

1964

QUEENSLAND

ANNUAL REPORT

OF THE

DEPARTMENT OF FORESTRY

FOR THE

YEAR 1963-64

PRESENTED TO PARLIAMENT BY COMMAND

BRISBANE:

BY AUTHORITY: S. G. REID, GOVERNMENT PRINTER

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LOGS FROM THE REMNANTS OF THE NATURAL STANDS OF HOOP PINE



SOME OF THE INCREASING YIELD OF HOOP PINE FROM PLANTATIONS
For the first time the Hoop Pine cut from plantations exceeded the cut from natural grown stands in 1963-64

REPORT OF THE CONSERVATOR OF FORESTS

For the Year ended 30th June, 1964

INTRODUCTION

On January 17th, 1964, Mr. V. Grenning, who had been in charge of the Department since October 1st, 1932, retired. Appreciation of his services to forestry in Queensland are expressed elsewhere in this report—but it is pointed out that any tribute paid would be inadequate to his outstanding achievement.

A very significant event in the year 1963-64, was the preliminary work towards the formation of the Australian Forestry Council, on which the Ministers in charge of Forestry in the various States and the Commonwealth will meet in consultation on forestry matters of National importance. The need for a top level Council on forestry has been long felt. Adequate recognition of the national importance of forestry has not been achieved in the past, nor has there been sufficient support for, and co-ordination of, forestry activities. The Australian Forestry Council should prove an effective step in that direction. It is essential that forestry should develop policies aiming at the overall attainment of adequate supplies of forest products for Australia. Furthermore, the indirect values of forests in watershed protection and control of run-off should be recognized and co-ordinated.

The build-up in the area of the National Parks continued during the year, and it is pleasing to record the 1,000,000 acre mark in National Park reservations has now been exceeded. This is certainly a milestone in National Park history in Queensland but it is clear that if the Parks are to properly fulfil one of their functions in the preservation of representative and adequate portions of the major biotypes of scientific interest, a substantial further increase in the area of National Parks is desirable. To secure a cross section of the opinions of those bodies interested in this type of conservation, both scientific and otherwise, the views of representative bodies and individual authorities were sought during the year. These views will be analysed with the object of initiating any further action that may appear necessary.

Some indication of the increasing part that plantation produced timber is playing in the timber economy of the State is gained by the fact that in 1963-64, the cut of Hoop Pine grown in plantations exceeded the cut of the Natural-grown Hoop Pine for the first time. With an ever increasing cut from plantations expected the proportionate supply of Hoop Pine, which is a high quality softwood, will be more and more from plantations. However the fact that Queensland pays an annual bill of some £10,000,000 for forest products imported into the State, and that Australian imports from overseas total in excess of £80,000,000 annually, cannot be lightly regarded. At the present rate of forestry activity in this State a substantial deficit between the future needs of the State and the local production of forest products is inevitable. Recent investigation of the land available and suitable for the establishment of softwood plantations reveals that the present rate of planting could be safely doubled. It is considered that the immediate objective should be the increase of present rate of plantation establishment by at least 50 per cent. Such action, properly planned, will ensure that within the next 20 years Queensland will have the opportunity of securing the establishment of a major paper pulp industry. This would have a decided beneficial effect on the economy of Queensland, and would effect a reduction in the expenditure by the State in the import of forest products. In this direction it is of some significance to report that the Australian Paper Manufacturers Ltd. have commenced utilising, in a small way, the early thinnings from the Beerburum plantations for the manufacture of pulp.

With the increasing usage of plantation grown timber there is a vital need for investigation to establish proper grading of the product to meet the uses to which the timber is to be put. It is essential at this stage that both incorrect grading and incorrect use should be avoided. The section of the timber industry that has established sawmills for the operation of plantation timber has readily recognized this aspect and is fully co-operating with officers of the Department in the drawing up of sound grading rules. During the year a number of well attended schools dealing with the grading of plantation timber were conducted.

The Department, with the object of encouraging the most efficient use of timber, has continued its efforts to promote co-operation both with other Government Departments that use

large quantities of timber and with the Sawmilling Industry, which converts into sawn product most of the output of the forests.

Queensland is deficient in its timber resources. Any inefficiency in the use of locally produced timber is reflected in increased import, for which Queensland must pay. It is of great importance that the raw material from the forest should be converted without economic waste, and further that the sawn product should be used to best advantage. It is unnecessarily extravagant to discard timber showing blemishes such as knots and gum veins that affect appearance only when the timber is for use in situations where good appearance is not essential; such as covered floors, painted surfaces and structural members covered by sheeting. Under no circumstances should timber be used that is not of adequate quality for the required purpose, but at present the standards generally applied in Queensland are wastefully high. If this aspect is borne in mind by the architect, the building authorities and the finance providers on the one hand, and if on the other hand the sawmiller produces properly graded timber, true to specification, efficiency in the use of a limited timber resource would be promoted, and the overall cost of timber to the community would be decreased. The fact is not generally realised that the users of timber, by sound and sensible specification in regard to timber use, can have a profound effect on the timber industry. It is also not generally realised that the Forestry Department is prepared to provide technical advice on the use of timber to any enquirers.

The need for the permanent reservation as State Forest of much of the remnant areas of the North Queensland rain forests has frequently been stressed by the Department. During the year under report, substantial progress was made in that direction, and at the end of the year action was current for the permanent reservation of large additional areas. These actions will have a decided bearing on the future of the timber industry in North Queensland, which is the home of many outstandingly beautiful and useful timbers.

In his Annual Report for 1962-63, the former Conservator, Mr. V. Grenning drew attention to the unsatisfactory nature of the accommodation available to the Head Office of the Department. I regret to report that despite follow up action no improvement in this direction has been achieved. The views expressed in the 1962-63 report concerning the excellent work done by officers of the Department under such working conditions are re-iterated. The Forestry Department has a great deal of contact, frequently of a business nature, with the public, not only from within the State but also from other States and Overseas. The unfavourable contrast with the offices of other Forestry Departments and other Departments is frequently a subject of comment. The matter is being pursued, and it is hoped that something tangible will result in the not far distant future.

During the year efforts were made to reduce the lag of timber valuations on areas that are the subject of freeholding applications. The number of camps engaged full time on this work was more than doubled, despite the difficulty of securing suitable staffing for the new camps. In addition, to speed up the calculations, the Department has enlisted the services of a digital computer. This step up of activities has had some effect in reducing the leeway, but at the end of the year there were still some 2,000,000 acres, subject of freeholding applications, on which timber valuations were not complete. At the end of the year the valuations were steadily overtaking the applications, but any sudden upsurge in applications for freeholding could again cause a critical position. At the end of 1963-64, the total expenditure on effecting timber valuations on freeholding areas would have exceeded £100,000. There has been some criticism of the expenditures involved in making valuations on areas where the timber values prove to be insubstantial, but it is pointed out that the Department, which is the authority on timber valuation, is obliged to ensure that both in the interests of the applicant and the Department, the valuations are fair and reasonable.

To the Minister, the Hon. Harold Richter, I desire to express my sincere appreciation of his understanding and help in handling the many complex problems in Forestry administration that arise from time to time.

MANAGEMENT

General

The area of State Forest Reservations increased by 54,176 acres in the period under review. Of this total, 35,895 acres were previously included in Timber Reserves. The total area reserved as State Forest is now 5,528,467 acres, contained in 355 Reserves.

Further progress was made, with officers of the Department of Lands, in the classification of Crown lands suitable for State Forest Reservation, and of sections of reserves of low timber value, for a determination of their best use. As a result 22,831 acres were reserved as State Forest and 67,857 acres of State Forest and Timber Reserve were released. Considerable areas of Cypress Pine forest and of Hardwood forests, suitable for reservation, are currently under discussion.

Expenditure

Nett expenditure under the Reforestation Vote was £1,733,620 compared with £1,864,257 in the previous year, which included special funds for the relief of unemployment. Expenditure on maintenance of capital improvements was from Trust funds and totalled £56,780.

Expenditure is itemised as follows:—

	Expenditure £	Percentage of Total
Plantations	381,322	21.3
Natural regeneration	111,135	6.2
Nursery expenses	47,264	2.6
Research	51,941	2.8
Protection	279,992	15.6
Surveys	34,430	2.0
New construction	86,458	4.8
Maintenance of capital improve- ments	56,779	3.2
Wet time, holidays and leave	188,737	10.5
Supervision, tools, cartage	346,744	19.4
Camping allowance	103,568	5.8
Pay roll tax	31,969	1.8
Workers' compensation	30,339	1.7
Administration	40,167	2.3
Miscellaneous	20,342	1.1
Stores Suspense	Cr.20,787	-1.1
	£1,790,400	100.0

Employment

The number of men engaged on Reforestation work was 1,720 at 30th June, 1963, and 1,256 at the end of June, 1964. The extra staff engaged in the half year ended the 30th June,

1963, was retained as far as possible, attrition being mainly due to men leaving the Department's employment. Funds did not permit the replacement of men who left the job through the year. The average level of employment was 1,413 men on this work, compared with 1,606 in 1962-63. Average annual expenditure per man employed was £1,267 compared with £1,198 in the previous year.

Timber Assessments

The rate of establishment of Inventory Plots in new areas was considerably less than for last year.

Wet weather in North Queensland early in 1964 hindered work, where, however, a third camp is now operating.

Plot establishment in the Cypress Pine areas has been slowed up by the need to divert one camp to freeholding areas and by giving emphasis to re-measuring work.

In the Coastal Hardwood areas, plot establishment was also curtailed so that other survey work could be attended to.

In the Plantations, all major centres have now been covered by plots and subsequent establishment will be to a reduced scale of sampling.

Current totals of areas covered by permanent plots are:—

	Plots	Acres
Cypress Pine, Western Hardwood	9,080	1,610,000
Coastal Hardwood	4,940	580,000
Rain Forest South Queensland	140	20,000
Rain Forest North Queensland	1,290	60,000
Plantations	2,840	40,000
	18,290	2,310,000

In addition strip surveys of some State Forests, Timber Reserves and other Crown land for management and investigation purposes covered 250,000 acres.

Valuation of timber on areas for freeholding

The area covered by applications for conversion to Freehold tenure has been considerable, totalling 3,592,000 acres, to 30th June, 1964.

At the end of last year the Department had two field parties full time and four part time on freeholding areas. Work was also done by one or two man inspections. Towards the close of this financial year there were 7 gangs full time and 3 gangs part time on this work.

The amount of data collected by these gangs has made it essential for mechanical means to be used to process the information.

Increasing use has been made of punch cards and special programmes have been written for the University's computer.

The following progressive figures show the position:—

	As at 30th June, 1962		As at 30th June, 1963		As at 30th June, 1964	
	No.	Area	No.	Area	No.	Area
Total Applications made	388	(Acres) 1,053,000	660	(Acres) 2,472,000	880	(Acres) 3,592,000
Withdrawn before valuation	30	68,000	34	75,000	39	108,000
Requiring valuation	358	985,000	626	2,397,000	841	3,484,000
Valued, including area through Land Court	206	588,000	317	914,000	171	484,000
Through Land Court .. .. .	..	..	..	..	278	1,044,000
Valuation complete .. .. .	..	..	..	..	230	1,096,000
Field assessment complete but not yet valued	59	145,000	42	125,000	162	860,000
To be assessed in field	93	252,000	267	1,358,000	162	860,000
Totals	358	985,000	626	2,397,000	841	3,484,000

While the total area covered by applications has risen by 1,087,000 acres, a further 614,000 acres have been valued (compared with 914,000 acres in the previous 3 years) and the area covered by field work rose by almost 1,000,000 acres.

However, all available staff and facilities for processing data will be fully engaged on this work for some considerable time to come, even if the rate at which applications are made falls off.

Protection

In general the fire season was a repeat of the 1962-3 year though somewhat less severe. Dalby, as in 1962-3, was the hardest hit district, having 42 out of a total of 130 fires for the State.

The most severe fire month was September when 31 fires were fought with a secondary peak in January when 24 fires were suppressed.

Early scrub burns were generally very good and a severe fire season was expected. However early summer rains resulted in a lessening of the fire hazard and less clean late-season scrub burns.

Fire weather developed again in January and February; but the danger was short lived.

Total fire fighting expenditure (including patrol and detention) was £41,576. Direct costs were £7,660. A further £5,537 was spent in early prescribed and protection burning and an area of 138,548 acres was covered.

Expenditure on new fire roads and firebreaks was £100,402 whilst maintenance cost £113,940.

Major causes of fire outbreaks were:—

	Outbreaks
Burning off	24
Lightning	11
Smokers	8
Campfires	6
Miscellaneous known causes	6

A further 75 fires resulted from unknown causes. The number of lightning fires in Dalby District, 8, is notable. Restarts of previous fires numbered 15.

A major new development was the hire of a fire-spotting aircraft in the September-October-November period, on a trial basis. Most of Maryborough district and parts of Gympie district were covered; but due to the lack of severity in the fire season at these centres, the trial was not decisive. Further work will need to be done in this field to assess the worth of spotting aircraft. District Foresters at Dalby and Inglewood also hired aircraft for short periods to assess fire damage and locate fire tower sites.

A 100-foot tall 4-pole tower has been erected at Barakula in the Dalby district. This is 18 feet taller than the next tallest fire tower. Costs are expected to be less than the equivalent in steel. The tower has an unrestricted view of a vast area of country north-west of this important Cypress Pine reserve and should be a great asset to the fire spotting system.

Radio installations are proceeding slowly due to difficulties in obtaining technical staff. A new £4,000 Communication Centre is almost complete in outer Brisbane and this facility should enable all radios to be more swiftly and easily serviced.

In late June, the Fire Protection Officer was sent to U.S.A. and Canada to attend a two months fire control field study under the sponsorship of the Food and Agriculture Organisation.

Industrial Safety

A training programme for supervisory staff has proceeded as far as other duties allowed the training officers. In the first quarter of 1964 the accident frequency rate showed an encouraging drop from 148 to 125 and in the second quarter the rate for the first time dropped below 100 to 99 accidents per million man hours worked.

A further 170 supervisors were trained in 19 different centres throughout the State; and a Job Safety Handbook has been drafted. Printing should take place early in the 1964-5 year.

