ANNUAL REPORT 1966

FORESTS DEPARTMENT

WESTERN AUSTRALIA

Cover . . .

Institute of Forest Research and Protection, situated in the Collier Pine Plantation, Como.

REPORT

on the operations of the

FORESTS DEPARTMENT

WESTERN AUSTRALIA

for the year ended

30th JUNE, 1966

by

A. C. HARRIS, B.Sc. (Adel.)

Conservator of Forests

PRESENTED TO BOTH HOUSES OF PARLIAMENT

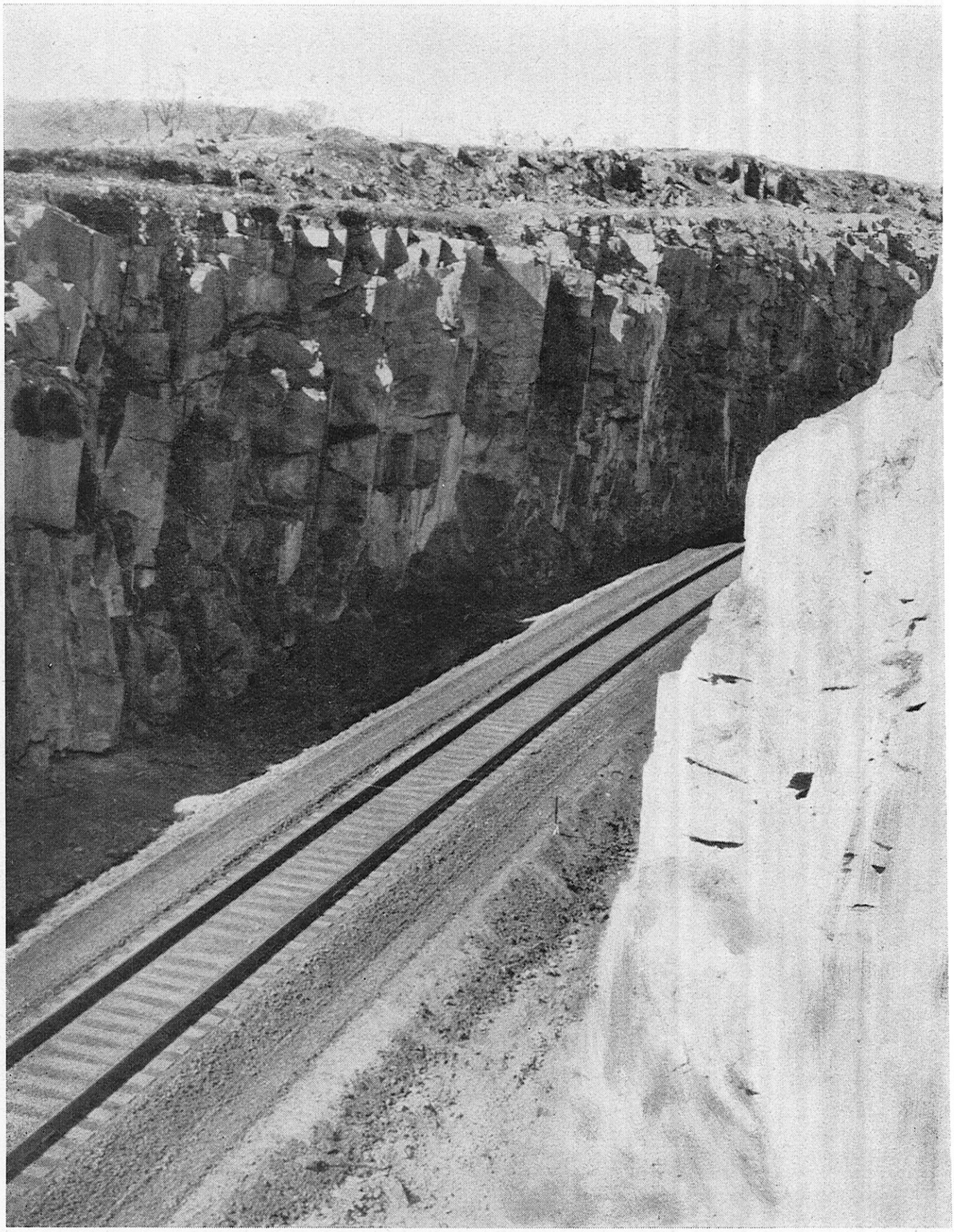
Forests Department,
PERTH,
30th September, 1966

TO THE HONOURABLE THE MINISTER FOR FORESTS

Sir,

I have the honour to transmit herewith my report on the operations of the Department for the year ended 30th June, 1966.

Yours faithfully,
A. C. HARRIS,
Conservator of Forests.



Timber plays a part in the development of mineral resources in the North-West.

The photograph shows part of the 179 mile standard-gauge railway line constructed by Hamersley Iron Pty. Ltd. to tap huge iron-ore deposits in the Hamersley Range.

At 3,520 to the mile (18 in. centres) some 630,000 sleepers were required. The total volume of sleepers used in this line was 1,890,000 cubic feet, or over 10 per cent. of W.A.'s annual sawn production.

CONTENTS

PRINCIPAL OFFICERS

Conservator of Forests	A. C. HARRIS, B.Sc. (Adel.), Associate Member, Australian Institute of Mining and Metallurgy.
Deputy Conservator of Forests	W. R. WALLACE, Dip.For. (Canb.).
Chief of Division	D. W. R. STEWART, B.Sc. (For.), Dip.For. (Canb.), Dip.For. (Oxon.).
Chief of Division	D. R. MOORE, B.Sc. (Adel.).
Chief of Division	W. H. EASTMAN, B.Sc. (For.), Dip.For. (Canb.), DipFor. (Oxon.).
Fire Control Superintendent	A. J. MILESI, B.Sc. (Adel.).
Utilization Officer	H. C. WICKETT, M.Sc. (Adel.), B.For.Sc. (N.Z.), A.M.I.E. (Aust.), Dip.For. (Canb.).
Superintendent	J. C. MEACHEM, D.F.C., B.Sc.(For.), Dip.For. (Canb.).
Superintendent	B. J. BEGGS, B.Sc.(For.), Dip.For. (Canb.).
Secretary	E. S. BUDD.
Accountant	E. G. BAKER, A.A.S.A.
Registrar	R. K. REID.

LIST OF COMMON AND BOTANICAL NAMES OF TREES USED IN THIS REPORT

Brown Boronia	*Boronia megastigma*
Brown Mallet	*Eucalyptus astringens*
Coral-flowered Gum	*Eucaluptus torquata*
Dwarf Sugar Gum	*Eucalyptus cladocalyx var. nana*
Jarrah	*Eucalyptus marginata*
Karri	*Eucalyptus diversicolor*
Marri	*Eucalyptus calophylla*
Maritime Pine (Pinaster Pine)	*Pinus pinaster*
Monterey Pine (Radiata Pine)	*Pinus radiata*
Powderbark Wandoo	*Eucalyptus accedens*
River Gum	*Eucalyptus camaldulensis*
Sandalwood	*Santalum spicatum*
Sheoak	*Casuarina fraseriana*
Sugar Gum	*Eucalyptus cladocalyx*
Tingle (Red)	*Eucalyptus jacksoni*
Tingle (Yellow)	*Eucalyptus guilfoylei*
Tuart	*Eucalyptus gomphocephala*
Wandoo	*Eucalyptus redunca var. elata*
W.A. Blackbutt (Yarri)	*Eucalyptus patens*

I. STATISTICAL SUMMARY OF MAJOR OPERATIONS

Timber Production in cubic feet.

