	11	45 0 0	181 11 0
Lighting fire in a fire district, contrary to the provisions of the Act	Section 44 (1) (c), Forests Act, 1921-22	12	32 10 0	46 8 8
Hunting in State forest un- lawfully	Section 47 (a), Forests Act, 1921-22	5	8 0 0	10 11 6
Negligent failure to extinguish lighted cigarette dropped within a fire district	Regulation 10 (1), Forest (Fire-prevention) Regula- tions 1940	1	..	14 9 0
Operating engine without efficient spark-arrester	Regulation 6 (1), Forest (Fire- prevention) Regulations 1940, as amended by Amendment No. 1	1	17 10 0	14 1 0
Fire set in terms of permit left unattended	Regulation 11 (2), Forest (Fire-prevention) Regula- tions 1940, as amended by Amendment No. 1	1	2 0 0	2 9 6
Unlawfully entering State forest	Regulation 12, Forest (Fire- prevention) Regulations 1940, as amended by Amendment No. 1	6	15 0 0	12 13 0
Totals	..	49	125 0 0	442 14 11

APPENDIX X LOCALITIES OF MANAGED FORESTS

North Island.		South Island.	
Name of Forest.	Locality.	Name of Forest.	Locality.
Mangonui ..	North Auckland.	Golden Downs ..	Nelson.
Herekino ..	"	Moutere Hills ..	"
Warawara ..	"	Pelorus ..	Marlborough.
Waitangi ..	"	Seddonville ..	Westport.
Omahuta ..	"	Te Kuha ..	"
Puketī ..	"	Tawhai ..	Reefton-Grey.
Russell ..	"	Hukawai ..	"
Waipoua ..	"	Granville ..	Westland.
Pūhipūhi ..	"	Rimu ..	"
Glenbervie ..	"	Lake Ianthe ..	"
Great Barrier ..	Auckland.	Hamner ..	North Canterbury.
Riverhead ..	"	Balmoral ..	"
Maramarua ..	North Waikato.	Ashley ..	"
Whangapoua ..	Coromandel Peninsula.	Eyrewell ..	"
Tairua ..	"	Oxford ..	"
Kauaeranga ..	Thames.	Herbert ..	North Otago.
Katikati ..	Bay of Plenty.	Naseby ..	Central Otago.
Rotoehu ..	"	Allanton ..	Otago.
Pūreora ..	Main Trunk - Taumarunui.	Berwick ..	"
Whakarewarewa ..	Rotorua.	Akatore ..	"
Waiotapu ..	"	Milton Nursery ..	"
Kaingaroa ..	Rotorua-Taupo.	Conical Hill ..	Tapanui-Otago.
Whirinaki ..	Te Whaiti - Urewera.	Dusky ..	"
Tongariro ..	Main Trunk - National Park.	Crookston ..	"
Rangataua ..	Main Trunk - Ohakune.	Blue Mountains ..	"
Karioi ..	"	Tapanui ..	"
(Unnamed) ..	Gisborne.	Pebbly Hills ..	Hedgehope-Southland.
(Unnamed) ..	Taranaki.	Longwood ..	Southland.
Gwavas ..	Hawke's Bay.	Lillburn-Alton ..	"
Ngāumu ..	Wairarapa.		

APPENDIX XI

TRAINING AND RECRUITMENT 1946-47

Course.			Number attended.	Examination Results.			Number of New Appointments made.	
Name.	Serial No.	Period.		Number passed.	Number failed.	Number on Staff who passed.	Ex- servicemen.	Others.
ROTORUA FOREST TRAINING CENTRE								
Timber-measurers	8	2 months	14*	12	1	7	3	2
Working plans ..	9	2 weeks	21†	..	..	..	..	..
Cruising methods	10	2 weeks	14†	..	..	..	..	..
Forest survey-party leaders	11	2 weeks	12†	..	..	..	..	..
Forest foremen ..	12	6 weeks	15	8	7	2	6	..
Fire-protection ..	13	2 weeks	14†	..	..	..	..	..
Clerical officers ..	14	3 weeks	15†	..	..	..	..	..
Timber-measurers	15	8 weeks	14	‡	‡	‡	..	..
Leading hands ..	N1	6 weeks	30	15	15	N.A.	N.A.	N.A.
Trainee, prelimi- nary	N2	6 weeks	29	16	13	N.A.	N.A.	N.A.
Leading hands ..	N3	6 weeks	30	15	15	N.A.	N.A.	N.A.
Professional trainees	N4	2 weeks	14†	..	..	..	..	..
Leading hands ..	N5	6 weeks	17§	5	7	N.A.	N.A.	N.A.
Tool-maintenance (continuous)	..	Until proficient	4	..	..	..	..	..
TAPANUI FOREST VOCATIONAL SCHOOL								
Leading hands ..	S3	6 weeks	20	11	3	N.A.	N.A.	N.A.
Trainee, prelimi- nary	S4	6 weeks	19	9	10	9	N.A.	N.A.
Leading hands ..	S5	6 weeks	19	19	..	N.A.	N.A.	N.A.
Professional trainees	S6	3 weeks	14	..	..	..	..	..
Leading hands ..	S7	6 weeks	17	13	4	N.A.	N.A.	N.A.

* One man did not sit examination. † Non-competitive. ‡ In progress. § Five did not sit examination.
 || Five were for experience only; 1 did not sit the examination. N.A. = not applicable.

GLOSSARY

1. INDIGENOUS

(a) *Softwoods*—

- Kahikatea or white-pine (*Podocarpus dacrydioides*).
 Kaikawaka (*Libocedrus bidwillii*).
 Kauri (*Agathis australis*).
 Matai (*Podocarpus spicatus*).
 Miro (*Podocarpus ferrugineus*).
 Rimu (*Dacrydium cupressinum*).
 Tanekaha (*Phyllocladus trichomanoides*).
 Toatoa (*Phyllocadus glaucus*).
 Totara (*Podocarpus totara* and *P. hallii*).

(b) *Hardwoods*—

- Beech (*Nothofagus* spp.).
 Hinau (*Elacarpus dentatus*).
 Mangeo (*Litsea calicaris*).
 Manuka (*Leptospermum* spp.).
 Pukatea (*Laurelia novae-zealandiae*).
 Rata (*Metrosideros* spp.).
 Red beech (*Nothofagus fusca*).
 Rewarewa (*Knightia excelsa*).
 Silver beech (*Nothofagus menziesii*).
 Silver-pine (*Dacrydium colensoi*).
 Taraire (*Beilschmiedia taraire*).
 Tawa (*Beilschmiedia tawa*).

2. EXOTIC

(a) *Softwoods*—

- Corsican pine (*Pinus laricio*).
 Douglas fir (*Pseudotsuga taxifolia*).
 Hoop pine (*Araucaria cunninghamii*).
 Insignis pine (*Pinus radiata*).
 Larch (*Larix decidua*).
 Loblolly pine (*Pinus taeda*).
 Macrocarpa, or Macrocarpa cypress (*Cupressus macrocarpa*).
 Ponderosa pine (*Pinus ponderosa*).
 Redwood (*Sequoia sempervirens*).
 Slash pine (*Pinus caribaea*).
 Western red cedar (*Thuja plicata*).

(b) *Hardwoods*—

- Australian hardwoods, principally *Eucalyptus* spp.
 Eucalyptus (*Eucalyptus* spp.).
 Poplar (*Populus* spp.).
 Teak (*Tectona grandis*).
 Turpentine (*Syncarpia laurifolia*).

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