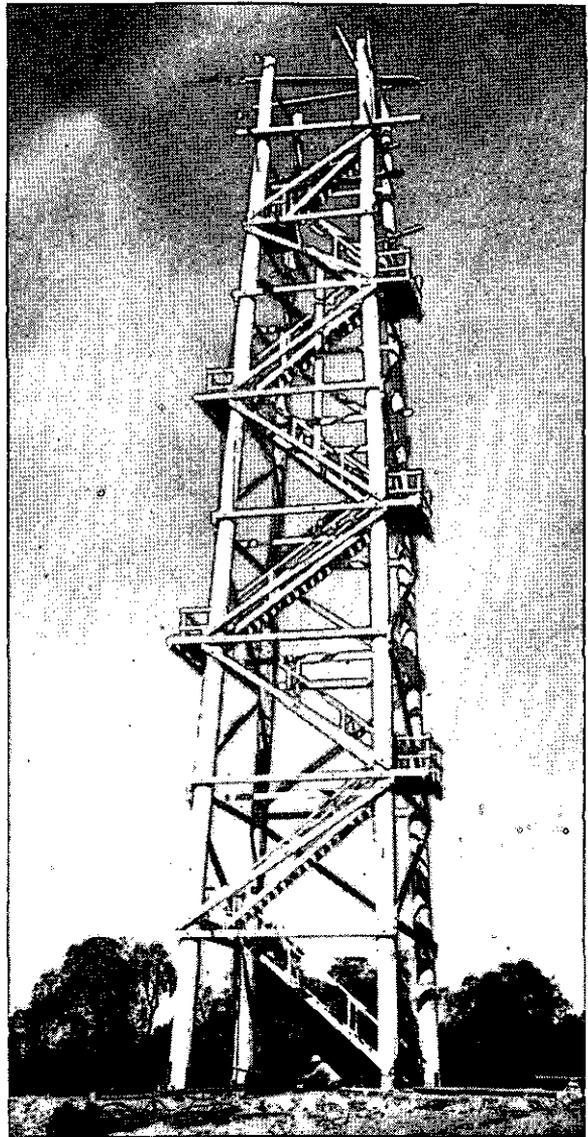
Various items of Safety equipment were given field tests during the year.

MECHANICAL EQUIPMENT

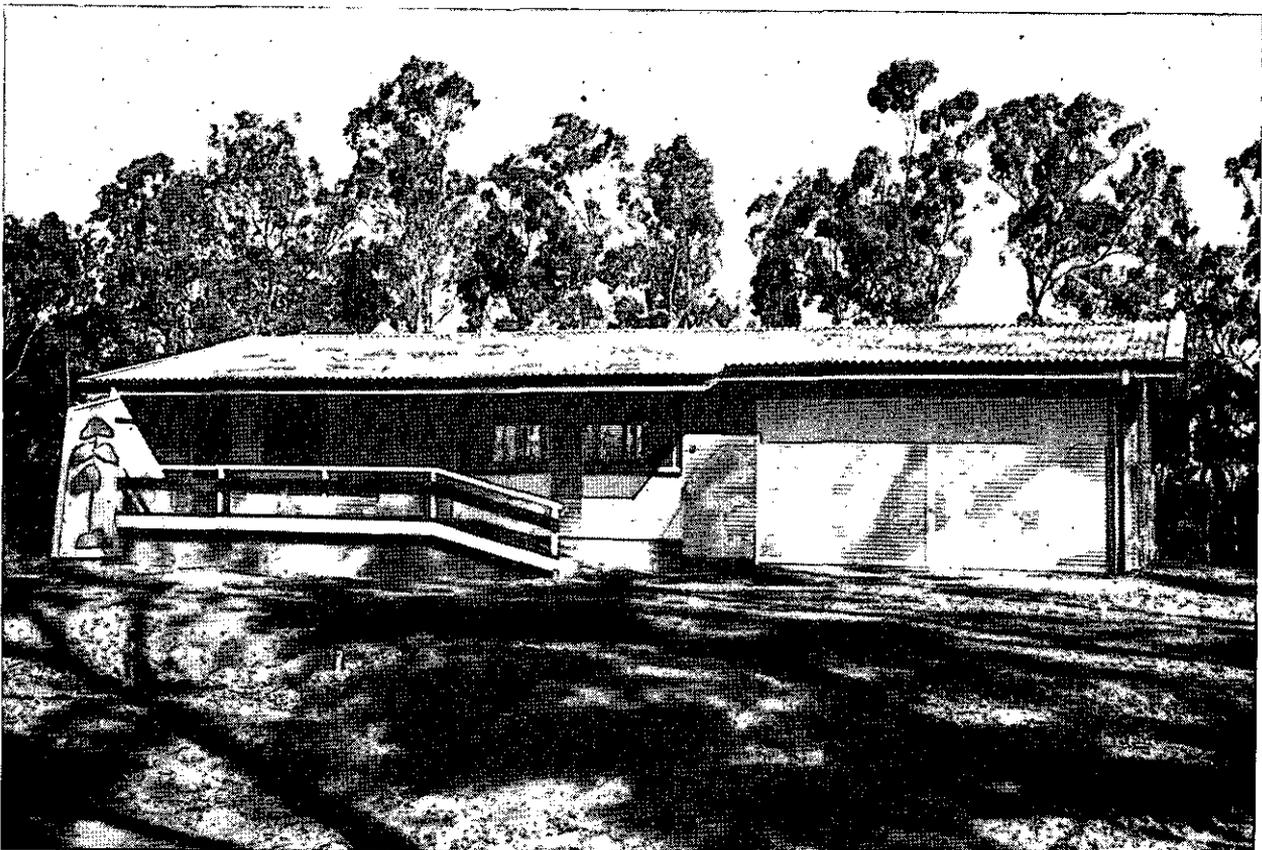
The loan funds available for the purchase of plant were sufficient to enable a heavy replacement programme to be carried out during the year. Some unexpected delays towards the end of the year resulted in the non-delivery of a number of vehicles.

Delays in replacement of uneconomic units can result in unwarranted expenditures on the maintenance of such units in order to keep them operative until they are replaced.

The demand for additional vehicles, mainly for Forest Inventory Surveys and for Freeholding camps has been heavy.



**100-FT. FIRE TOWER UNDER CONSTRUCTION
BARAKULA STATE FOREST**
This is now the tallest fire tower in Queensland



COMMUNICATIONS CENTRE—BUNYA STATE FOREST—ERECTED 1963-64
The nerve centre of radio communication for the Department

The withdrawal of a number of private vehicles from official running and the appointment of field mechanics has also called for additional vehicles.

Investigations into the costs of maintaining roads and firelines have continued and some encouraging results have been obtained.

An initial service school for mechanics and supervisory staff is to be conducted early in the 1964-65 financial year. Subsequent service schools will be required to cover the Department's fleets in order to increase the reliability of the individual units and to generally increase usage rates. Economy of operation is expected to follow.

Some difficulty is being experienced in obtaining suitable tenders for road construction and clearing of plantation sites by machines. If this trend continues, the Department will be forced to consider acquisition of plant for this work.

Purchases.—Brief details of the major purchases follow:—

- Four small dozers as additional units. These machines are used mainly for the extension of firelines and they are of a size suitable for use in the fighting of forest fires.
- Two heavy-medium graders as additional units. They are being used on road construction and maintenance in the more rugged areas.
- Ten 2-berth and eight 4-berth caravans.
- Eight dozers and six rubber-tyred tractors fitted with rotary hoes and other 3-point linkage equipment.

Details of expenditure are—

	£
Loan Purchase of Plant	258,597
Trust Maintenance of Plant	234,346
Hire Credits received	292,833

A Census of Plant as at 30th June, 1964, was—

Item	Dis-posal	Pur-chases	Balance 30th June 1964
Motor Vehicles—			
Sedans and Station Sedans ..	1	5	15
Panel Vans, Light Utilities, and 4-wheel drive vehicles ..	35	54	245
1 to 2 ton	6	8	3
2 to 4 ton	11	11	114
4 to 6 ton	5	6	33
Total	58	84	410
Tractors (D.B.H.P.)—			
(a) Track Type—			
Up to 50 h.p. with blade ..	..	4	33
Up to 50 h.p. without blade ..	..	..	..
50 to 100 h.p. with blade ..	..	8	22
Over 100 h.p. with blade ..	..	..	9
(b) Wheel Type (End Loaders and Rotary Hoes)			
.. .. .	..	6	37
Total	8	18	101
Power Graders—			
40 to 80 h.p. .. .. .	..	..	16
80 to 100 h.p. .. .. .	..	..	9
Over 100 h.p. .. .. .	..	2	7
Total .. .. .	..	2	32
Road Compressors .. .. .	..	2	14
Light Weight Rockdrills .. .. .	..	6	17
Rotary Hoes .. .. .	..	6	36
Rippers	2	..	21
Firetanks, Slip-on Type .. .. .	..	..	82
Firetanks (Various types) .. .. .	..	..	38
Road Rollers .. .. .	..	..	6
Road Scoops .. .. .	..	..	18
Terracers .. .. .	..	..	10
Chain Saws	6	25	100
Rotary Slashers .. .. .	..	3	3
Disc Harrows .. .. .	..	3	4
Disc Plough .. .. .	..	1	1

Acquisition of Land

During the year 1963-64 an amount of £9,963 2s. 2d. was expended on the acquisition of land for Forestry purposes as follows:—

	£	s.	d.
Purchase of Land	9,018	18	9
Survey and Real Property Fees	940	3	5
Miscellaneous	4	0	0
	£9,963	2	2

The expenditure of £9,018 18s. 9d. represents the purchase of three properties comprising 2,150 acres 1 rood 32 perches as additions to existing State Forests.

Forest Surveys

Thirty-four camps operated during the year, details being as follows:—

General Surveys.—Fourteen camps were engaged on general survey work. This was associated with the traversing of reserve, logging area, and compartment boundaries, fire-breaks, roads, species separation, soil, timber and slope classification and road investigations. Two of these camps were engaged part-time on theodolite control traversing, one in South and one in North Queensland.

Personnel.—At the end of 1963-64 the following were engaged in survey work: Eight Foresters, seven Forest Rangers, 34 Overseers, 11 trainees and 110 men. Drafting Branch personnel totalled 17 officers.

Details of work in miles

Theodolite Controls	Compass and Chain Traverse	Re-opening of old lines	Investigation Surveys	Stripping
43	927	320	198	5,830

REFORESTATION

General

Apart from centres located in the drought-stricken region of Central Queensland, rainfalls in forestry areas of both North and South Queensland were very close to average and, in general, were well distributed in so far as the principal silvicultural operations associated with plantation establishment are concerned. The dry late winter and early spring provided good conditions for scrub falling and good early burns were possible. The late spring brought above average falls which favoured the planting of Hoop Pine and ensured that it was finished before Christmas. Summer rains were below average but adequate whilst the autumn and early winter rains were excellent for the open root plantings of exotic pines.

Representative figures for rainfall in the financial year are shown against average in the following table:—

Centre	Annual Rainfall in Points	
	1963-64	Average
Yarraman (Hoop Pine)	3,181	3,154
Imbil (Hoop Pine)	4,821	4,582
Kalpowar (Hoop Pine)	2,301	2,960
Beerwah (Exotic Pine)	6,067	6,112
Tuan (Exotic Pine)	4,545	5,275
Bowenia (Exotic Pine)	3,816	6,516

Bowenia in Central Queensland stands out as the centre with the greatest deficit in annual rainfall and merits mention also for the fact that in July 1963 screen temperatures below freezing were recorded on 13 days with the minimum of 23°F—the lowest ever registered at this centre which is within the tropics, only a few miles from the sea and less than 100 ft. above sea level. Considerable frosting of branches was observed in the *P. caribaea* plantations but young plantings and nursery stock were not affected and there has been complete recovery of the older plantings.



HOOP PINE PLANTATION—SHOWING HIGH QUALITY PRUNED STEMS
Age:—32½ years. This stand has produced 20,000 super. feet of logs per acre as thinnings and is now carrying 50,000 super. feet per acre.

On the whole, growth rates in the plantations have been very satisfactory bearing in mind the rainfall experienced. Results from measured plots indicate that at Bowenia volume production per acre was down about 20 per cent. on the previous year, at Beerwah it was only slightly down, at Yarraman about 50 per cent. up, whilst at Imbil in the Mary Valley figures recorded are amongst the best ever with increments of up to 500 c. ft. per acre being given.

Details of the year's work with those of the previous year for comparison are:—

	1962-63	1963-64
	Acres	Acres
Area of natural forest treated	86,862	60,326
Area of plantation established	4,878	4,644
Area covered in pruning	18,538	17,996
Area tended	75,473	68,645
Area thinned merchantably	4,901	5,639
Area thinned unmerchantably	7,869	5,213

It will be seen that there has been a decrease in area covered in most of these operations but necessary work in tending, thinning and pruning of plantations was carried out. The main drop is in the area of natural forest treated which, after the increase of the previous year associated with the funds made available to relieve unemployment, returned to the figures of 1961-62.

Plantations

Appendix F shows by districts and species, the area planted from 1st April, 1963, to 31st March, 1964, and from it the following figures have been taken:—

Species	Acres
Native Conifers (Chiefly Hoop Pine) ..	2,072.2
Exotic Conifers (Chiefly Slash Pine, <i>Pinus caribaea, radiata and patula</i>)	2,314.5
Broadleaved Species (Maple)	4.9
Eucalypts	252.7
	<u>4,644.3</u>

This area is 234 acres below that for the previous year and brings the total area of effective plantations to 111,531 acres made up as follows:—

Native Conifers	54,487.0 acres
Exotic Conifers	51,631.7 acres
Eucalypts	3,978.2 acres
Other Broadleaved Species	1,434.5 acres
	111,531.4 acres

In so far as slope permitted machines were used in the clearing of rain forest for Hoop Pine planting and in the clearing of Eucalypt forest for Exotics the principle of extending contracts to include burning, re-stacking and final burning was extended to include areas at Toolara as well as at Tuan.

Pruning was kept up to date by the coverage of 17,996 acres which consisted of:—

Operation	Area treated (acres)	
	1962-3	1963-4
First	5,290	4,427
Second	5,427	5,978
Third	5,448	4,914
Fourth	2,373	2,677
	18,538	17,996

In addition 1,451 acres of completed pruning were covered to remove epicormic shoots that had developed on the pruned section of the select trees and 10 acres had the paint bands renewed on the select stems to facilitate marking for merchantable thinning.