Total Production Sawn Timber	17,377,858	
Exports—Interstate	1,614,471	(9.3 per cent.)
Overseas	817,907	(4.7 per cent.)
Local Consumption	14,945,480	(86 per cent.)

Recent Trends in Production and Consumption.

Year	Production			Total Export	Local Consumption	Sawmills	Monthly Average of Men Employed
	Sawn	Hewn	Total				
	cub. ft.	cub. ft.	cub. ft.	cub. ft.	cub. ft.	No.	No.
1925–26	14,522,733	6,277,952	20,800,685	12,001,384	8,799,301	....	....
1937–38	11,720,642	2,573,540	14,294,192	7,545,744	6,748,448	134	3,112
1945–46	8,869,847	14,041	8,883,888	3,373,025	5,510,863	128	2,876
1950–51	12,571,635	1,183	12,572,818	2,342,492	10,230,326*	256	4,047
1951–52	14,717,112	....	14,717,112	2,373,553	12,343,559*	280	4,708
1952–53	16,973,332	1,761	16,975,093	3,965,188	13,009,905	306	5,395
1953–54	18,343,974	1,454	18,345,428	3,858,956	14,486,472	299	5,724
1954–55	18,915,967	4,561	18,920,528	3,477,249	15,443,279	279	5,879
1955–56	19,213,771	5,308	19,219,079	4,568,034	14,651,045	274	5,804
1956–57	17,798,984	3,790	17,802,774	4,679,979	13,122,795	261	5,574
1957–58	17,487,573	742	17,488,315	5,671,712	11,816,603	268	5,227
1958–59	17,758,023	1,310	17,759,333	6,465,021	11,294,312	260	5,155
1959–60	16,625,475	....	16,625,475	6,167,132	10,458,343	265	5,037
1960–61	15,783,370	....	15,783,370	5,212,532	10,570,838	238	4,790
1961–62	15,801,067	....	15,801,067	5,660,639	10,140,428	236	4,906
1962–63	15,593,099	....	15,593,099	5,482,513	10,110,586	221	4,725
1963–64	16,088,169	....	16,088,169	5,266,328	10,821,841	214	3,448*
1964–65	17,052,025	....	17,052,025	4,716,296	12,335,729	206	3,615*
1965–66	17,377,858	....	17,377,858	2,432,378	14,945,480	203	3,518*

* From 1963-64 these figures exclude persons employed in associated timber yards in the Metropolitan area.

	1965–66			1964–65
Total Cut				
Log Volumes (in cubic feet)	52,330,608	Jarrah	39,606,377	36,934,837
		Karri	7,834,423	8,854,282
		Wandoo	2,205,133	2,509,252
		Pine	1,912,897	1,721,951
		Other	771,778	623,838
			50,644,160	

Made up as follows:—

From State Forest and Crown Land	42,224,817 cubic feet	(80.7 per cent.)
From Private Property	10,105,791 cubic feet	(19.3 per cent.)

Value Produced

Total Value of Timber (on mill skids)	$26,871,250	$25,076,700
Total Value of other Forest Products	$6,475,600	$6,507,000

Forest Area

Additions to State Forest	1,940 acres
Excisions from State Forest	14,379 ,,
Land Purchased for Pine Planting	2,558 ,,
Total Area of State Forest	4,448,827 ,,

Reforestation

Cut-over area treated for regeneration	109,826 ,,

Afforestation

Area planted with pines, 1964		2,839 ,,
Pinus radiata	1,234 acres	
Pinus pinaster	1,601 ,,	
Other species	4 ,,	
Total area of pine plantation established		43,761 ,,
Pinus radiata	18,249 ,,	
Pinus pinaster	25,026 ,,	
Other species	486 ,,	
Total experimental areas (additional)		1,032 ,,

Management

Survey:—	
Theodolite surveys	70 miles
Other surveys	160 ,,
Topographical mapping	1,800,000 acres
Air Photo Interpretation—	
Complete	404,000 ,,
Preliminary	153,500 ,,
Assessment—	
Detailed	1,683 ,,
Area covered	450,000 ,,
Type maps produced, covering	1,777,500 ,,
Engineering, new works:—	
Roads and tracks	359 miles
Telephone lines	1 ,,
Houses and buildings	4 (No.)

Protection

Controlled burning	735,179 acres
Fire Outbreaks:—	
Number	251
Area burnt	6,158 acres

Nurseries (Hamel and Dryandra)

Trees produced for—	
Private buyers	217,440 (No.)
Forests Department	195,816 ,,

Sandalwood

Quantity exported	716 tons

SOURCE AND USE OF FUNDS

	1965–66	1964–65
Source		
Revenue—		
Royalties on Timber, etc.	2,458,322	2,307,728
Departmental Sales of Logs, etc.	1,458,896	1,314,006
	3,917,218	3,621,734
General Loan Fund	360,000	300,000
Federal Aid Road Grant	170,000	152,000
	4,447,218	4,073,734
Use:		
Consolidated Revenue Fund	1,296,882	1,247,640
Reforestation Fund	2,730,825	2,120,396
General Loan Fund	360,000	300,000
	4,387,707	3,668,036

2. REVENUE AND EXPENDITURE

Revenue from all sources was $3,917,218 compared with $3,621,734 the previous year. In the following, figures in brackets refer to 1964–65.

Of the net revenue $2,352,665 ($2,142,086) was transferred to the Forests Improvement and Reforestation Fund. Expenditure charged against this Fund was $2,713,194 ($2,093,680) and the balance in the Fund at the 30th June, 1966, was $471,303 ($613,904) which includes reserves for Building $110,000 and Fire Control $201,000.

The return from thinning operations in Departmental pine plantations was $246,622 ($174,470).

3. THE FOREST AREA

(1) State Forests (Forests Act, 1918–1964)

The total area of State Forest at 30th June, 1966, was 4,448,827 acres which is a decrease of 12,439 acres compared with the total area at 30th June, 1965. This is the first annual decrease since 30th June, 1945.

During the year, additions totalling 1,940 acres were made to State Forest and 14,379 acres were excised and reverted to the Lands Department.

	June, 1965 Acres	June, 1966 Acres
Jarrah	3,190,853	3,190,463
Karri	171,049	171,053
Jarrah and Karri (mixed)	655,241	655,994
Jarrah and Wandoo (mixed)	176,815	163,785
Tuart	5,995	6,471
Tingle Tingle	10,687	10,687
Karri and Tingle (mixed)	13,885	13,885
Sandalwood	1,930	1,930
Pine Planting	177,774	177,762
Mallet	56,885	56,645
Miscellaneous	152	152
	4,461,266	4,448,827

(2) Timber Reserves (Forests Act, 1918–1964)

The area held under Timber Reserve at 30th June, 1966, was 1,859,538 acres, which is an increase of 2,052 acres on the area at 30th June, 1965.

	June, 1965 Acres	June, 1966 Acres
Jarrah	93,638	96,015
Wandoo and Jarrah	61,320	61,320
Jarrah and Karri	78	78
Pine Planting	5,908	5,908
Mallet	475	475
Sandalwood	23,100	23,100
Mining Timber, Firewood, etc.	1,672,967	1,672,642
	1,857,486	1,859,538

(3) Land Alienations, etc.