During the year unmerchantable thinning was applied to 5,213 acres distributed as follows:—

District	Exotic Pine	Hoop Pine	Eucalypt	Others
	Acres	Acres	Acres	Acres
Brisbane	231.4	1.6	..	..
Gympie	527.2	354.9	66.0	54.7
Mackay	504.0	..	..	..
Maryborough	2,024.0	..	..	..
Monto	2.7	122.2	..	..
Murgon .. .. .	..	335.6	..	..
Yarraman	196.0	557.0	..	..
Warwick	234.0	..	..	..
Atherton	2.0	..	..	..
	3,721.3	1,371.3	66.0	54.7

Merchantable thinning covered 5,639 acres which was 738 acres more than in the previous year. The average yield per acre was just under 6,000 s.ft. (Hoppus) with an average return in stumpage of approximately £22 per acre.

During the year operations commenced in the exotic plantations at Beerwah to provide thinnings for pulping at the A.P.M. plant at Petrie and this will permit improved silvicultural treatment of the older areas which, without the benefit of early unmerchantable thinning, carried numbers of small stems below the minimum size set for milling operations.

Entomology

Insects of Silvicultural Importance.—Serious damage from insect pests of plantation trees was confined to *Pinus radiata* at Passchendaele and the kauri pines (*Agathis* species) in the Mary Valley. Other instances of damage in both plantations and nurseries were of a minor nature.

At Passchendaele populations of the leaf bagworm *Hyalarcta hubneri* (Westw.), Psychidae, showed a downward trend at the commencement of the year. This continued and, later, stabilised at a level which has permitted trees to commence recovery. Some progress was made in studies to determine the nature and degree of natural control but results will not be clear until the pattern of long term variations in insect populations is known. Actual losses of height and girth increment due to defoliation during the year were insignificant.

The kauri coccid *Conifericoccus agathidis* Brimb., Monophlebidae, continues to cause serious defoliation of kauri in the Mary Valley. Preliminary field trials to test the effectiveness and practicability of insecticide applications have been

undertaken and this aspect will be continued. Studies on the life cycle and general biology of the insect are proceeding. The kauri thrips *Oxythrips agathidis* Mor., continues to increase the overall level of damage caused to this species.

A reduction in viability of seed of hoop pine (*Araucaria cunninghamii*) followed an attack by a small moth of the family Blastobasidae. This was the first recorded instance of damage by the insect which appears to initiate its attack before cones reach maturity. Damage by defoliating insects (sawflies and lepidopterous caterpillars) gave rise to numerous reports but attacks were mainly of short duration and confined to localised areas.

Pathology

Beds sown in the exotic pine nurseries at Passchendaele, Beerburum and Beerwah during the year were fumigated with Methyl Bromide prior to sowing because of the occurrence of serious root rot losses due to *Phytophthora cinnamomi*. Following fumigation precautions were taken to prevent reintroduction of the fungus to the beds.

This treatment was successful at the Beerburum and Beerwah nurseries where root rot occurred in some experimental sowings in unfumigated beds but not in the fumigated areas. Fumigation at Passchendaele was only partly effective and did not completely prevent losses from root rot, however the losses were low and the root systems of plants transferred to the field were healthier than in previous years. This partial failure of the fumigation is believed to be due to low soil temperatures in July, 1963, when the beds were fumigated.

As a result of the success this year, the beds for the 1964 sowings at the three nurseries are to be fumigated. The work at Passchendaele was carried out in May when conditions were much warmer.

Investigations are being made into other possible methods of control of the root rot. Work will also be carried out to determine how frequently Methyl Bromide fumigation will be required in these nurseries.

Two limited outbreaks of root rot of plantation Hoop Pine (not caused by *P. cinnamomi*) were recorded in the Yarraman area. One outbreak occurred in a 1939-40 plantation where losses in a small area have been noted on several occasions since 1959. The fungus responsible for this outbreak has not been determined.

An outbreak of a serious nursery disease, "collar rot," occurred in the 1963 Hoop Pine sowings at Jimna. This is only the second record of this disease caused by *Sclerotium rolfsii* in Queensland.

Heavy "damping off" losses were reported in most of the *Pinus patula* 1964 sowings. Later sowings at some of the nurseries were virtually free of this problem.

During the year investigations were commenced to determine the actual losses occurring in forest nurseries and where possible the causes of these losses. Apart from the losses in *P. patula* the other exotic pines were virtually free of losses. "Damping off" occurred in a number of the Hoop Pine nurseries but only at Yarraman were the losses high. Experiments will be initiated this year to reduce losses from this cause both pre- and post-emergence.

Regeneration of Natural Forests

Details of areas covered are shown in the following table:—

	1962-63	1963-64
	Acres	Acres
Eucalypt Forest	45,863	38,389
Cypress Pine	38,101	19,843
Tropical Rain Forest	2,778	2,094
Natural Hoop Pine	120	..
	86,862	60,326

The area covered has fallen to about the 1961-2 level. This is explained largely by the fact that special funds available in 1962-3 were not continued and in part by the extended use of 2,4,5-T in treatment of Cypress pine areas in the Dalby district to control the regrowth of Bull Oak and Eucalypts, the complete removal of which results in greatly increased growth of Cypress pine which more than justifies the added cost per acre associated with use of the hormone. During the year action was taken to extend its use to the Cypress stands of the Inglewood district.

Seed Collection

Of recent years there has arisen a considerable demand for seed of *P. elliotii* from our plantations particularly from South Africa. As a result it is necessary to collect up to

1,000 lb. per year though our own requirement is less than 300 lb. This year 795 lb. was collected and this included 11 lb. from our seed orchards which would soon contribute substantially to the seed supply.

There was no Hoop Pine seed crop this year and despite an unexplained loss in viability in the previous year's collection recent tests show that the position has stabilised and seed in storage should be ample to support programmes at full capacity till the next general seed crop occurs.

Import of 94 lb. of seed from British Honduras has ensured ample supplies of that species and, with the exception of maple, there are adequate supplies of all other plantation species.

Nurseries

The State's 21 nurseries had an output of 3,350,000 plants for the year and stock on hand for future years is 5,330,000 plants.

Sale of Trees

Sale of trees to the public and to other Government Departments totalled 197,628, which is 103,000 lower than in the previous year. This is largely due to the fact that the production of *P. elliotii* stock was below expectations and sales to the public had to be considerably curtailed. Provision has been made in the 1964 sowings to meet any additional demand to plant up areas held over on this account.

Particulars of plant sales are:—

By Species		By Type of Planting	
<i>Pinus elliotii</i>	.. 94,390	Forest Plots	.. 134,030
<i>Pinus patula</i>	.. 2,395	Schools	.. 5,823
<i>Pinus radiata</i>	.. 26,783	Government Departments	.. 12,134
<i>Pinus caribaea</i>	.. 18,966	Private Sales	.. 45,641
Hoop Pine	.. 8,598		
Miscellaneous	.. 46,496		
	<u>197,628</u>		<u>197,628</u>

The Rocklea nursery continues to meet an increasing public demand and sales of miscellaneous species from it increased by nearly 6,000 plants to 35,322 for the year with a value of £2,550 17s.

Sales of Christmas trees were 4,567 with a value of £1,138 3s.

The value of all tree sales was £6,464 2s.

SILVICULTURAL RESEARCH

Atherton Regional Research Station

The main work of this station is research into the silviculture characteristics of the North Queensland rain forests with a view to determining treatment prescriptions suitable for application to these forests. Work on the establishment and maintenance of plantations is concentrated on specialised local problems, the basic plantation research work being carried out by the southern research stations.

(i) Rain Forests.—Observations have continued on the flowering and fruiting habits of the more important species, the effect of canopy cover and ground preparation on germination and survival of the seedlings and the effect of liberation on the subsequent growth and form of the regeneration. In some species germination is far better under heavy canopy than under light canopy. Germination and survival are usually improved by brushing prior to seedfall and further improved by raking the seed bed. Growth of established seedlings is promoted by opening up the canopy. Spot sowings were made during the year to elucidate the findings from this series of experiments.

A series of experiments using 2,4,5-T butyl ester at concentrations of 1½ per cent. to 5 per cent. for the control of unwanted rain forest trees has been completed. Analysis of the treatments applied in April, 1960, indicates that application in frills is superior to a bark spray, while for frills, water as a carrier is slightly inferior to fuel oil. Smaller trees are easier to kill than large ones and also die more quickly. Species effects are highly significant.

Observations on the suitability of a number of species for enrichment planting in rain forests were continued. Queensland maple (*Flindersia brayleyana*) continues to give

very promising results. Growth data for three plots at Kuranda underplanted with about 450 maple per acre are shown below:—

Overwood	Queensland Maple			
	Height		Basal Area	Survival
	1955	1958	1962	1962
Sq. Ft.	In.	Ft. In.	Sq. Ft.	%
15	4	13 9	15.6	80
37	6	16 1	21.7	80
77	4	16 10	20.8	82

This basal area of maple is about one third of that recorded on a neighbouring open maple plantation. However, cost of establishment of the underplanting is far lower, form is better and the increment of the overwood is retained.

An examination of the results obtained from the series of maple underplantings indicated that success could be expected with plantings at any time between September and March provided soil moisture is adequate at the time of planting.

An assessment of grafting trials with red cedar (*Cedrela australis*) has shown that side veneer grafting is more satisfactory than other methods tried and that a take in excess of 50 per cent. may be anticipated at any season of the year. Scion material was collected from maple trees in excess of 150 inches g.b.h. harvested during the year which were outstanding in form and wood quality and which showed the popular "fiddleback" figure in its timber. These scions were grafted on to tubed stocks by the terminal wedge method and subsequently outplanted in a clonal reservoir.

A review of the studies of the growth habits and method of control of the stinging trees (*Laportea moroides* and *L. cordifolia*) was made during the year. Germination takes place in the wet season over a period of four months with dormant seed germinating each succeeding wet season for at least four years. The seedlings thrive where there are breaks in the canopy but die under full canopy. It can be anticipated that undergrowth will eliminate vigorous stinging tree growth from 10 to 15 years after the break in the canopy. Stinging tree regeneration one foot in height will succumb to foliage sprays of 2,4-D amine in water at 0.1 per cent. W/V or of mixed esters of 2,4-D and 2,4,5-T in water at 0.05 per cent. W/V provided at least 100 gallons of the solution are applied per acre when the plants are growing vigorously. Direct applications of these sprays at these concentrations will not kill regeneration of commercial species.

(ii) Plantations.—Observations on standing basal area and basal area increment in a hoop pine (*Araucaria cunninghamii*) plantation established in 1939-40 have been continued. Basal area increments (1955-63) for stands maintained at prescribed basal areas have been as follows:—Standing basal area 100 sq. ft. basal area increment 55.1 sq. ft.; 115—53.3; 130—62.4; 145—60.6; 160—56.2; 175—55.3. While there is a tendency for basal area increment to culminate at about 130 sq. ft. basal area on this site, increments vary little in stands ranging from 100 sq. ft. to 175 sq. ft.

In experiments dealing with control of grass in degraded pastures which are being reforested, all plots were re-treated during the year. As with the initial treatments, 2,2-DPA alone and in mixtures with amitrole and simazine have given the best overall results, although it is now clear that timing of treatments is most important. Grass and weeds should be growing vigorously for chemical control to be most effective. On present indications, chemical tending of planted areas should be cheaper than hand chipping, and a cost trial is being established. Where grass is the major problem, straight 2,2-DPA would be preferred at present, but if broad leaved weeds are also present the more expensive mixtures with amitrole and simazine, which have a broader spectrum of activity and some residual effects, may ultimately show an economic advantage. Both types of formulations are being used in the cost trial. Whether chemical treatment could entirely replace ripping and rotary hoeing prior to planting is not yet clear, but further work is proposed.

The early vigour of Caribbean pine (*Pinus caribaea*) permits it to establish canopy and suppress the competing grass much more rapidly than hoop pine. Trials have been established thinning the Caribbean pine to 300 stems per acre

after suppression of the grass by about age 7, and planting about 300 hoop pine per acre in the spaces left. The object is an early timber yield from the vigorous Caribbean pine and the reduction of the establishment cost of the hoop pine crop.

Other approaches to lessening the cost of the establishment of hoop pine in grasslands have included fertilising with nitrogen and continued rotary hoeing after the planting of the hoop. The pine has responded to the addition of nitrogen but not sufficiently to justify the cost. The rotary hoeing experiment has been inconclusive but it seems to offer less promise than the use of herbicides or planting the hoop under a Caribbean pine stand.

Measurements were continued in the various hoop pine-maple mixtures planted in 1958. Observations in maple plantations ranging in age at present from 17 to 34 years have indicated the average log length will be less than 40 feet. The log length will not be significantly lessened by reducing initial stocking to 350 stems per acre or by thinning to 250 stems per acre at age 10 or to 200 stems per acre at age 20. Heavier thinning will probably reduce log length but this may be more than offset by increased girth growth and consequent earlier production of high stumpage logs. Trial plantings have continued to show the suitability of Caribbean pine and *Pinus khasya* for planting on a wide variety of well drained forest sites in the good rainfall areas of North Queensland.

Beerwah Regional Research Station

The work of this station is divided into four sections, three dealing mainly with exotic pine plantations and the fourth with coastal hardwoods.

(i) Plantation Silviculture.—Research within this section covers a diversity of subjects including (a) introduction trials, (b) nursery management and plantation establishment techniques, (c) the effect of planting espacement on growth, tree form, crown and timber characteristics and (d) the effect of pruning and thinning regimes on growth, yield and product quality.

Thinning investigations aim at establishing the relationship between standing basal area, basal area increment, site index and age for slash pine (*Pinus elliotii*) and Caribbean pine. Preliminary analysis of data, for slash pine has indicated that the basal area yielding maximum basal area increment is independent of age and rises with increasing site index.

With the advent of a pulp market in south-east Queensland, a series of experiments was established during the year to determine the most suitable direction of thinning pulp material. Thinning from above would give early liberation of select stems, but this advantage may be offset by a lower and more delayed yield of mill logs than would be obtained if thinning were from below.

Studies in slash pine, designed to assess the effect of plant spacing on growth, yield, stem form, crown depth and size of knotty core resulting from pruning to routine prescription, have been completed. Data are being evaluated and it is hoped to publish the results during the coming year. Several empirical pruning schedules for Caribbean pine are now under test in a replicated experiment involving 21 plots. The experiment is designed to evaluate the effects of each schedule on girth, height increment and size of knotty core of select stems. Studies on the number of stems per acre which can be economically pruned to 21 ft. are proceeding.

An attempt to develop a technique for establishing Caribbean pine as open root stock during the wet season (January to March) has been unsuccessful. Great variations in survival percent resulted (5 per cent.—90 per cent.) due to a complex interaction of stock condition and soil and weather conditions. Tubed stock which consistently gives a survival in excess of 90 per cent. appears to be essential for successful establishment of this species.

(ii) Tree Breeding.—Tree improvement work, controlled from this station, is concentrated on slash pine, Caribbean pine and Monterey pine (*Pinus radiata*) with some work done in loblolly pine (*P. taeda*) and Mexican pine (*P. patula*). For each species emphasis is placed on the selection of the best available phenotypes, testing of their open pollinated and controlled-cross progenies, and the establishment of clonal seed orchards.

(a) *Slash Pine*.—Two seed orchards have been established in the Beerwah-Beerburum area. Five and a quarter pounds of seed were collected from the older orchard and five and a half pounds of seed from the younger orchard (commenced in 1958) in March, 1964. Addition of 1.5 lb. of superphosphate and 12 oz. K.Cl. per tree, twice in 1963, lifted cone production in the younger seed orchard in 1964 from 40 per graft to 57 per graft. Addition of 4.5 lbs. of ammonium sulphate twice in 1963 in addition to the above fertiliser lifted cone production to 66 per graft.



Testing the possibilities of land at present regarded as unplatable

The di-allele crossing programme between the seed orchard parents is now nearing completion. A 7½-acre progeny trial was outplanted, bringing the total acreage in the series close to 70 with a further 30 acres to follow in 1964.

Six FI hybrid families of the cross slash pine x Caribbean pine are now planted in the field along with one F2 and backcrosses. Fifty-one crosses were made during the year between the two varieties of slash pine and the three varieties of Caribbean pine.

(b) *Caribbean Pine*.—All three varieties of this species are receiving detailed study and three more provenance trials were established, making ten in all. All provenances except Nicaragua are now well represented in S.E. Queensland. During the year an intervarietal crossing programme was carried out. Plans are well advanced for the establishment of a seed orchard on the Kuranda forest. Potential seed orchard parents have been reduced to 20 plus trees of the variety *hondurensis* and it is expected this number will be reduced to 15 when field grafting in the seed orchard is carried out in 1966. Several of the selected clones show a high degree of incompatibility when grafted. Attempts to overcome this by grafting on to the tree's own seedlings commenced during the year.

(c) *Monterey Pine*.—Three further progeny trials were established at Pechey in an effort to find more trees relatively resistant to the dieback caused by the fungus *Diplodia*. Of 25 trees tested so far, approximately 10 are regarded as resistant. Progeny of another 26 are still too young to assess. Inoculation of seedlings with *Diplodia* spores is also being carried out to further determine resistance of the subject strains to this pathogen. Field grafting of scions kindly supplied by the Victorian Forestry Commission proved most successful with takes ranging from 50 per cent. to 100 per cent., depending on the season of the year.

(iii) Nutrition.—It has long been known that phosphorus is the major limiting nutrient for exotic pines planted on coastal sands. Following initial work total soil phosphate values were used as a fertility index and the minimum levels necessary for healthy growth were set at 110 and 135 p.p.m. P₂O₅ for slash and loblolly pines respectively. However, there has occurred a number of cases in which response to phosphatic fertiliser has not been correlated with total soil phosphate. Investigation has revealed that there is a promising correlation between percentage phosphate in the needles and response to fertilising. Critical levels of foliar phosphorus have been tentatively established at 0.077 per cent. for slash pine and 0.099 per cent. for loblolly pine. When foliar phosphorus falls below these levels a response to phosphatic fertiliser may be anticipated.

Recent work has indicated that an early response to phosphorus depends on the nitrogen status of the plant. A marked response to superphosphate can be obtained in the year of planting if the site is cultivated before planting and N fertiliser at up to 200 lb. acre is applied in addition to the superphosphate. In experimental stands planted at 4,800/acre and thinned to 1,200/acre at age 3 such a combination has significantly increased mean height by 1.5 feet and mean girth by 0.75 inches.

Work was continued aiming at the elucidation of the factors which permit hoop pine, bunya pine (*Araucaria bidwillii*) and kauri (*Agathis robusta*) to succeed as underplantings under exotic pine stands on these coastal sands, where they would fail as open plantings. It has been proved that nitrogen is the major limiting nutrient for these native conifers. Success has been achieved in growing hoop pine as an open planting up to the stage of canopy closure by the application of nitrogen fertilisers at the rate of 100 lb. per acre per annum of nitrogen. A cost trial using the legume *Lotononis hainesii* as a nitrogen source is now well established. There are indications that shading is also a factor in the success of the underplantings. The relative height growth at age 7½ years of hoop established by these different techniques in comparison with the growth obtained on an average hoop pine site in the Mary Valley is shown in the table below.

Treatment	Height in Feet
Open planting nil nitrogen	3
Open planting plus nitrogen	21
Underplanting in S.I. 80 slash*	19
Average hoop plantation Mary Valley	23

* S.I. 80 stands for site index 80 feet. Site index is the anticipated or actual average height of the tallest 20 trees per acre at age 25.

(iv) Coastal Hardwoods.—Within this programme problems associated with a wide range of forest types are examined, with more recent emphasis on silvicultural techniques for increasing productivity over the mosaic of sites present in most hardwood forests.

(a) *Blackbutt (Euc. pilularis)*. Ecological studies in the Blackall Range showed that the gradient from dry sclerophyll to marginal rain forest is associated with a gradient in parent material from acid rhyolites to the more basic trachytes. Cut over forests on many trachyte-derived soils are in poor silvicultural condition, with a high frequency of turpentine (*Syncarpia glomulifera*) and brush box (*Tristania conferta*), while on lower slopes the rain forest element has restricted regeneration of commercial species. A detailed study of stocking on typical areas was completed, and experiments designed to cover additional logging, ringbarking and enrichment planting.

(b) *Spotted Gum (Euc. maculata)*. Determination of the effects of prescribed burning in these forests has been a major project since 1952. For the first five years after inception of annual burning, increments on the burnt area were significantly greater than those on the control. Subsequently there has been a decline in burnt area increments for all species and for most size classes of spotted gum total increment since 1952 is greater on the unburnt area. Recent studies have disclosed substantially lower levels of nitrogen and phosphorus, in the burnt area soils, while foliar nutrient levels are also below those in the unburnt control. This evidence strongly suggests a marked deterioration in soil fertility with annual burning. Further studies along these lines are proposed.

Dalby Regional Research Station

This research station covers silviculture of cypress pine (*Callitris glauca*) and western hardwoods, as well as wind-break and shelterbelt planting. At present, control of unwanted species in the treatment of cypress pine and hardwood stands is a major field of investigation.

Experiment 36 was established in 1957 to measure the influence of dense bull oak (*Casuarina luehmanni*) on the growth of well stocked cypress pine stands, and the effect of its removal and control. Initial treatments, and subsequent increments are shown in the table below:—

Plot	1. Control Untreated	2. Bull Oak Brushed	3. Bull Oak Brushed and 2,4,5-T amine on Stumps
Mean g.b.h./BA (inches) 1964	22.16	24.58	25.97
P.A.I. 1957-62 ..	0.14	0.50	0.49
1962-64 ..	0.21	0.32	0.44
1957-64 ..	0.16	0.45	0.47
Basal Area/acre (sq. ft.) 1964	29.9	35.1	41.0
P.A.I. 1957-62 ..	0.36	1.33	1.42
1962-64 ..	0.59	0.91	1.34
1957-64 ..	0.43	1.21	1.40
Merch. Vol/acre (cub. ft.) 1964	291.1	396.6	499.5
P.A.I. 1957-62 ..	5.0	24.0	26.6
1962-64 ..	13.2	19.4	28.8
1957-64 ..	7.3	22.7	27.2
Standing Value/acre (shillings) 1964	358	596	805
P.A.I. 1957-62 ..	11	41	53
1962-64 ..	21	34	60
1957-64 ..	14	39	55

Response to removal of the bull oak understorey has been immediate in both treatments, and sufficient to recoup the cost of treatment within the first two years. For the first 5 years increments on both treated plots were similar, any difference being related to initial plot differences, but since then increments in plot 2, where bull oak regrowth has again developed to a height of 10-15 feet, have declined considerably, while in plot 3, where a 91 per cent. kill of bull oak was achieved by the application of 2,4,5-T, increments have been maintained at a high level. Since the interval between routine silvicultural treatments is much longer than 5 years at the present intensity of management, the importance of controlling regrowth is obvious.

The use of 2,4,5-T was introduced into routine treatment last year and since then further experiments have been established to determine whether costs can be reduced by increasing cutting height above the 6 inches specified at present. Preliminary indications are that an increase in frilling height to

about 18 inches may be permissible in a number of species, particularly if the concentration of 2,4,5-T is raised to 2 per cent., but low stumps still appear essential for a good kill. Initial experiments with the tree injector have given promising results, but there is considerable species variation, and further work involving refinements of technique, new formulations and season of application is in progress.

A large scale cost trial covering treatment of spotted gum with 2,4,5-T was established in 1962. Results to date show an immediate and marked response to treatment where all competitors have been removed, but where only the larger competitors were removed to establish the dominance of select stems, the response so far has been negligible.

All cypress pine thinning experiments were remeasured during the year and a comprehensive review of the data accumulated over the past 25 years has been commenced. 33 detailed yield plots at R. 328 Yuleba were also remeasured, and individual plot summaries brought up to date. A general summary of the past 10 years growth on these plots will be prepared in the near future.

Imbil and Yarraman Research Stations

These two research stations have concentrated their work on the establishment and maintenance of hoop pine plantations. With the passage of time work on establishment and pruning experiments has declined and thinning experiments, many of long standing, now demand much of the research effort. A tree-breeding officer was appointed to Imbil during the year to control this phase of the work at both stations. These two centres carry out the seed testing required by the Department, the results from one centre being used as a check on the other.

(i) Plantation Silviculture.—Presowing treatment of two seed beds with mylone 85W at 75 lb. per acre, 150 lb. per acre and 300 lb. per acre was carried out prior to 1963 sowing in Yarraman nursery. Germination in the treated plots was about 20 per cent. in excess of untreated controls, with no significant difference between the three mylone treatments.

Chenopodium species occur as very dense weed growth in unburnt pushed edges of new hoop plantations. Application of 2,4-D amine 0.1 per cent.—0.2 per cent W/V acid equivalent in December, to the point of visible wetness, gave effective control at a overall cost considerably less than routine chip tending.

The effect on growth, of pruning the bole from about 22 feet 6 inches to 32 feet in stems ranging from 48 feet to 68 feet in height, is receiving attention at Imbil. In the first year after pruning girth increment in stems of all heights was adversely affected though much less markedly in stems in excess of 56 feet in height. Height increment was not affected by the pruning.

Studies in 1955 in a thinning experiment in hoop pine, planted at Yarraman in 1934-5, showed that ratio-basal area increment pruned fraction of stand to basal area increment whole stand closely agreed with ratio-basal area pruned fraction to basal area whole stand. Figures extracted from two plots in 1963 support this finding. In an unthinned plot percentage of total basal area in the pruned fraction of the stand was 29.7 in 1946, 30.7 in 1955 and 30.8 in 1963. In a periodically thinned plot the corresponding percentages in periods between thinnings were 54.3 to 55.6 from 1947 to 1955, 68.6 to 69.2 from 1957 to 1961 and 85.2 to 85.0 from 1961 to 1963.

Six hoop logs which were pruned between 1936 and 1941 according to the then current pruning prescription were rotary peeled during the year. A record of the maximum girth over pruned stubs and the height at which this occurred had been kept. The comparison between this measured maximum girth over stubs and girth of core at which knot defects were first encountered, when peeled in 4 feet 4 inch lengths, is shown below.

Section of Butt Log	Girth over Stubs	Knotty Core
0-9 feet	Inches 15.6	Inches 19.1
9 feet-13 feet 6 inches	18.4	21.4
13 feet 6 inches-18 feet	18.3	23.5

A trial aiming to determine the relative accuracy and economy of the use of various height measuring instruments in stands between 54 feet and 88 feet average height was carried out at Imbil. One hundred trees were heighted by each of two teams with each of four instruments and the correct heights were obtained with a tape after falling the trees. Analysis of the data gave the following estimates of the error of the mean of 100 measurements within 95 per cent. confidence limits.

	Error of Mean in Feet	
	Height 55 Feet	Height 85 Feet
Height sticks	-0.2 to -1.0	-0.05 to -1.1
Abney	0.6 to -1.0	1.2 to -1.2
Hypsometer	1.6 to -1.1	1.6 to -1.4
Relaskop	0.8 to -1.8	1.1 to -3.5

It is clear that the most consistent readings were obtained with height sticks and that their advantage increases with height. However in this experiment they have shown a bias of about 6 inches which is postulated to be a parallax error. Heights were determined more rapidly with height sticks than with other instruments up to a height of about 70 feet on steep country and up to about 80 feet on flat country. The necessary introduction of a third man into the team when using height sticks above about 80 feet further increases the cost of measuring by this method. The cost of measuring with the relaskop was higher than with the abney or hypsometer as sighting could not commence until brushing was completed.

(ii) Tree Breeding.—This year has seen the failure of a number of patch grafts in hoop pine made in 1959. The failures appear to result from incompatibility between stock and scion. About 50 per cent. of the scions had become unhealthy by the end of the fourth year after grafting and this percentage has risen to about 66 per cent. in the fifth year. Tests have been commenced to ascertain whether more success can be obtained by altering the method of patch grafting. Work has also been initiated in an endeavour to ascertain whether certain strains of hoop pine will produce more satisfactory stock material than the unselected stocks used in the past. The kauri patch grafts continue to thrive.

As a result of this setback, plans to establish a clonal seed orchard at Taromeo have been postponed. The best 15 phenotypes for inclusion in the Imbil seed orchard have been selected and it is planned to commence grafting on the two year old stocks in the field in October 1964. However this could be delayed until 1965 in view of the above developments.

The di-allele crossing programme of the selected seed orchard parent trees continued during the year at Imbil. Assessment of control and open pollinated progenies was carried out. At Yarraman, where the tree breeding work is less advanced than at Imbil, open pollinated progenies of nine plus trees were outplanted and control pollination of six plus trees was effected.

General

Revision of the loblolly pine volume table was completed during the year, and initial data preparation for revision of the slash pine volume table is well advanced. An extensive check of the hoop pine volume table for Yarraman district, using a sample of 560 trees representing first, second and third thinnings from a range of sites showed an overall difference of only 0.26 per cent. in the case of the standard table as used in the thinning sales. Other tables and methods of volume estimation gave differences of up to 3 per cent., but none of these was statistically significant.