During the year ended 30th June, 1966, 235 applications for land and road protections and closures were received covering a total of 144,540 acres.

The Department agreed to the release as follows:—

Alienations			Mineral Claims and Leases (Pastoral-Grazing)		
Timber Zone		Outside Timber Zone	Timber Zone		Outside Timber Zone
State Forest	Crown Land		State Forest	Crown Land	
acres 85	acres 41,688	acres 23,312	acres 9,493	acres 4,513	acres 6,000

No. of alienations approved 101
No. of leases approved 43

4. SAWMILLING, TIMBER INSPECTION AND FOREST PRODUCE

Timber Production and Inspection

The production of 17,377,858 cubic feet of sawn timber was an increase of 325,833 cubic feet on last year's figure. Of this total production 3,360,175 cubic feet were from timber from private property, which is an increase of 94,436 cubic feet on last year.

During the year ended 31st December, 1965, 203 sawmills were registered, of which 121 operated on Crown land and 82 on private property. Details of the intake of mill logs and production of sawn timber are given in the accompanying tables.

The annual intake of logs (1829–1966) is shown in Appendix 5.

Departmental plantations yielded 1,875,750 cubic feet of pine logs measured under bark compared with last year's figure of 1,721,951 cubic feet measured under bark.

The following quantities of logs were used in local plywood factories:—

	Cubic Feet
Karri	126,896
Pine	84,635
Jarrah	4,048
	215,579

Sawn sleepers produced during the year amounted to 5,018,677 cubic feet of which 1,522,195 cubic feet were from private property. All sleepers produced were inspected and 95,925 cubic feet were re-inspected. Other sawn timber inspected during the year amounted to 870,038 cubic feet.

Track-laying for the Hamersley Iron railway line.

The sleepers, mostly jarrah, but some wandoo and blackbutt, are 8 feet long by 9 in. by 6 in. section. Heavy rails (119 lb./yd.) are welded to 1,020 feet lengths before laying. Train loads of up to 18,000 tons will travel at 45 m.p.h.

Timber Grading Rules

The grading rule for "Timber Used in the Manufacture of Joinery in Western Australia," A.S.O. 36, was published, filling a long-felt need.

One meeting of the Joint Timber Committee was held during the year at which it was decided that at the next re-printing, due shortly, the Western Australian grading rules should be bound more conveniently for users in separate groups instead of in the present Bulletin 56 booklet form.

Two timber grading courses for metropolitan timber yard graders, and one course for sales and management staff were conducted by the Department's metropolitan timber inspector.

TIMBER PRODUCTION

PRODUCTION OF TIMBER FOR YEAR ENDED 30th JUNE, 1966 (EXCLUSIVE OF MINING TIMBER, FIREWOOD, PILES AND POLES)

	Mill Logs in Cubic Feet								Totals	
	Jarrah	Karri	Wandoo	Yarri	Sheoak	Marri	Pine	Other	In Log	Recovery of Sawn Timber
Crown Lands	31,222,186	7,310,871	1,280,533	327,875	16,311	112,595	1,875,750	78,696	42,224,817	14,017,683
Private Property	8,384,191	523,552	924,600	215,025	6,125	10,355	37,147	4,796	10,105,791	3,360,175
Total	39,606,377	7,834,423	2,205,133	542,900	22,436	122,950	1,912,817	83,492	52,330,608	17,377,858

In addition to the above 44,210 tons of Wandoo logs were treated for Tannin Extract.

QUANTITY OF SAWN TIMBER PRODUCED FROM CROWN LANDS AND PRIVATE PROPERTY FOR THE PAST TWO YEARS

Year	From Crown Lands		From Private Property		Total Quantity	Estimated Value of Timber Obtained
	Sawn Timber other than Sleepers	Sawn Sleepers	Sawn Timber other than Sleepers	Sawn Sleepers		
	cub. ft.	cub. ft.	cub. ft.	cub. ft.	cub. ft.	$
1964/65	11,023,179	2,763,107	1,768,477	1,497,262	17,052,025	25,076,700
1965/66	10,521,201	3,496,482	1,837,980	1,522,195	17,377,858	26,871,250

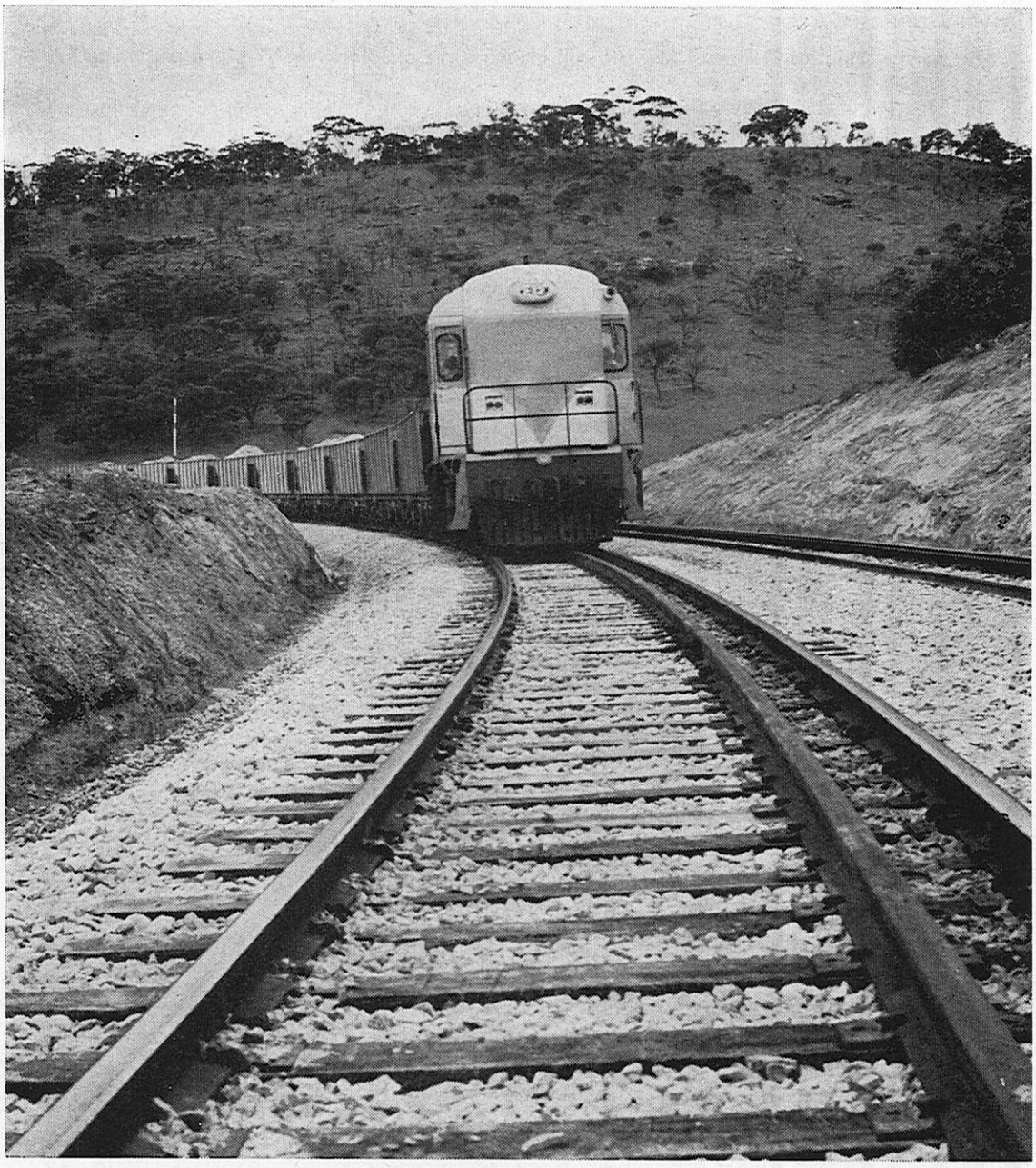
Distribution	Sleepers	Other Sawn Timber		Total
	All Species	Karri	Jarrah and Other Species	
	cub. ft.	cub. ft.	cub. ft.	cub. ft.
Interstate	323,240	561,427	729,804	1,614,471
Overseas	344,897	273,091	199,919	817,907
Local	4,350,540	2,021,673	8,573,267	14,945,480
Total	5,018,677	2,856,191	9,502,990	17,377,858

Distribution of Timber

The impact of the industrial expansion of the State on timber production and distribution is clearly shown by the very high local demand for sleepers, and the sharp fall in overseas and interstate exports.

The construction of a standard-gauge railway linking Kwinana and Kalgoorlie (400 miles) and the complex of railroads required for the development of the huge iron-ore deposits in the North-West of the State has resulted in an increase this year of over 1.3 million cubic feet of sleepers for local use. There was also an equivalent rise in the local use of other sawn timber.

Balancing this local demand there was a very sharp fall in total timber exports of some 2.3 million cubic feet.



The double track, dual-gauge railway line winding through the Darling Range. This section forms part of the West Australian Standard Guage Project, the biggest of its kind in the free world. The complete project will require 1,950,000, 8 ft. by 9 in. by 4½ in., wooden sleepers with a total volume of 4,390,000 cubic feet.

Supplies to interstate markets fell by 1.4 million cubic feet, karri representing 650,000 cubic feet, jarrah 530,000 cubic feet and sleepers 140,000 cubic feet.

Exports to overseas markets fell by some 870,000 cubic feet, mostly sleepers and other sawn jarrah in that order. Most of the decrease in both items was accounted for by a reduction in supplies to South Africa.

The value of imports of timber fell by about $500,000 when compared with the previous year. Overseas sources accounted for the whole of this decrease, the main item being a reduction of $400,000 in sawn hardwood from Malaysia.

Firewood Production and Consumption

The firewood consumption for the State was estimated at 705,500 tons of which 30 per cent. was used for industrial and mining fuel. The quantity of sawdust burnt as fuel was 122,085 tons.

The following table accounts for approximately 49 per cent. of the firewood consumed, the balance being obtained from private property for which specific records are not available.

Of the total quantity consumed 44 per cent. was obtained from Crown Land.

	Crown Land Tons	Private Property Tons	Total Tons
Production—			
Domestic Firewood—			
Firewood Permits (South-West)	62,408	—	62,408
Mill Waste sold as firewood (estimated 50 per cent. of total)	41,356	16,723	58,079
Domestic use on Goldfields	23,935	—	23,935
Total Domestic Firewood as shown by returns	127,699	16,723	144,422
Industrial Firewood—			
Supplied under License, Nos. 3 to 8 Pumps	16,972	—	16,972
Other Pumps	605	—	605
Factories, etc.	72,723	—	72,723
Mill Waste sold as firewood (estimated 50 per cent. of total)	41,356	16,723	58,079
Mill Waste used as firewood	48,138	1,637	49,775
Total Industrial Firewood as shown by returns	179,794	18,360	198,154
Mining Firewood	2,462	—	2,462
Total Firewood Produced (as shown by returns)	309,955	35,083	345,038

Consumption—	Tons	
Domestic (estimated)	473,900	(at 2 tons per dwelling)
Industrial	211,554	(ex Govt. Statistician)
Pumping Stations	17,577	(as per F.D. Returns)
Mining	2,462	(as per F.D. Returns)
	705,493	

Other Forest Produce

Piles and poles obtained from Crown Land during the year amounted to 887,055 lineal feet compared with 941,217 lineal feet for the previous year. Of this total 18,152 lineal feet were produced from Departmental operations. Returns received from private property show 41,385 lineal feet produced as compared with 291,154 lineal feet for the year 1964–65.

There were approximately 474,630 posts and strainers cut from Crown Lands during the year of which 14,290 were produced by this Department. Records received show 26,689 posts obtained from private property but this is only a small percentage of the total production from this source.

The quantity of Mallet Bark obtained from Departmental plantations was 113 tons with a further 73 tons from other Crown Land.

The quantity obtained from private property was 95 tons making a total of 281 tons.

Apart from sawn timber supplied by sawmills, 17,554 tons of mining timber were used. This was nearly all from Crown Lands, 11,220 tons being from inland forests.

The number of Christmas trees sold was 13,027 compared with 12,965 the previous year. The revenue from sales was $6,600.

The following table shows the quantity of minor forest produce obtained during the year. The estimated total value of this forest produce was $6,475,600.

FOREST PRODUCE NOT ELSEWHERE INCLUDED IN PRODUCTION TABLES

Description of Forest Produce	South-West Division and Agricultural Areas			Northern, Central and Eastern Goldfields	Totals
	Supplied by Department	Other Crown Lands	Private Property*		
Mining Timber .... Tons	....	6,329	5	11,220	17,554
Charcoal .... Tons	....	39,510	....	....	39,510
Piles, Poles and Bridge Timbers .... Lin. ft.	18,512	840,665	41,385	28,238	928,440
Fence Posts and Rails .... No.	13,416	150,408	26,689	303,207	493,720
Strainer Posts .... No.	874	6,725	....	....	7,599
Mallet Bark .... Tons	113	73	95	....	281
Wandoo Timber for Tannin Extract .... Tons	....	30,529	13,681	....	44,210
Christmas Trees .... No.	13,027	....	....	....	13,027
Bean Sticks, etc. .... No.	....	25,900	....	4,980	30,880
Boronia Blossom .... Lbs.	....	2,763	....	....	2,763
Stone, Gravel .... Cu. yds.	....	118,458	....	....	118,458
Sand .... Cu. yds.	....	761	....	....	761
Scout Staves .... No.	560	....	....	....	560
Sawdust consumed as Fuel† .... Tons	....	122,085	....	....	122,085

* Complete figures from Private Property not available, only information furnished to the Department is included.
† Apportionment between Crown Land and private property unknown.

Sandalwood

The demand for sandalwood from overseas continued and orders received were above those for the previous year. Although logwood was in short supply from time to time, all orders were filled and there was a small stock on hand at the end of the year.

A total of 1,040 tons of sandalwood was delivered to Fremantle during the year as compared with 812 tons for the year ended the 30th June, 1965, and this quantity was made up as follows:—

	Tons
Crown Lands	
Logwood (including roots and butts)	765
Pieces	246
Private Property	
Logwood (including roots and butts)	29
	1,040

Exports amounted to 716 tons compared with 695 tons for the previous year.

No orders for logwood were placed by distillers but 89 tons of roots and butts severed from the Crown Lands logwood at Fremantle were delivered to them for oil distillation purposes.

The quantity of sandalwood oil distilled was 7,658 lb. and 4,373 lb. were exported interstate and overseas.