It has been found that with some species the linear model normally used in preparing predominant height volume tables may not be entirely satisfactory for basal areas in the upper part of the range, particularly as the top diameter limit is increased. Several more complex models have been considered and an asymptotic relationship selected for further study. The order of magnitude of critical constants has been determined empirically, but development of best fit criteria which will permit direct computation from the original data still presents some problems. Electronic computer programs to permit further work along these lines are under development.

A punch card system has been developed for use in conjunction with the plantation register in which are recorded details of all areas planted. The main advantage of the system will lie in the rapid availability of any required information on plantation areas. Two computer programs have been written and checked, but data preparation is not yet at a stage at which they can be fully utilised.

NATIONAL PARKS

The past year has seen several significant events in National Park administration in Queensland—the first million acres of park reservation was reached, biological work was commenced, and a new booklet on Queensland's National Parks was prepared.

A further important development was the action taken to invite other Administrations interested in land use, together with Scientists and Scientific Institutions concerned with the preservation of our native flora and fauna, to contribute their help and advice in furthering the better management of National Parks in this State. It is pleasing to record that the replies received indicate that the ready co-operation and advice of a large body of experts seems assured.

There is a tendency to value National Parks primarily for their scenic attraction, but these areas also play a valuable role as undisturbed natural museums, and as such, they are extremely important for scientific study and for fauna conservation. An important object of national park administration must therefore be to reserve permanently, typical examples of all the main environments, including the less scenic. The achievement of this, whilst giving due consideration to all forms of land usage so that the best interests of the State are served, calls for expert knowledge in many fields, and it augurs well for the future that there is such a wide range of informed scientific opinion not only willing but anxious to help and advise in any way possible.

In order to make full use of this advice and help, while still maintaining the standards of service to visitors in the form of access tracks and other amenities, extra staff and finance are needed. A start has been made with the secondment full time to National Parks work of a trained Forester with a B.Sc.(For.) degree, and University Students at an advanced stage in their studies were employed for zoological and botanical work on one of our parks during the University vacation. While it is pleasing to note that the available funds allowed the annual expenditure to reach £60,000 for the first time, expenditure of still larger amounts will be necessary, if Queensland is to play its part in preserving for the world adequate representation of Australia's unique wild life.

There are indications of an upsurge of interest in National Parks in Australia, similar to that which has already taken place in the United States.

The expanding membership and activities of nature conservation societies, and the admirable and enthusiastic efforts of individuals, are all indicative of an increasing awareness of the value of National Parks. The Department welcomes this interest and is endeavouring to cater for it by publishing as opportunity and funds permit, informative literature, on these areas.

During the past year a general booklet on Queensland's National Parks was prepared, and by the end of the year the printing of it was well under way. This booklet discusses briefly the concept of National Parks and their management in Queensland, contains short articles on plant, animal and bird life together with descriptions of individual parks, and is illustrated with both coloured and black and white plates.

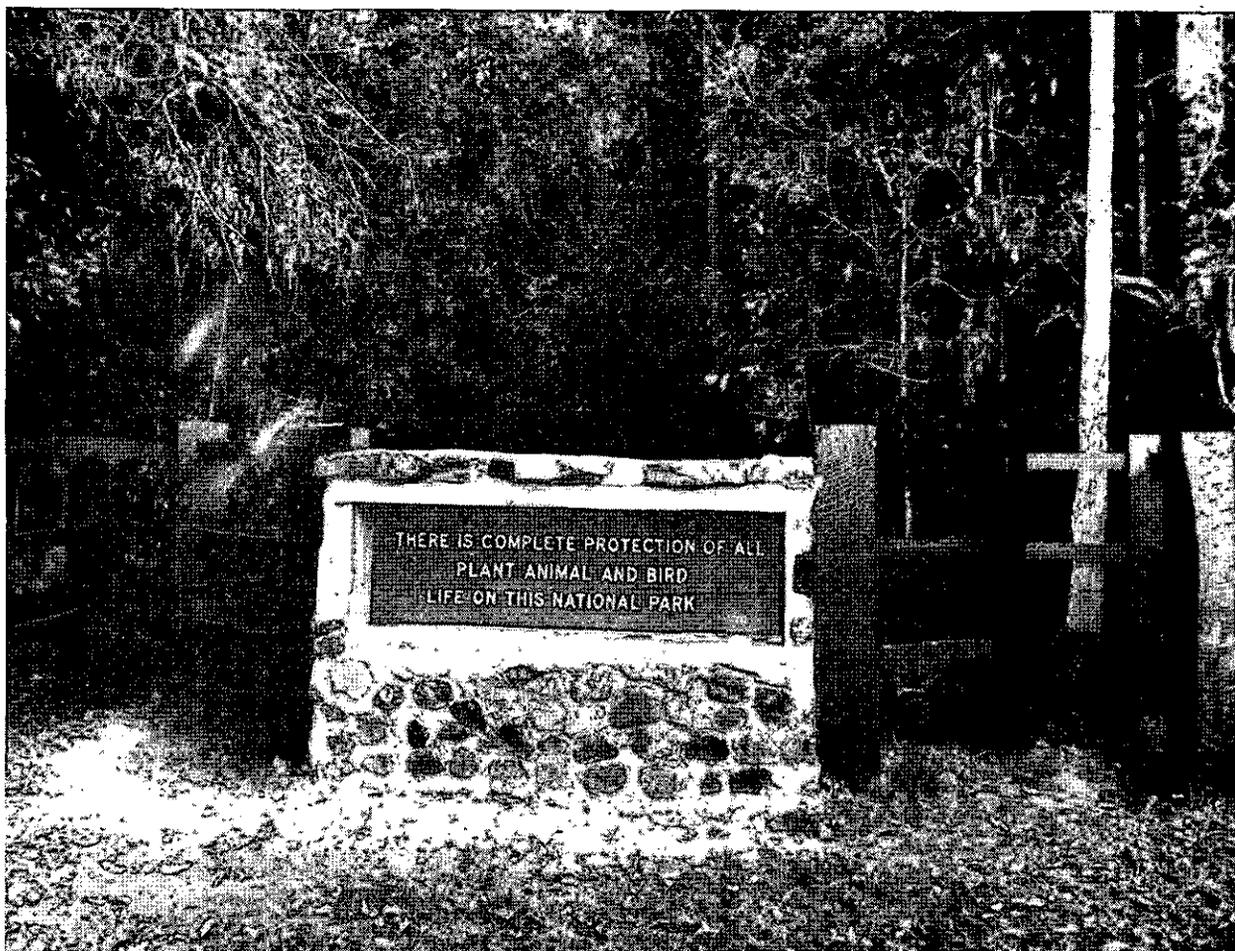
New Areas Reserved

During the year there were three new parks proclaimed—Garrawalt Falls (R. 553 Garrawalt) of 1,280 acres, on a tributary of the Herbert River; Isla Gorge (R. 30 Moss) of 11,500 acres between Theodore and Taroom; and Auburn River (R. 81 Delembra) of 961 acres near Mundubbera.

However the largest addition was the acquisition of about 50,000 acres of vacant Crown Land in the Mossman Gorge. This was amalgamated with two existing parks and the unit so formed, R. 133 in the parishes of Amy, Bloomfield, Dagmar, Dedin, Spurgeon, Victory and Whyanbeel, becomes our largest National Park with an area of about 133,000 acres.

An area of about 5 acres donated by Mr. O. Perry of Bingil Bay was added to Scenic Area R. 1110, parish of Hull (Clump Mountain). This former freehold land will make available an area for parking space with suitable access thereto. The Department places on record its appreciation of this generous gesture by Mr. Perry.

The area of the Salvator Rosa Park has been increased by 16,600 acres, and that of Robinson Gorge by 10,600 acres.



TRACK ENTRANCE—EUNGELLA NATIONAL PARK.
A sign with its own message.

With the addition also of areas to Kondalilla, Natural Bridge, Bald Rock and Castle Rock Parks and the re-alignment of the boundaries of Tully Falls Park the total area of parks in Queensland now exceeds one million acres.

	National Parks		Scenic Areas		Total Reservations	
	No.	Acres	No.	Acres	No.	Acres
30-6-1963	71	911,252	169	35,338	240	946,590
30-6-1964	73	1,005,442	169	35,623	242	1,041,065

An amount of £60,203 was expended during 1963-64, bringing the total expenditure on parks to £817,807.

Walking Tracks

While the year's work was mainly concentrated on maintenance of existing tracks, some new track work was undertaken.

At Lamington a new track of 7 chains was built as a continuation of the work on the construction of the Tullawala loop which will give a three mile circuit walk and obviate the necessity for all hikers to use the main border track both to and from Binna Burra.

Other new track work in the South Queensland Parks was the construction of twenty chains of the Caves track at Ravensbourne, four chains at McDonald Park (Tamborine Mountain) and three chains at Queen Mary Falls (Killarney).

In the Shute Harbour area two miles of track were pegged and twenty-five chains constructed on the eastern slopes of Mt. Rooper. This track will give some fine views of the Whitsunday Islands.

Track work at Clump Mountain, which commenced in 1962-63, was continued and a further 17 chains constructed to bring the total length of tracks on this park to 110 chains, including the circuit to Bicton Hill lookouts, which provide excellent views of the coastline and offshore islands.

At Mt. Spec, 65 chains of track were constructed to Witts Lookout, also a vantage point for splendid panoramic views.

In all, one hundred and forty-one chains of new tracks were provided to bring the total length of the track system at 30th June, 1964, to 259 miles 11 chains.

Other Improvements

At Springbrook, toilets were constructed at Goomoolahra and commenced at Turramurra. At Tamborine Mountain, a shelter shed was built at MacDonald Park, and the Cedar Creek shed rebuilt.

Post and rail fencing was carried out at Koonawarra (Bunya Mountains), at the Cunningham's Gap Forestry Camp, and at Ravensbourne. Construction of new quarters for workmen continued at Nagarrijoon Falls (Lamington), the camp at Numinbah was completed and a prefabricated camp was erected at Shute Harbour.

At Lake Eacham re-construction of the main landing and the small jetty was completed. A new dressing shed was built and complete new construction of the children's pool at a fresh site.

New toilets were provided at the Goolagan Creek picnic area (Palmerston) and at the Crater.

At Eungella a flight of concrete steps was constructed to the children's swimming pool at Broken River and a new entrance consisting of a flight of concrete steps, interspersed with landings, was built at Palm Walk to eliminate the steep grade into this popular walk.

The Department financed the sealing of the circle road at Gwongorella Park and the access road at Cedar Creek—the work being carried out by the respective Local Authorities. A road to improve the access into Carnarvon National Park was located and surveyed by the Department's Road Engineer.

Park Patrols

Patrol work on selected week-ends was continued, and uniforms were provided for patrolling officers. Many people welcomed the information and advice that the patrolling officers could supply, and it is hoped that the work of a Patrol Officer will be increasingly that of a guide and source of information and less that of an enforcer of regulations. The protective aspects of the patrols, though of great importance, may well take the form of prevention rather than detection of offences, and this is much to be desired.

One Million Acres

In noting the million acre milestone in the progress of National Parks in Queensland, it is appropriate to pay tribute to two men who played a major part in this achievement—Mr. C. I. Trist, who was secretary of the Department from 1921 to 1954, and Mr. V. Grenning, who was head of the Department from 1932 until his retirement in January this year. For a combined span of 43 years these gentlemen worked with untiring zeal and fervour for the furtherance of the National Parks ideal in Queensland. The standard of park administration in Queensland, which has been commended on numerous occasions by visitors to the parks, is a tribute to their foresight and keen personal interest.

HARVESTING AND MARKETING

General

Removals of milling timber during the year under review were in excess of 212,000,000 superficial feet. This exceeded the 1962-63 figure by about 18½ million and the 1961-62 total by nearly 25½ million superficial feet. These figures indicate an industry recovery following reduced activity attributed to the credit restrictions and first noticeable early in 1961.

The natural stands of Hoop and Bunya Pine in Queensland are a diminishing resource. It was in order to continue to meet the demand for high quality softwood timber, the Department established Hoop Pine plantations. These plantations are regularly thinned to promote the growth of the final crop stems and in 1963-64 for the first time the cut of plantation-grown Hoop Pine for commercial use exceeded the cut of natural Hoop and Bunya Pine.

Total cut of plantation-grown timber including Exotic Pines was nearly 16 per cent. of the State's cut of milling timber from Crown Land and this percentage should increase progressively.

Mill Logs Cut—Crown and Private Lands

This table shows logs cut by all mills in the State, annually, for the periods indicated:—

Year	Queensland Grown							Imported	Total
	Hoop and Bunya Pine	Kauri Pine	Plantation Thinnings	Cypress Pine	Hardwood	Cabinet Woods	Miscellaneous		
(1,000 superficial feet)									
1958-59	43,729	1,897	19,931	54,072	252,500	26,631	48,458	17,365	464,583
1959-60	37,614	2,081	26,420	55,738	264,069	24,644	49,595	19,944	480,105
1960-61	35,027	2,223	25,959	50,473	252,482	27,389	48,558	17,091	459,202
1961-62	25,822	2,124	26,632	45,275	215,450	20,914	39,791	12,612	388,620
1962-63	28,277	2,114	31,443	50,044	212,014	21,404	38,937	12,833	397,066
1963-64 Estimated	29,000	2,000	34,000	51,000	215,000	21,000	40,000	13,000	405,000

Mill Logs—Crown Lands

The following are the annual quantities of Mill Logs obtained from Crown Lands as from 1954-55:—

	Super. feet		Super. feet
1954-55	224,000,000	1959-60	239,000,000
1955-56	223,000,000	1960-61	219,000,000
1956-57	221,000,000	1961-62	187,000,000
1957-58	213,000,000	1962-63	194,000,000
1958-59	228,000,000	1963-64	212,000,000

A comparison of quantities of the various species of log timber cut from Crown Forests during the past five years is illustrated hereunder:—

Year	Hoop and Bunya Pine	Kauri Pine	Cypress Pine	Forest Hardwoods	Scrub Hardwoods	Cabinet Woods	Miscellaneous	Plantation Timbers
(1,000 superficial feet)								
1959-60	34,998	2,139	26,835	88,245	12,761	17,894	28,284	27,565
1960-61	31,849	2,188	24,093	76,879	11,302	18,118	28,601	26,234
1961-62	22,324	2,171	23,731	62,722	9,695	15,726	23,599	26,660
1962-63	24,393	2,253	26,037	60,479	9,029	17,302	23,108	31,116
1963-64	25,336	1,615	28,932	66,664	11,405	16,653	27,949	33,659

The Timber Business

(a) Mill Logs—	1962-63	1963-64
Hoop and Bunya Pine	24,393,000 super. feet	25,336,000 super. feet
Forest Hardwoods	60,479,000 super. feet	66,664,000 super. feet
Scrub Hardwoods	9,029,000 super. feet	11,405,000 super. feet
Cypress Pine	26,037,000 super. feet	28,932,000 super. feet
Kauri Pine	2,253,000 super. feet	1,615,000 super. feet
Cabinet Woods	17,265,000 super. feet	16,633,000 super. feet
Miscellaneous Species	23,108,000 super. feet	27,949,000 super. feet
Plantation Timbers	31,116,000 super. feet	33,659,000 super. feet
Limb Logs, Head Logs, Stumps and Fitches	37,000 super. feet	20,000 super. feet
Total Crown Mill Logs	193,717,000 super. feet	212,213,000 super. feet
 (b) Construction Timbers—		
Headstocks, Transoms, Crossings, Braces, &c.	264,438 super. feet	310,973 super. feet
Sleepers	702,971 pieces	997,761 pieces
Girders, Corbels, Piles, Sills, and Girder Logs	61,600 lineal feet 281,836 super. feet	49,417 lineal feet 238,771 super. feet
Poles	187,505 lineal feet	265,482 lineal feet
House Blocks	54,432 lineal feet	27,015 lineal feet
Mining Timbers	247,780 lineal feet 83,260 pieces	393,714 lineal feet 33,526 pieces
Gross Receipts from Timber Sales, &c.	£1,784,623	£1,958,506 8 4
Net Revenue	£904,506	£976,941 8 3

Logging

During 1963-64 the following quantities were hauled by, and payments made to, contractors to the Department:—

Class	Quantity	Expenditure
	Super. feet	£ s. d.
South Queensland—		
Hoop and Bunya Pine	17,078,280	
Forest Hardwoods	5,335	
Scrub Hardwoods	86,395	
Miscellaneous	83,431	
Cedar	22,170	
	17,275,611	178,691 11 3
North Queensland—		
Cabinet Woods	885,757	
	885,757	10,363 7 7
Totals	18,161,368	189,054 18 10

Rosewood

The following figures show the position regarding the supply and sale of Rosewood during the year:—

In stock 1st July, 1963	23 tons 13 cwt.
Purchased during year	Nil
Exported to Hong Kong	23 tons 5 cwt. 1 qr.
Written off (wastage)	7 cwt. 3 qrs.
On hand 30th June, 1964	Nil

No Sandalwood was purchased or exported during the year.

Timber Felling and Timber Getting Award—State

During the twelve months under review the basic wage rate under the above Award varied as follows:—

On 12th July, 1963—£15 14s. to £15 17s.

Constructional Timbers—Departmental Contracts

A comparison of supply of constructional timbers from Crown Lands with the two previous years is given hereunder:—

Class of Timber	1961-62	1962-63	1963-64
Sleepers	245,562 pieces	339,103 pieces	526,159 pieces
Crossings	35,411 super. feet	103,569 super. feet.	117,793 super. feet
Transoms	21,543 super. feet	72,724 super. feet	77,230 super. feet
Bridge Timber (Round)	22,970 lineal feet	15,590 lineal feet	11,714 lineal feet
Bridge Timber (Square)	416 super. feet.	1,702 super. feet	1,512 super. feet

Hewn Timber Prices

No price change was made during the year.

Logging Roads—1963-64

The Department's road programme for the year constituted 101 miles of construction. Location and working surveys covering 116 miles were carried out.

Expenditure from Forestry Votes was as follows:—

	£
New construction	172,460
Maintenance	67,608
Subsidies to Shire Councils	22,309
Workers' Compensation	146
Pay Roll Tax	3,347
Surveys	1,689
Fares and Freights	3,813
Resumption for Access	1,766
	£273,138

The following table sets out the position with regard to sawmill licenses as at the 30th June, 1964:—

Number of Licenses as at 30-6-63	Classification	New Licenses Issued	Changes in Classification		Licenses not Renewed			Current Licenses as at 30-6-64	Total as at 30-6-64
			Plus	Minus	Refused	Relinquished	Under Consideration		
635	General mills	1	..	1	8	25	11	591	602
15	Case mills .. .. .	..	..	..	..	1	..	14	14
46	Sleeper mills	4	..	..	1	3	..	46	46
17	Other restrictions .. .. .	..	..	..	..	1	..	16	16
72	Re-saw and dressing	2	1	..	..	3	..	72	72
785		7	1	1	9	33	11	739	750

Offences

During the year ended 30th June, 1964, officers reported 129 breaches of the Acts and Regulations administered by the Department.

Proceedings were successfully instituted against 13 persons and fines totalling £167 imposed.

In 48 cases of unauthorised timber operations, where it was considered the offences did not warrant proceedings the value of the timber was collected and warnings issued. In some instances part of the cost of investigation was charged. Appropriate action was taken in other cases.

As a result of action taken in all cases, an amount of £3,564 2s. was recovered by the Crown in timber revenue.

FOREST PRODUCTS RESEARCH**I. Engineering and Seasoning**

(a) *Sawmill Engineering.*—During the year several sawmillers sought the advice of the Department on design for new mills and alterations to existing mills with a view to increasing efficiency and so reducing the costs of converting log timber to sawn timber.

Two new mills of modern design were erected, one at Theodore and one at Yednia.

The Department's experimental mill is operating satisfactorily and mill studies of particular problems were undertaken as detailed below. It is hoped to co-operate with the Industry in research on such aspects as saw design, speeds, &c.

(b) *Seasoning.*—Assistance was given in the design of steam kilns for four firms and problems associated with kiln and air seasoning were investigated.

Arrangements have been made to conduct a seasoning school in North Queensland. It is anticipated that this type of service will increase with Industry requirements of efficient seasoning of timber.

During the year some 3,161 samples of sawn timber were submitted for testing of moisture content. Ten per cent. of these were outside the range of recommended moisture content for use in building construction.

II. Economics

The plantation log timber milling studies commenced in the previous year were completed. Other milling studies carried out in conjunction with the Industry were—

- (a) a study on Broad Leaved Ironbark;
- (b) a study of pruned pine stems at Beerwah;
- (c) a study of scrubwoods, including the peeling of one species, carried out in South Queensland.

SAWMILLS LICENSING

The number of mills in active operation during the year was 586 during the first quarter, 576 during the second quarter and 572 during the third quarter.

Progressive figures for the final quarter indicate that the number of mills working will approximate that shown for the third quarter.

A reduction in the number of licenses current has again been demonstrated.

The mills, the licenses of which have not been continued, were in the main of minor capacities relying on private timber supplies, but also include a few mills that had been established for many years.

Failure of supplies has largely been responsible for the closure of most of the mills and this trend is expected to be maintained with the further depletion of private timber resources.

The Sawmills Licensing Committee gave consideration to matters pertaining to sawmill licensing at regular intervals during the year submitting its recommendations to the Conservator of Forests.

Studies at the Department's mill dealt with Queensland Maple and Kauri Pine from North Queensland plantations, Rose Gum, plantation Hoop Pine and Exotic Pines in South Queensland. These were, in the main investigations of particular problems with silvicultural significance and affecting silvicultural techniques.

The Timber Movement Survey initiated the previous year in conjunction with the Australian Timber Industry Stabilisation—State Committee was completed and the response was encouraging. It is proposed to continue this work as it is anticipated that a repetition of the survey covering a recent period will show trends of vital interest to all sections of Industry.

III. Utilisation

The Department's advisory services on the correct use of timber were again in heavy demand. Some 1,800 enquiries were received, with identification being made of some 4,700 specimens, to a large extent for other Departments.

With the advent of all purpose preservative treatment plants there has been a gradual increase in the use of treated hardwood poles. It is anticipated that the next few years will see an increase in the use of treated softwoods to replace the diminishing supply of forest hardwood.

As a result of the planting programme which has been carried out so as to replenish the State's Timber resources, an increasing volume of plantation timber is becoming available. As with all other species of timber, the correct treatment and grading of the sawn product is necessary to provide maximum serviceability in the uses for which it is required.

These are subjects in which the section of the Sawmilling Industry which converts plantation timber, is fully co-operating.

The formation of the Timber Development Association in Queensland is a forward step which is expected to lead to a more advantageous use of sawn timber. This involves a proper recognition of the special merits and conversely, the limitations, of the many grades and species available.

The work of the Standards Association of Australia has also shown an advance in Queensland. The preparation of standard grading rules for Queensland Rain Forest Species and Softwoods was commenced. The completion of these grading rules and those for Forest Hardwoods and Cypress Pine, which are well in hand, must greatly assist the correct and fuller utilisation of the State's overall timber resources.

The task remains of making up-to-date information available to all users of sawn timber. The Timber Development Association in transmitting information to engineers, architects and students, is assisting in this direction.

The Department has taken an active interest in the work of compiling sawn timber grading rules and, in co-operation with the Queensland Timber Board, has conducted grading schools within the Industry. It is hoped to expand this work so that the advantages of using the appropriate grade of timber for the end use for which it is suited are appreciated by all users of sawn timber.

During the year the New South Wales Forestry Commission developed a stress grading machine for sawn timber. It is one of the most significant technical advances in the Australian Timber Industry for some years. It is anticipated that within a few years all structural timbers will be machine graded. The advantage of this will be that engineers and architects, in specifying timber strengths for structural members, will not have to depend on visual grading.

The use of machine grading to date has shown that timber could be used in smaller dimensions than those currently specified for many purposes and that material with knots and other minor blemishes, at present not being used, can be used effectively and safely.

"Valuable Queensland Trees", a booklet for use by non-professional timber men, was published, and the demand has been well up to expectations. A revision of current pamphlets on "Queensland Building Timbers and Specifications for their Use" has been made, and will be available in the New Year.

The co-operation of the Queensland Housing Commission and Public Works Department on all aspects of timber utilisation is greatly appreciated.

The usual inspections in relation to "The Timber Users' Protection Acts" were made and four convictions were obtained. Twenty-three complaints were received and seven are still under investigation, the remainder having been settled between the parties concerned by remedial action.

IV. Wood Structure and Timber Physics

WOOD QUALITY ASSESSMENT AND IMPROVEMENT

(a) Assessment of the wood quality of twenty 17 to 42 years old potential seed orchard trees of Hoop Pine (*Araucaria cunninghamii* Ait.) has been completed. Fifteen of the twenty trees were considered to have acceptable wood characteristics.

There is evidence suggesting maturity of micellar angle in this species at an average value of about 15° and 5.5 in. from pith. This is not coincident with maturity of tracheid length.

A definite pith to bark trend for average spiral grain values was observed, increasing to a maximum of 3.8° at 1.1 in. from pith, then decreasing gradually to 2° at 8.5 in. Spirality was very predominantly positive (i.e., to the right).

(b) Investigations of the wood characteristics of 17 trees preselected for a *Pinus elliottii* var. *elliottii* seed orchard at Beerwah have also been completed and wood quality ratings are now being compiled.

Here again a trend for average spiral grain values was noted, increasing to 4.4° in the second ring from pith and then decreasing to remain amazingly constant at around 2° from the seventh ring out. Spirality was predominantly negative in this species.

(c) The survey of basic density and per cent. latewood in 6 to 13 years old *Pinus caribaea* Morelet showed mean values of 25.3 lb./cu. ft. and 16 per cent. respectively for these characteristics. Results indicated that the wood of this species should be easy-working and relatively uniform in texture.

(d) A study designed to determine the narrow-sense heritability of wood and morphological characteristics in *Pinus elliottii* has been commenced in collaboration with the Division of Forest Products, C.S.I.R.O. 11-years old open-pollinated progeny are being sampled initially.

(e) Causes for the failure of 5-years old grafts of Hoop Pine (*A. cunninghamii* Ait.) through apparent incompatibility are being investigated. At this early stage, the most likely explanation seems to be the inability of relatively low-vigour stock to sustain highly vigorous scions.

(f) Pulping trials carried out on 8 to 24-years old *Pinus elliottii* by Australian Paper Manufacturers Ltd. have shown that this material is satisfactory for the production of kraft pulp and their mill at Petrie is now utilising considerable quantities of plantation thinnings for this purpose.

TREE GROWTH STUDIES

A three-year study of the pattern of incremental growth and the effect of a number of climatic factors on wood formation in 30-years old and 5-years old trees of *Pinus elliottii* and *P. taeda* has been completed and detailed analysis of the final results is in progress.

WOOD ANATOMY

(a) The determination of micellar angle by semi-visual assessment of X-ray diffraction diagrams has been checked against a new photometric method of assessment developed by the Physics and Engineering Laboratory, D.S.I.R., New Zealand, and found satisfactory. This followed a 3-day visit by a physicist from the Laboratory to discuss fibre characteristics and their effect on the physical properties of wood.

(b) The anatomy of the "grey-heart" of Yellow Walnut (*Beilschmiedia bancroftii*) was investigated and the presence of certain deposits not found in normal wood of the species noted. Marked starch depletion was also observed. There was no anatomical evidence of fungal activity, but fresh material has been referred to the Pathologist for isolation tests.

V. Wood Chemistry and Preservation

During the year there has been a sharp increase in the commercial application of general all purpose preservative treatment plants operating with copper-chrome-arsenic salts, and there are now some 140 treatment plants in Queensland.

Research work has been concentrated on the Vacuum Pressure Diffusion Process and its application to commercial practice and this has resulted in a reduction of treatment time and the addition of non-ionic wetting agents has resulted in the reduction of sludge.

The majority of poles now used in Queensland are treated and in an effort to reduce splitting of treated poles in the dry western areas, work has been done with treatment above fibre saturation point. This has been satisfactory at moisture contents of 60 per cent. for hardwoods and with Pine at 80 per cent., but it would appear that the optimum moisture content for commercial use is about 50 per cent. for sawn and round timbers. Further work has to be done particularly with scrubwoods in North Queensland.

The use of all purpose preservatives has reached the stage where the Standards Association of Australia is preparing a code for the treatment of poles and sawn timber.

Two field trials of treated material were established in North Queensland in co-operation with the C.S.I.R.O. and an experiment on the treatment of 400 Slash Pine poles was undertaken in conjunction with the P.M.G. Department. The first group of these poles is ready for installation.

Co-operation has continued with the plywood and veneer Industry into aspects of manufacture. With the use of sodium fluoride for treatment of veneers, difficulty has been encountered in maintaining solution strengths and the time period necessary for adequate penetration.