5. FOREST MANAGEMENT

Working Plans

The continuous inventory of the hardwood forest has proceeded throughout the year with a further 1,683 acres of detailed assessment which covers some 450,000 acres of the forest area.

Interpretation of forest types from aerial photographs was continued with a total of over 400,000 acres being fully interpreted and a further 150,000 acres interpreted to less exacting standards. Aerial photographs were also used to determine the extent of " die-back " in the northern jarrah forests. This project covered 500,000 acres over and above the standard interpretation and was located mainly along the western scarp of the Darling Range.

A special study of the rate of spread of the disorder was also carried out over specially selected areas in Harvey and Gleneagle Divisions, which had been flown at intervals between 1941 and 1965. The results have provided a basis for planning control measures, and it is proposed to extend the scope of this project to cover the jarrah forests south of the Preston River.

A further 400 acres of Pine Site Quality mapping was carried out.

Field work connected with a complete revision of management tables for *P. pinaster* has been completed and similar work is in progress for *P. radiata*. This project involves a great deal of routine calculations that could be handled most effectively by computor processing, and the application of A.D.P. to Working Plans procedures is at present under investigation.

Special projects carried out during the year include the finalisation of the assessment of mining timber in the Collie region, and a study of the availability of marri timber near Manjimup.

Surveys and Mapping

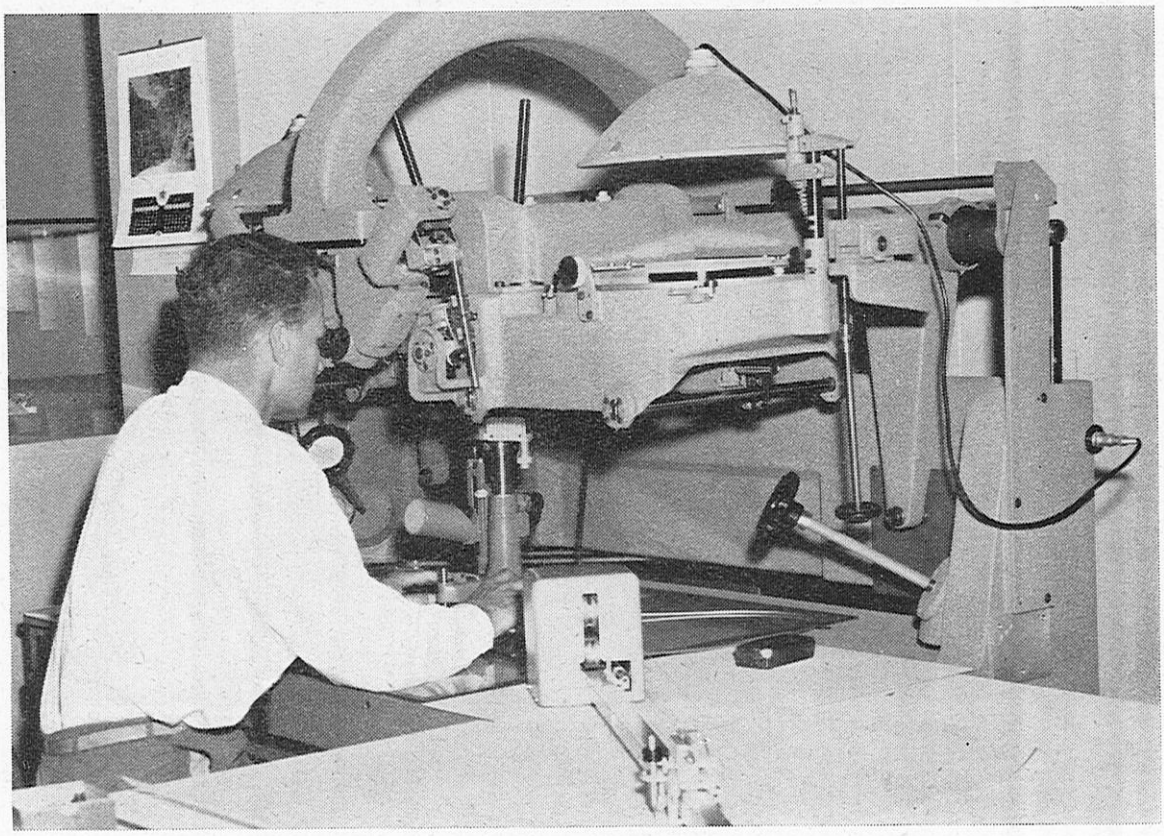
A total of 380 miles of traverses were charted during the year. This included 70 miles of mapping control surveys, 150 miles of power line traverses supplied by the Department of Lands and Surveys, and 160 miles of minor demarcation surveys.

This work assisted in the preparation of base maps covering 1,777,500 acres of forest country of which 1,056,000 acres had not previously been covered by reliable up-to-date maps.

Project mapping completed during the year included sketch mapping of the Stirling National Park, the mapping of areas affected by " die-back " in the northern jarrah forest, and a mapping project at the request of a private sawmilling firm.

Five standard 40-chain lithographs were produced, and in the new 80-chain four colour series the Grimwade sheet was drawn and published, and the Shannon, Mundaring and Pemberton sheets revised and reprinted. Work on the Gleneagle, Dwellingup, Collie and Muja sheets is in progress.

A temporary " 80-chain litho " covering the Moore River area was also produced.



The Wild B8 Aviograph used for topographical mapping.

Photogrammetry

The Wild B.8 Aviograph has resulted in substantial economies in mapping and a total of 17 planimetric plans were produced by direct plotting from up-to-date 1/40,000 photos. The Aviograph was also used to prepare plantation maps from large-scale photographs covering the Harvey Weir plantation. The Blackwood Valley plantation was mapped from 40-chain photos and contours at 20 feet vertical intervals were also plotted. Planimetric mapping of the Mundaring plantations is now in progress.

Forest Engineering

During the year 359 miles of new forest roads, tracks and firelines were constructed and 4,855 miles maintained. One mile of telephone line was erected.

Plant and Equipment

All vehicles and items of field equipment were maintained in a satisfactory condition and over 60 items of fabrication were carried out. The latter included fire pumpers and steel tanks, jib cranes, canopies for bulldozers, tractor-mounted blades, a nursery seeding machine, welding protection screens, and many small items for research.

Two pine planting machines were built to suit local conditions. These machines cost less than those previously imported and have proved more suitable for our needs.

The Department has contributed to the new intensive training scheme for apprentices by the selection of five suitably qualified for the new shortened term of four years. A further two apprentices were engaged and three completed their term, and a total of nineteen are now in training.

Departmental Buildings

Institute of Forest Research and Protection: On April 6th, 1966, the Honourable David Brand, M.L.A., Premier of Western Australia, officially opened the new Institute of Forest Research and Protection.

The official opening of the Institute of Forest Research and Protection.
Standing (left) is the Hon. David Brand, M.L.A., Premier of Western Australia, and (right) the Hon. W. S. Bovell, M.L.A., Minister for Forests. Seated (left) is Mr. A. C. Harris, Conservator of Forests, and (right) Mr. H. E. Graham, M.L.A.

Over the years a research staff has gradually been built up until today it numbers nine professional officers, one senior forester and seventeen technical assistants. The Department already maintains field research stations at Wanneroo, Dwellingup and Manjimup but there has been an urgent need for a central controlling station. This has now been provided by the new Institute.

Housing: A further three new houses were erected and two purchased, bringing the total number of Departmental houses to 474.

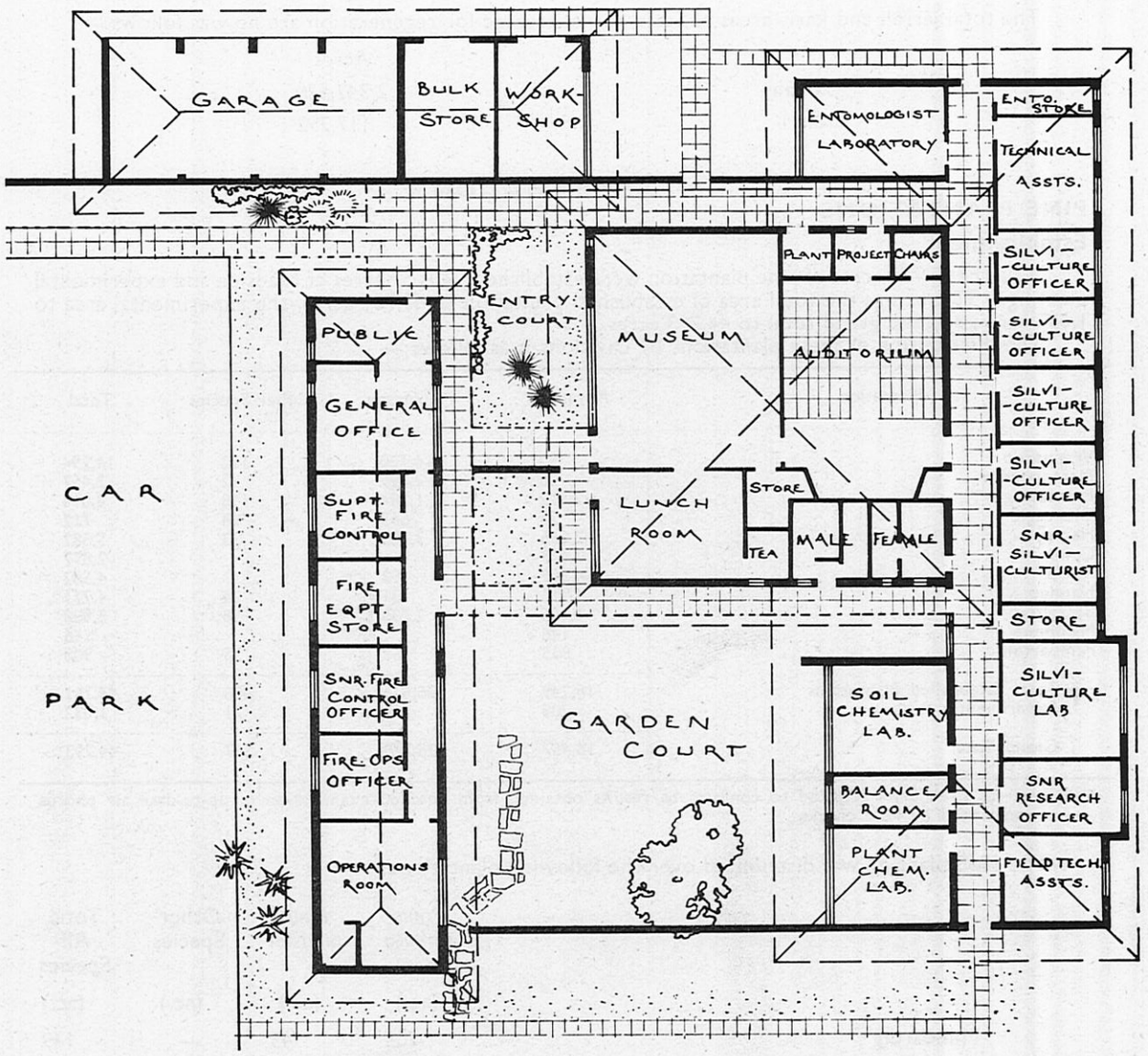
The transfer of houses from the outlying settlements of Barlee Brook, Heartlea and Tallanalla to centres of higher population is yet to be completed. Changing times and social attitudes make it necessary to move these houses to larger towns, and better road systems and faster transport make it possible to cover large forest areas from these central locations.

Other Buildings: The new small pine mill being erected at Margaret River is nearing completion and modifications to the Grimwade pine mill are being carried out.

Two new fire lookout towers were erected, one in the Somerville plantation near Perth, and the other (Garvin) in the Kirup Division overlooking the Lewana plantation.

Communications

Radio: As planned, the V.H.F. radio coverage was considerably expanded by the erection of a further three repeater stations. In the north, the new station at Wabling Hill extends communication to the Moore River. In the south, Dickson Tower now serves the area west of Manjimup and Pemberton. Further to the south-east, Mt. Frankland provides good communication to the Walpole district and is particularly valuable for mobiles working well east of Mt. Frankland. A further 39 transceivers were placed in service.



Ground plan of the Institute of Forest Research and Protection.

Experiments in the use of aircraft for controlled burning (reported elsewhere) involved the temporary installation of V.H.F. radio in small aircraft to provide air-to-ground communication.

Remote control equipment was developed and manufactured for the new Institute of Forest Research and Protection. The equipment enables specialist officers in this section to operate the High Frequency and V.H.F. systems installed in the Radio Branch.

Telephone: The earth-return telephone still plays an important part in the Departmental telecommunication system but there has been some reduction of overall mileage due to the wider use of radio, and for economic reasons.

6. REFORESTATION

The use of "Tordon," the hormone derivative of picolinic acid, applied in low concentration to notches through the bark has permitted the economic thinning of jarrah pole stands. This work is now developing on a substantially increased scale and is being extended from prime pole stands to areas of lesser quality.

A strong drive is being exerted to secure utilization of all merchantable trees made available for normal trade cutting and associated salvage logging operations. This can then be followed by an improvement operation involving the poisoning of useless culls and the thinning of pole stands where they occur. In this way the residual stand is left free from competition by unwanted trees and maximum productive use of the site secured until the next logging operation.

During the year 51,009 acres of virgin State Forest were cut over under the West Australian selection system of treemarking. This consisted of 40,295 acres of jarrah, 4,657 acres of karri and 6,057 acres of wandoo. In addition, 58,817 acres of State Forest cut over in the past were again logged.

The total jarrah and karri areas of State Forest treated for regeneration are now as follows:—

	Acres
Jarrah	2,342,540
Karri	117,292

7. AFFORESTATION

PINE PLANTATIONS

Establishment

A further 2,782 acres of pine plantation were established, plus 57 acres of roadside and experimental planting. This brings the total area of established plantation to 43,761 acres, the experimental area to 1,032 acres, and the grand total to 44,793 acres.

The distribution of these plantations by Divisions is as follows:—

Plantation	*P. radiata*	*P. pinaster*	Other Species	Total
Wanneroo	52	14,120	122	14,294
Metropolitan	26	2,399	32	2,457
Mundaring	2,512	1,344	158	4,014
Gleneagle	25	663	24	712
Harvey	2,066	3,483	33	5,582
Collie	2,877	....	....	2,877
Kirup	4,309	193	....	4,502
Nannup	4,216	31	24	4,271
Busselton	1,205	2,735	58	3,998
Manjimup	146	....	....	146
Pemberton	815	58	35	908
Total Established Plantations	18,249	25,026	486	43,761
Experimental Areas	208	753	71	1,032
Grand Total	18,457	25,779	557	44,793

Note :—Areas have been adjusted to conform to results obtained from detailed examination of up-to-date air photos supported by field checks.