Three plants have satisfactorily used a dieldrin emulsion in the treatment of veneer.

With the increase in general purpose treatment the demand on the chemical laboratory has been increased. 920 samples were subjected to detailed chemical analysis and trade and spot tests totalled 1,400.

VI. Insects of Forest Products Importance

The Department continues to receive numerous enquiries re borer and wood termite damage in homes.

Wood termite damage in homes is the result of faulty preventative methods and failure to regularly inspect for the presence of termites, which can result in costly eradication when attack is ultimately revealed.

The hoop pine jewel beetle, *Prospheres aurantiopictus* (L. & G.) Buprestidae, gives rise to some concern from time to time by its emergence in constructed buildings. The insect has proved difficult to locate in the field and although its incidence in logs and in sawn timber is very low, and its effect of little importance, the mode of use of pine timber may result in a widespread series of reports arising from an isolated infestation in the log from which boards were secured and dispersed to building projects.

The Queensland Pine Beetle may cause serious damage in older homes and here proper maintenance minimises the cost of control.

Weather conditions were generally favourable to the application of good management procedures and damage from green log borers in rain forest areas during the past year was minimal. However where pressure impregnation treatments are being applied to hardwoods a revision of mill procedures has been found necessary to avoid borer damage to

sapwood which is utilized in both poles and sawn timber. Most damage is caused by the Longicorns (*Phoracantha* species and the auger beetles (family Bostrychidae) which attack logs prior to pressure treatment).

Investigations are being carried out on log borers.

To gain the full benefit of preservative treatment of newly sawn timber, it is necessary to have good mill hygiene to minimise attack on the sapwood of logs before sawing. Although properly treated timber is safe from insect attack, the presence of insect holes which have occurred prior to sawing and treatment can be a talking point for over-enthusiastic pest-control salesmen.

White fleck and the birdseye defects of *Flindersia* spp. have been found to be the result of damage by the larvae of a small moth, the biology of which is being studied.

VII. Biometrics

During the year 120,000 cards were punched for log samples, mill studies and management purposes.

Several programmes have been developed using the University computer.

Statistical analysis of data from research projects has been carried out for all Branches.

STAFF

At the 30th June, 1964, there were 403 salaried officers on the staff, comprised of 163 in Head Office and 240 at District Centres. This total is 13 more than for the same time in 1963. The number of wages staff employees decreased from 2190 to 1602.

Sixty-nine salaried officers left the Department during the year and two officers—Messrs. V. Grenning and R. H. Burke—retired.

Mr. V. Grenning retired as Conservator of Forests on 17th January, 1964, after nearly 40 years of Public Service and after having been in charge of the Department since 1st October, 1932.

Under his leadership the Department made great progress. The Crown area of plantations rose from a mere few acres to a figure in excess of 100,000 acres, whilst the total area of treated forest had increased to almost three-quarters of a million acres from a figure of under 5,000 acres when Mr. Grenning took up office. In the technical field procedures have been developed under his guidance and encouragement that have won world-wide recognition. His sound and inspiring leadership of the Department will have a permanent beneficial effect on Forestry in Queensland.

Mr. Grenning's services are well recognised by prominent world forestry authorities, one of whom once described him as "the doyen of Australian foresters", whilst his prestige in the Commonwealth is demonstrated by the fact that he was the first recipient of the N. W. Jolly Award, which is awarded for outstanding service to forestry.

Added to his achievements as a Forester, Mr. Grenning has personal qualities that endeared him to every member of the Department and this affection was reflected in the many tributes paid to him at a function at which Mr. Grenning was farewelled by the Minister for Local Government and Conservation, the Honourable Harold Richter, M.L.A., and the staff of the Department. These expressions of goodwill led Mr. Richter to comment that he appreciated sincerity when he saw it and he was struck by the evidence of this sentiment in all remarks made.

I wish to record here the deepest appreciation for all Mr. Grenning has done for Forestry in Queensland during his long term of leadership and to extend to him again the best wishes of the staff for many years of health and happiness in his retirement.

It is with deep regret that the deaths are recorded of Mr. C. W. F. Pohlmann, Senior Forester, Brisbane, Mr. R. G. Trevethan, Forester, Gympie, and Mr. W. J. W. Benstead, Forest Ranger, Imbil. The sympathy of all members of the Department is extended to the bereaved relatives.

Mr. Pohlmann, who passed away on Sunday, 28th July, 1963, had served the Department with great merit for forty years, the latter seventeen years in the capacity of Senior Forester, which embraced the control of forest management. In this position Mr. Pohlmann had a very substantial influence in developing the management practices and procedures of the Department. He displayed great courage in carrying on over the latter years of his service despite severe physical handicap. His loss was deeply felt by the Department.

Mr. B. A. Stark was awarded the Schlich Medal, which is awarded to the graduate of the Australian Forestry School attaining the highest pass in the final year.

Mr. R. E. Pegg and Mr. D. G. Nikles were each awarded Overseas Studentships and left for the United States of America in July and August respectively.

ACKNOWLEDGEMENT

I desire to record my appreciation of the loyal and efficient service of all members of the staff during the past year.

A. R. TRIST,
Conservator of Forests.

APPENDICES

APPENDIX A

Return of Timber, &c., Removed from Crown Lands during the Year ended 30th June, 1964

SPECIES	QUANTITY	
	Super. feet	Super. feet
Milling Timber—		
(a) Native Forests—		
Hoop and Bunya Pine—		
Ply	3,133,044	
Logs	10,758,793	
Tops	11,443,817	25,335,654
Kauri Pine	1,615,190	
Cypress Pine	28,932,025	
Forest Hardwoods	66,664,304	
Scrub Hardwoods	11,404,963	
Cabinet Woods	16,632,935	
Miscellaneous Species	27,948,714	
Limb Logs, Head Logs, Stumps and Fitches	20,552	153,218,683
(b) Plantation—		
Hoop Pine	26,395,127	
Bunya Pine	70,454	
Kauri Pine	204,399	
Slash Pine (<i>Pinus elliotii</i>)	2,396,891	
Loblolly Pine (<i>Pinus taeda</i>)	2,863,552	
<i>Pinus patula</i>	1,209,211	
<i>Pinus radiata</i>	190,987	
Exotics (Miscellaneous)	12,492	
Silky Oak	1,843	
Hardwood (Rose Gum)	266,628	
Hardwood (Blackbutt)	47,308	
		33,658,892
		212,213,229
	Expressed as Superficial feet (Hoppus)	Log Measure
Other Classes—		
Sleepers Hewn	37,122 pieces	1,410,636
Sleepers Sawn—5 ft.	151,701 pieces	4,247,628
Sleepers Sawn—7 ft.	403,646 pieces	15,338,548
Sleeper Blocks (as sleepers contained)	387,292 pieces	13,942,512
Transoms, Crossings, Headstocks, Longitudinals	310,973 superficial feet	497,557
Girders, Corbels, Piles, Sills, Kerb Logs	49,417 lineal feet	889,506
Girder Logs	238,771 superficial feet	238,771
Poles	265,482 lineal feet	1,858,374
House Blocks	27,015 lineal feet	162,090
Fencing Material—Split	212,082 pieces	1,908,738
Fencing Material—Round	79,954 lineal feet	199,885
Mining Timber—Split	33,526 pieces	134,104
Mining Timber—Round	393,714 lineal feet	787,428
Stumps	17,853 superficial feet	17,853
		41,633,630

Other Classes—continued—	
Fuel	34,035 tons
Charcoal	3 bags
Trees and Plants (number)	35,322
Sand, Gravel, Soil, Antbed, &c.	393,133 cubic yards
Freestone	2,142 cubic feet
Fibre, Bark and Dry Leaves	69 bags
Duboisia	360 pounds
Flora	209 pieces
Peat	183 bags
Lawyer Cane	1 ton
Mulga Wood	69 tons
Poling Timber (Copper Refining)	3,768 tons
Mangrove Case Timber	2,802 lineal feet

APPENDIX B

Total Receipts for the Year ended 30th June, 1964

RECEIPTS FROM DISTRICTS	TOTALS	
	£	s. d.
Group 1—South Queensland (Beerburum, Beerwah, Benarkin, Bundaberg, Fraser Island, Gallangowan, Gympie, Imbil, Jimna, Kalpowar, Maryborough, Monto, Murgon, Yarraman)	977,440	6 11
Group 2—North Queensland (Atherton, Cairns, Cooktown, Charters Towers, Herberton, Hughenden, Ingham, Innisfail, Port Douglas, Ravenswood, Townsville)	386,068	5 1
Group 3—Dalby, Roma, Taroom, Charleville, Mitchell, Quilpie	114,962	11 6
Group 4—Warwick, Goondiwindi, Inglewood, St. George, Stanthorpe, Cunnamulla	-75,710	18 0
Group 5—Mackay, Rockhampton, Clermont, Bowen, Proserpine, Emerald, Springsure, Theodore	59,571	12 11
Group 6—Bacaldine, Blackall, Jundah, Longreach, Muttaborra, Stonehenge, Winton, Aramac, Isisford, Jericho	759	3 4
Group 7—Cloncurry, Boulia, Kynuna, Mackinlay, Richmond	199	14 10
Group 8—Burketown, Coen, Croydon, Georgetown, Normanton, Thursday Island		
	£1,614,712	12 7
OTHER RECEIPTS		
Forestry and Lumbering	284,626	2 1
Sale of Plants, Material, &c.	8,942	7 2
Licenses* (See note after Appendix C)	3,493	4 6
Rents and Grazing Dues	11,997	16 5
Fancywoods	116	13 3
Miscellaneous (Kiln A/c, Forfeited Wages &c.)	34,617	12 4
	£1,958,506	8 4
Plant Hire—		
Charged Loan Fund Projects	210,789	18 8
Trust Fund Projects	80,826	13 0
Revenue Fund Projects	1,216	5 7
	292,832	17 3
	£2,251,339	5 7

APPENDIX C

Proceeds of Sales of Timber, &c., for the Period 1st July, 1960, to 30th June, 1964

Groups*	1960-61			1961-62			1962-63			1963-64		
	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.
Group 1	1,209,080	4	8	929,551	3	6	962,516	15	5	977,440	6	11
Group 2	468,668	16	4	413,157	6	6	417,796	12	7	386,068	5	1
Group 3	121,174	0	6	92,704	11	3	96,415	1	6	114,962	11	6
Group 4	79,615	12	9	65,935	4	4	61,203	8	10	75,710	18	0
Group 5	60,250	11	2	50,695	6	2	40,297	0	4	59,571	12	11
Group 6	1,410	10	9	1,065	1	3	960	15	10	759	3	4
Group 7	287	12	1	1,076	2	10	4,569	11	6	199	14	10
Group 8	1	10	0	4	0	0	237	10	0	..	..	..
	1,940,488	18	3	1,554,188	15	10	1,583,996	16	0	1,614,712	12	7
Receipts—Forestry and Lumbering ..	299,108	3	8	154,927	9	3	155,746	9	9	284,626	2	1
Sale of Plants, Material, &c. ..	26,209	5	4	21,782	18	7	11,337	3	0	8,942	7	2
Licenses†	3,138	3	4	3,442	3	4	3,316	11	0	3,493	4	6
Rents and Grazing Dues	9,677	11	1	9,950	2	1	11,175	8	6	11,997	16	5
Fancywoods .. .. .	..	..	..	..	..	..	968	11	3	116	13	3
Miscell. (Kiln A/c, forfeited wages &c.) ..	..	..	..	..	..	..	18,081	19	0	34,617	12	4
	2,278,622	1	8	1,744,291	9	1	1,784,622	18	6	1,958,506	8	4

* For Districts within the groups, see Appendix B.

† Includes the following license fees:—Fuel, Quarry, Sawmill, Apiary, Forest Products, Sales Permit.

APPENDIX E

Comparative Statement of Expenditure for Years 1962-63 and 1963-64

APPENDIX D
Constructional Timber Supplied During Financial Year 1963-64
under Forestry and Lumbering Operations

Class of Timber	Quantity	Sales Value	
		£	s. d.
Hewn Crossings ..	29,374 superficial feet	1,452	5 8
Sawn Crossings ..	82,406 superficial feet	4,080	16 7
Headstocks and Braces ..	7,525 superficial feet	428	3 10
Hewn Transoms ..	45,800 superficial feet	2,984	11 5
Sawn Transoms ..	31,430 superficial feet	1,712	18 9
Piles	2,056 lineal feet	859	15 9
Girders—Dressed ..	9,658 lineal feet	9,253	3 0
Hewn Sleepers ..	12,578 pieces	8,412	5 3
Sawn Sleepers ..	126,289 pieces	85,054	14 3
Sleeper Blocks (as sleepers contained) ..	387,292 pieces	153,510	15 4
Split Posts and Rails, &c. ..	16,184 pieces	2,788	3 1
Total		£270,537	12 11

	1962-63	1963-64
	£	£
Revenue—		
Salaries	500,129	580,676
Travelling Expenses and Incidentals ..	31,297	35,124
Fares, Printing, Stores, &c. ..	4,988	4,960
Cash Equivalent of Long Service Leave ..	3,991	6,972
National Parks	57,561	22,849
Loan—		
Reforestation	1,864,257	1,733,620
Acquisition of Land for Forestry Purposes	7,256	9,963
Access Roads	144,689	181,407
Purchase of Plant	189,429	258,597
Purchase of Radio Equipment ..	9,950	19,910
National Parks .. .. .	..	37,354
Trust—		
Hardwood Supplies to Railway Department and Others ..	171,099	254,248
Harvesting and Marketing Timber ..	546,125	578,806
Access Roads—Maintenance and Subsidies	103,301	91,732
Maintenance of Capital Improvements ..	59,360	56,780
Maintenance of Plant	236,506	234,346
Interest and Redemption on Loans ..	904,506	976,941
Total	£ 4,834,444	5,084,285