The 1965 planting was distributed over the following plantations:—

	Pinus radiata	*Pinus pinaster*	Other Species	Total All Species
	(ac.)	(ac.)	(ac.)	(ac.)
Mundaring	104	45	—	149
Wanneroo				
Gnangara	—	1,179	—	1,179
Yanchep	—	187	—	187
Harvey				
Myalup	27	134	—	161
Harvey Hills	262	—	—	262
Collie	95	—	—	95
Kirup				
Grimwade	269	—	—	269
Kirup	135	—	—	135
Nannup	183	—	—	183
Busselton (Ludlow)	8	13	—	21
Pemberton	141	—	—	141
Plantation Total	1,224	1,558	—	2,782
Experimental Planting	10	43	4	57
Grand Total	1,234	1,601	4	2,839

were placed in service

Roundwood Production

The total roundwood production from Departmental plantations, mainly in the form of thinnings, was a record 1,875,750 cubic feet (underbark). This is an increase of 153,799 cubic feet, or 8.9 per cent., on the previous year's underbark figure.

The following figures show the marked increase in the production of pine in recent years:—

Year ended 30th June	Cubic feet (Underbark)
1950	298,010
1955	710,845
1960	1,002,619
1965	1,721,951
1966	1,875,750

Removals by category and by species were as follows:—

Category	*P. radiata* cub. ft.	*P. pinaster* cub. ft.	Total cub. ft.
Sawlogs	718,772	728,037	1,446,809
Chipboard Logs	—	324,005	324,005
Peeler Logs	83,635	—	83,635
Fence Posts	—	12,210	12,210
"Woodwool" Logs	—	6,290	6,290
Poles	—	2,801	2,801
Total	802,407	1,073,343	1,875,750

Forest trainees observe the operation of a jib-crane loading small pine logs in the Grimwade plantation.

Compared with the previous year, the production of chipboard logs more than doubled and there was a marked increase in the supply of fence posts and "woodwool" logs. The volume of sawlogs obtained remained steady but the supply of peelers and poles showed a reduction.

Roundwood removals from the various plantations were as follows:—

	Cub. ft.	Cub. ft.
Wanneroo (Gnangara)		257,143
Metropolitan		324,631
Somerville	215,360	
Collier	105,491	
Scaddan	3,780	
Mundaring		421,827
Gleneagle*		15,490
Harvey		198,914
Myalup	97,057	
Harvey Hills	82,682	
Hamel	19,175	
Collie		9,580
Kirup (Grimwade)		200,569
Nannup		820
Busselton		426,090
Keenan	218,233	
Ludlow	207,857	
Pemberton (Pimelea)		20,686
		1,875,750

* Includes Carinyah.

Sawn Production

The total sawn production from all sources was 582,582 cubic feet, a decrease of 23,117 cubic feet on last year's adjusted figure. There was a reduction in the output of case material and a small but significant increase in board production.

Sawn production by species was as follows:—

P. pinaster	293,618 cub. ft.
P. radiata	288,964 cub. ft.
	582,582 cub. ft.

Mallet Plantations

No further plantings took place and the total area of mallet plantations remains at 19,111 acres.

During the year, thinnings from the plantations yielded 113 tons of mallet bark and seven tons of mining timber.

Inland Arboreta

No new arboreta were established in the 1965 season, work being confined to extending and/or refilling 24 of the 56 existing sites.

Planting and Survival: Favourable planting conditions and a good growing season resulted in an overall survival of 92 per cent. of the young trees planted.

For the first time, a ring of cardboard about 12 inches high was attached to the base of the guard surrounding each newly planted tree. This innovation, aimed at providing protection against frost and strong winds, appeared successful and most of the cardboard rings were still in position one year later.

Maintenance: The mobile maintenance unit operated during the spring months of 1965. A 14-disc two-gang cultivator replaced the rotensor plough previously used, and gave satisfactory results. As in previous years, hand cultivation close to young trees, removal of guards where necessary, and a general tidying of arboreta was carried out.

The continued co-operation of the Department of Agriculture, Shire authorities, and individual farmers in this work is greatly appreciated.

School Arboreta: Arrangements have been made for the Shackleton School to establish an arboretum on a piece of land donated by a neighbouring farmer. Preparation of the site, planting the trees and their subsequent tending will be carried out by school staff, pupils and local helpers. The young trees, supplied by this Department, will be planted in the 1966 season.

Investigation: The long term project of moisture investigations in wheatbelt soils under different forms of cover was continued.

Tree Nurseries

In 1965, the Hamel and Dryandra nurseries supplied 217,440 young trees to private buyers on farms and in country towns, an increase of 81,296 plants, or 60 per cent., on last year's figure. This sharp rise in demand largely resulted from increased interest in tree establishment in the Esperance Downs region, where extensive land development is taking place in country generally devoid of natural tree growth.

Apart from pines, River Gum (24,835 plants distributed) was once again the most popular choice, followed by Sugar Gum (12,199), Dwarf Sugar Gum (11,112) and Tuart (9,913).

The distribution of plants from each nursery is summarised as follows:—

Nursery	Number of Plants Sold			Departmental Use		Number of Species
	Potted Stock	Tray Stock	Open Rooted Plants	Pines	Other	
Hamel	86,060	11,938	66,800	166,860	18,029	159
Dryandra	46,886	5,756	....	221	10,706	92

In addition to the foregoing, 59,074 pine seedlings from plantation nurseries were sold to the public.

Seed Supplies

Sales of seed to Australian and overseas buyers were valued at $5,535, a decline of $2,731 on last year's figure. The largest single order valued at $1,866 was placed by Morocco, while other large orders came from the Forest Research Institute, Canberra ($998) and France ($396).

Seed was supplied free of charge to 64 approved schools and seed for the requirements of the north-west of the State was handled on behalf of the Department of the North-West.

At 30th June, 1966, the value of seed of all species held in store was $22,434.

8. PROTECTION

FIRE PROTECTION

State Forest under protection

Indigenous Forest	4,384,923 acres
Pine Plantations	44,793 acres
Mallet Plantations	19,111 acres

The Fire Season

Figures given are for the Forest Weather Stations at Dwellingup (Jarrah) and Pemberton (Karri).

	Jarrah	Karri
Rainfall	Above average for October and November. Below average, February and March.	Generally above average. November a record wet month.
Temperature	Generally low. Highest maximum 99.8°. Mean maximum for season 75.9°. 26 days above 90°.	Generally low. Two days of maximum temperature 100°. Mean maximum for season 72.7°. 18 days above 90°.
Relative Humidity	5 days between 11 per cent. and 15 per cent. 44 days between 16 per cent. and 25 per cent.	No days below 15 per cent. 7 days between 16 per cent. and 25 per cent.
Fire Hazard	8 days Dangerous. 23 days Severe Summer. Mean Hazard 5.5. Mean for all seasons 5.4.	2 days Severe Summer. Mean Hazard 3.6. Mean for all seasons 4.4.

Controlled Burning

Intermittent late rains in the spring generally curtailed the controlled burning programme and only 735,179 acres were burnt, compared with 885,000 last year. A considerable number of burning days were lost in the autumn in the karri region due to the necessity to send gangs to escaping private property fires.