APPENDIX F

Net Area of Plantation Established 1st April, 1963, to 31st March, 1964

Species	Brisbane	Gympie	Mackay	Maryborough	Monto	Murgon	North Queensland	Warwick	Yarraman	Queensland Total
	Acres	Acres	Acres	Acres	Acres	Acres	Acres	Acres	Acres	Acres
<i>Softwoods</i>										
A. Native Conifers—										
Hoop Pine	43.7	445.1	..	19.0	192.1	432.4	86.0	..	816.9	2,035.2
Bunya Pine .. .. .	..	37.0	..	..	..	..	..	..	..	37.0
B. Exotic Conifers—										
<i>P. elliotii</i>	466.4	399.8	33.0	564.3	..	..	..	26.6	..	1,490.1
<i>P. taeda</i>	25.3	..	..	..	..	..	..	..	0.5	25.8
<i>P. patula</i> .. .. .	..	..	..	..	..	..	..	..	117.0	117.0
<i>P. caribaea</i>	10.0	..	461.4	1.5	..	..	11.0	..	..	483.9
<i>P. radiata</i> .. .. .	..	..	..	..	..	..	..	175.7	21.0	196.7
Other Exotic Conifers .. .. .	..	1.0	..	..	..	..	..	..	..	1.0
C. Broadleaved Softwoods—										
Maple .. .. .	..	4.9	..	..	..	..	..	..	..	4.9
Total—Softwoods	545.4	887.8	494.4	584.8	192.1	432.4	97.0	202.3	955.4	4,391.6
<i>Eucalypts</i>										
<i>Euc. grandis</i> (inc. <i>Euc. saligna</i>) ..	64.3	..	1.5	..	..	..	..	..	..	65.8
<i>Euc. microcorys</i>	7.0	..	..	..	..	..	..	..	..	7.0
<i>Euc. pilularis</i>	4.5	48.0	1.5	..	..	..	..	..	..	54.0
Other Eucalypts	9.6	115.8	0.5	..	..	..	..	..	..	125.9
Total—Eucalypts	85.4	163.8	3.5	..	..	..	..	..	..	252.7
Total—All Species	630.8	1,051.6	497.9	584.8	192.1	432.4	97.0	202.3	955.4	4,644.3

APPENDIX G

Net Area of Effective Plantation Classified into Forestry Districts to 31st March, 1964

Species	Brisbane	Gympie	Mackay	Maryborough	Monto	Murgon	North Queensland	Warwick	Yarraman	Queensland Totals
	Acres	Acres	Acres	Acres	Acres	Acres	Acres	Acres	Acres	Acres
<i>Softwoods</i>										
A. Native Conifers—										
Hoop Pine	615.5	16,793.6	15.4	169.6	3,415.0	9,993.2	1,141.0	..	19,794.7	51,938.0
Kauri Pine	4.5	1,559.9	0.7	69.7	2.2	4.9	298.1	..	7.1	1,947.1
Bunya Pine	1.5	433.3	1.7	4.7	1.2	37.6	0.9	..	58.0	538.9
Other Native Conifers	5.2	51.4	0.6	1.7	1.6	..	0.9	..	1.6	63.0
B. Exotic Conifers—										
<i>P. elliotii</i>	12,671.6	8,859.1	2,407.8	11,079.9	70.5	54.3	7.8	781.0	916.4	36,848.4
<i>P. taeda</i>	3,338.3	105.1	9.8	54.1	1.0	116.2	13.7	224.7	41.9	3,904.8
<i>P. patula</i>	18.7	25.6	7.6	8.1	25.2	123.9	43.6	669.8	3,391.2	4,313.7
<i>P. caribaea</i>	56.3	124.5	3,291.3	165.7	1.0	..	45.5	..	..	3,684.3
<i>P. radiata</i> .. ..	..	..	..	..	..	..	..	1,860.2	458.7	2,318.9
<i>P. palustris</i>	252.7	1.8	5.8	1.0	..	..	..	9.2	2.6	273.1
Other Exotic Conifers	83.2	24.2	86.2	17.2	8.5	1.8	10.1	30.4	26.9	288.5
C. Broadleaved Softwoods—										
Silky Oak .. ..	..	175.9	..	..	..	32.1	31.7	..	675.5	915.2
Maple .. ..	..	71.5	..	..	..	2.9	202.3	..	..	276.7
Red Cedar .. ..	..	12.5	..	..	..	..	29.2	..	..	41.7
Others	0.1	105.2	..	0.3	0.8	0.9	93.6	..	..	200.9
Total—Softwoods	17,047.6	28,343.6	5,826.9	11,572.0	3,527.0	10,367.8	1,918.4	3,575.3	25,374.6	107,553.2
<i>Eucalypts</i>										
<i>Euc. grandis</i> (inc. <i>Euc. saligna</i>)	146.5	900.2	1.5	..	..	33.7	0.7	..	215.7	1,298.3
<i>Euc. paniculata</i>	229.2	216.2	..	..	..	76.4	35.6	..	459.3	1,016.7
<i>Euc. microcorys</i>	264.4	17.5	..	..	..	..	27.7	..	28.7	338.3
<i>Euc. pilularis</i>	230.7	207.3	3.0	..	..	..	0.2	..	..	441.2
Other Eucalypts	170.8	680.9	2.0	..	..	12.8	4.5	..	12.7	883.7
Total—Eucalypts	1,041.6	2,022.1	6.5	..	..	122.9	68.7	..	716.4	3,978.2
Total—All Species	18,089.2	30,365.7	5,833.4	11,572.0	3,527.0	10,490.7	1,987.1	3,575.3	26,091.0	111,531.4

APPENDIX H
Areas of Natural Forest Treated

A.—EUCALYPTS

Sub-District	Treated 1963-64	First Treatment 1963-64	Total as at 30th June, 1964
	Acres	Acres	Acres
Brisbane	1,119	834	27,457
Beerburum	1,187	67	20,190
Gympie	908	750	19,248
Imbil .. ..	..	..	159
Mackay	412	412	5,000
Emerald .. ..	..	..	33,875
Maryborough	6,442	2,800	99,509
Bundaberg	1,537	1,105	34,002
Fraser Island	1,706	707	21,847
Monto	1,400	1,220	18,585
Murgon	5,713	4,461	29,819
Atherton .. ..	..	..	3,689
Ingham .. ..	..	..	2,985
Warwick	1,327	150	10,167
Inglewood .. ..	..	..	15,697
Yarraman	250	..	6,391
Benarkin .. ..	..	..	2,051
Dalby	16,388	12,935	71,427
Total—Eucalypts	38,389	25,441	422,098

APPENDIX H—continued

B.—CYPRESS PINE

Sub-District	Treated 1963-64	First Treatment 1963-64	Total as at 30th June, 1964
	Acres	Acres	Acres
Bundaberg .. ..	..	..	2,152
Fraser Island .. ..	..	..	4,424
Monto .. ..	..	..	2,496
Inglewood	6,694	3,074	89,059
Dalby	13,149	10,445	205,635
Total—Cypress Pine	19,843	13,519	303,766

APPENDIX H—continued

C.—RAIN FOREST

Sub-District	Second Treatment 1963-64	First Treatment 1963-64				First Treatment Completed 1963-64	Total as at 30th June, 1964
		Brushed	Ringbarked and Thinned	Logged under Treemarking Conditions	Trees Interplanted		
	Acres	Acres	Acres	Acres	Number	Acres	Acres
Natural Hoop Pine—							
Maryborough .. ..	..	..	..	..	..	..	65
Bundaberg .. ..	..	..	..	..	..	..	9,922
Total—Natural Hoop Pine	..	..	..	..	..	..	9,987
Natural Rain Forest—							
Atherton	749	686	1,233	2,834	3,340	1,233	5,489
Ingham .. ..	..	262	112	1,896	250	112	1,039
Total—Natural Rain Forest	749	948	1,345	4,730	3,590	1,345	6,528
Total—Rain Forest	749	948	1,345	4,730	3,590	1,345	16,515

APPENDIX H—continued

Grand Total—	Acres
Eucalypts	422,098
Cypress Pine	303,766
Rain Forest	16,515
	<u>742,379</u>

APPENDIX I

State Forests, Timber Reserves, National Parks and Scenic Areas listed by Forestry Districts and Sub-Districts at 30th June, 1964

District	Sub-District	State Forests			Timber Reserves			National Parks			Scenic Areas		
		No.	Area		No.	Area		No.	Area		No.	Area	
			A.	R. P.		A.	R. P.		A.	R. P.		A.	R. P.
Brisbane ..	Beerburum	34	99,411	2 11	19	6,902	0 35	1	1,669	3 20	10	2,250	2 8
	Brisbane ..	37	182,354	1 26	22	38,035	2 13	9	77,078	2 0	22	5,527	2 1
	Total ..	71	281,765	3 37	41	44,937	3 8	10	78,748	1 20	32	7,778	0 9
Dalby ..	Chinchilla-	13	806,360	3 18	3	17,911	0 0	1	22,000	0 0	..	..	..
	Barakula	..	..	..	..	..	..	..	..	..	..	..	..
	Dalby ..	15	471,852	2 35	5	5,977	0 39	1	13,145	0 0	..	..	..
	Roma ..	12	259,496	1 37	5	112,202	0 0	..	..	..	..	..	..
Total ..	40	1,537,710	0 10	13	136,090	0 39	2	35,145	0 0	..	..	..	..
Gympie ..	Gympie ..	34	292,627	2 37	4	2,704	0 7	..	..	..	3	886	0 0
	Imbil ..	10	143,320	2 0	2	148	2 3	..	..	..	1	640	0 0
	Total ..	44	435,948	0 37	6	2,852	2 10	..	..	..	4	1,526	0 0
Mackay ..	Emerald ..	3	132,478	3 35	10	210,762	2 0	2	131,400	0 0	..	..	..
	Mackay ..	6	134,837	0 0	23	151,469	3 19.1	24	255,339	0 0	64	15,618	1 38
	Rockhampton	11	253,983	1 0	18	148,153	2 22	2	13,050	0 0	14	1,047	0 0
	Total ..	20	521,299	0 35	51	510,386	0 1.1	28	399,789	0 0	78	16,665	1 38
Maryborough	Bundaberg ..	17	140,325	2 23	28	91,252	2 30	..	..	..	..	..	..
	Fraser Island	1	387,200	0 0	..	..	..	..	..	..	..	..	..
	Maryborough	38	364,170	2 13	18	31,276	0 37	3	10,540	0 0	3	805	0 0
Total ..	56	891,696	0 36	46	122,528	3 27	3	10,540	0 0	3	805	0 0	0 0
Monto ..	Kalpowar ..	4	28,077	2 0	14	46,635	0 35	..	..	..	..	..	..
	Monto ..	15	377,198	3 35	39	215,606	1 25	1	3,830	0 0	5	1,077	0 0
	Total ..	19	405,276	1 35	53	262,241	2 20	1	3,830	0 0	5	1,077	0 0
Murgon ..	Gallangowan	3	37,910	0 0	..	..	..	..	..	..	..	..	..
	Jimna ..	5	89,532	3 26	2	5,420	0 0	..	..	..	..	..	..
	Murgon ..	9	96,177	0 0	11	54,920	1 3	..	..	..	..	..	..
	Total ..	17	223,619	3 26	13	60,340	1 3	..	..	..	..	..	..
North Queensland	Atherton ..	30	391,105	0 24	29	1,067,429	0 13	12	251,249	1 28	30	5,941	0 19
	Ingham ..	8	231,143	0 0	10	276,373	1 6	14	199,377	0 0	12	1,305	0 0
	Total ..	38	622,248	0 24	39	1,343,802	1 19	26	450,626	1 28	42	7,246	0 19
Warwick ..	Inglewood ..	16	350,365	1 35	5	16,764	0 8	..	..	..	..	..	..
	Warwick ..	13	82,039	3 37	4	6,887	1 28	3	15,677	3 0	4	494	3 0
	Total ..	29	432,405	1 32	9	23,651	1 36	3	15,677	3 0	4	494	3 0
Yarraman ..	Benarkin ..	3	56,740	0 0	3	4,442	2 26	..	..	..	..	..	..
	Yarraman ..	18	119,757	2 17	11	15,304	2 9	..	11,085	0 0	1	30	3 0
	Total ..	21	176,497	2 17	14	19,747	0 35	..	11,085	0 0	1	30	3 0
Grand Total		355	5,528,467	1 9	285	2,526,578	1 38.1	73	1,005,441	2 8	169	35,623	0 26

At 30th June, 1964—

Total area reserved for—

	A.	R.	P.
State Forests	5,528,467	1	9
Timber Reserves	2,526,578	1	38.1
National Parks	1,005,441	2	8
Scenic Areas	35,623	0	26
Total Reservations	<u>9,096,110</u>	<u>2</u>	<u>1.1</u>

APPENDIX J

Reservations for the Year ended 30th June, 1964

1st July, 1963, to 30th June, 1964

STATE FORESTS			
	No.	A.	R. P.
At 1st July, 1963	351	5,474,291	0 20
Proclaimed 1-7-63 to 30-6-64 ..	5	22,831	3 8
Proclaimed Converted Timber Reserves	5	33,800	0 0
V.C.L. added to existing reserves ..	..	5,370	3 26
Timber Reserves amalgamated with State Forests .. .. .	..	2,095	0 0
Areas released .. .. .	..	-8,952	2 16.5
Recomputation of boundary .. .. .	..	-945	2 1.5
Reserves amalgamated with existing reserves	-5	..	..
Reserves cancelled	-1	-23	1 27
Total at 30th June, 1964 ..	355	5,528,467	1 9

TIMBER RESERVES			
	No.	A.	R. P.
At 1st July, 1963	294	2,619,079	1 33.1
Proclaimed	1	1,330	0 0
Recomputation of boundary .. .. .	..	+970	0 17.2
Areas released .. .. .	..	-56,834	2 8.2
Reserves cancelled	-3	-2,071	2 4
Reserves converted to State Forests ..	-7	-35,895	0 0
Total at 30th June, 1964 ..	285	2,526,578	1 38.1

APPENDIX J—continued

NATIONAL PARKS

	No.	A.	R. P.
At 1st July, 1963	71	911,251	3 8
Proclaimed 1-7-63 to 30-6-64 ..	2	12,780	0 0
National Parks Amalgamated ..	-1	..	..
Scenic Areas converted to National Park	1	686	2 0
V.C.L. added to National Park .. ..	..	77,413	3 0
Recomputation of boundary .. .. .	..	+3,398	2 22
Areas released .. .. .	..	-89	0 22
Total at 30th June, 1964 ..	73	1,005,441	2 8

SCENIC AREAS			
	No.	A.	R. P.
At 1st July, 1963	169	35,338	1 11
Proclaimed 1-7-63 to 30-6-64 ..	1	961	2 0
V.C.L. added to Scenic boundary ..	..	9	2 10.4
Recomputation of boundary .. .. .	..	+0	1 4.6
Scenic Areas converted to National Park	-1	-686	2 0
Total at 30th June, 1964 ..	169	35,623	0 26

APPENDIX K

Distribution of Personnel, 30th June, 1964

Salaried officers	403
Other employees	1,602
Total	2,005