Highlights of the burning programme were the advances made in drawing up precise control burning prescriptions to ensure minimum scorch damage ; improving techniques for the safe burning under pines ; and a beginning of experiments in the use of aircraft for dropping small incendiaries quickly to cover large areas of inaccessible, largely unroaded tracts of forest in the southern areas.

Prescribed burning—	Acres
General	683,263
Advance Burn and Top Disposal	51,916
Total	735,179

Detection

The old tree tower at Somerville was abandoned and a new tripod tower was erected on a higher point giving better coverage of the plantation area.

Negotiations were begun to liaise with the Control tower at the new Jandakot airport for cross bearings on fires in the pines.

Manning of Towers—	Jarrah	Karri
First watch	9.10.65	16.11.65
Last watch	19. 4.66	18. 4.66

Communications

V.H.F. coverage for the whole forest area was completed and the system worked satisfactorily.

It is now standard practice to carry " citizen band " walkie-talkie radios in the fast attack vehicles in the southern pine areas to give immediate communications in the event of a fire in the plantations.

Fires and Fire Damage

Total number of fires attended by Departmental gangs during the season was 251 compared with 214 last year and an overall average of 350.

The following table sets out fire causes for the season:—

Escapes from settlers' burning	67
Deliberately lit	36
Escapes from prescribed burning	33
Hunters and travellers	24
Children	17
Mill surroundings	13
Householders	10
Bush Workers	8
Other Government Employees	7
Lightning	6
Mine surroundings	4
Natives	3
Mill Locomotives	2
W.A.G.R.	2
Tractors	1
Unknown	18
Total	251

Again, escapes from settlers' burns heads the list with 26.7 per cent. against 23.8 per cent. last year and 22.4 per cent. the year before.

The second greatest cause was incendiarism with a surprising 14.3 per cent.

Half of these were in the Metropolitan plantations and a third were in the Collie Division.

Hunters and travellers caused only 9.6 per cent of the fires as against 20 per cent. last year.

The total area burnt was 6,158 acres made up as follows:—

Acres	
1	—Young pines, destroyed.
7	—Pines, salvageable.
3	—Pines, slight scorch.
5,573	—Protected indigenous forest.
574	—Wasteland in indigenous forest.
6,158	

Date of first fire— 2/10/65.
Date of last fire—18 /4/66.

During the year Departmental gangs were largely instrumental in saving one sawmill, one factory, one public hall, 100 acre private pine plantation, one orchard and house, four separate farm houses, one haystack and one town house.

Public Relations

Co-operative protective burns were organised with local bush fire control officers at a number of centres, and Departmental gangs assisted with these burns.

Department officers continue to attend bush fire brigade meetings and are frequently invited to observers at Shire Fire Advisory Committee meetings.

A number of fire fighting demonstrations were given by invitation at Agricultural shows and festivals.

9. SILVICULTURE, SOILS AND FIRE RESEARCH

PINE SILVICULTURE

P. pinaster Plantations

Tree Breeding

Grafting: A batch of scions and grafts of *Pinus pinaster* was imported from Portugal in September, 1965. This shipment was the last in the programme to introduce vegetative material of 85 superior phenotypes selected within the Forest of Leiria.

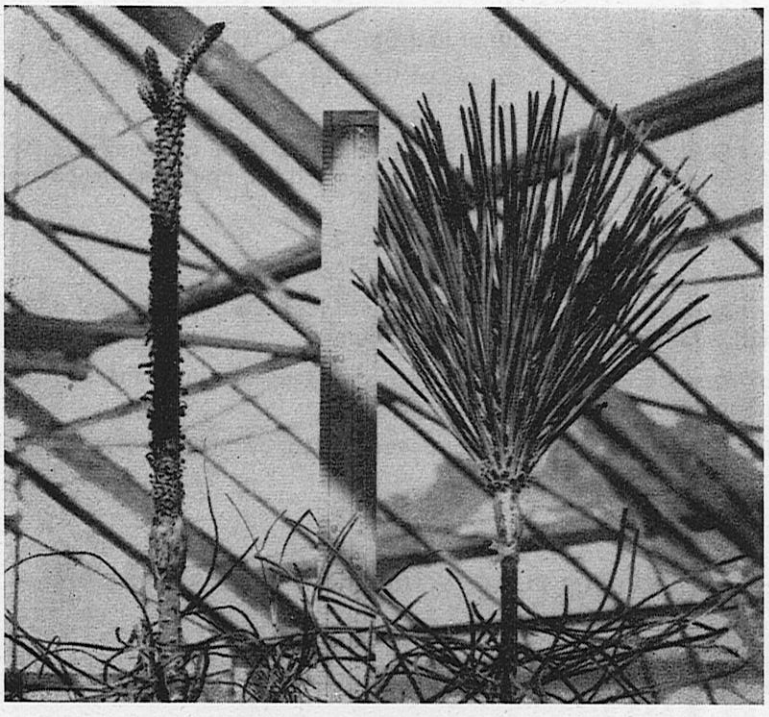
Of 170 completed grafts included in the shipment from Portugal, only one survived the root washing and methyl bromide fumigation entailed. It was considered, however, that this method was worth a trial in an endeavour to secure several clones which had proved difficult when grafted locally.

Details concerning the overall grafting programme associated with the introduction of plus phenotypes from Portugal are summarised in the following table:—

Date of Importation	Number of Plus Trees Represented	Storage Method	Number and Type of Grafts				Percentage Survival
			Tip	Bottle	Side	Total	
9.9.64	19	Wet	411	186	....	597	6.0
15.9.64	19	Wet	295	172	....	467	
22.9.64	20	Wet	268	197	....	465	
11.3.65	14	Dry	162	141	9	312	28.4
18.3.65	16	Dry	163	159	16	338	
25.3.65	12	Dry	126	115	1	242	
1.4.65	16	Dry	199	148	2	349	8.7
23.5.65	9	Dry	211	....	....	211	39.3
8.9.65	7	Dry	135	....	....	135	38.5
8.9.65			Grafted in Portugal			169	0.0

Further successful grafts were obtained by grafting buds developed on surviving ramets. This process was continued in all months of the year yielding an average survival of approximately 70 per cent. As at June 1st, 1966, a total of 1,100 successful grafts were available from the Portuguese phenotypes. A number of these will not be released from quarantine until September, 1967.

Problems associated with the propagation phase of the importation venture are not evident from the above table of summarized results. All bottle grafts attempted failed due to the presence of a bacterial soft rot on the old wood of scions. A considerable number of late deaths, associated with a condition of bud dormancy in scions picked in late summer and grafted in Western Australia in spring, were also a major factor in the overall mortality. The weak, long bud development resulting from the dormant condition is illustrated in the accompanying photograph.



Scion development to long bud growth (left) due to a summer induced bud dormancy. Normal development is shown on the graft on the right.

A major source of variation in survival values recorded for the various seasons of grafting resulted from the refractory nature of specific clones. Clonal variation in survival varied from zero to 77 per cent. for individual clones. Shipments were arranged in an attempt to provide at least five survivors for each clone, i.e., trees with low graftability were introduced twice in most instances. Certain clones failed completely when tried in two opposite seasonal conditions for grafting. Others failed badly in one season and were highly successful in another.

Seventy-nine of 85 desirable phenotypes selected in Portugal have now been established in Western Australia. The survival position, including ramets obtained by grafting on from direct survivors, is as follows:—

Number of Survivors	0	1	2	3	4	5	6	7	8	9	10	10+
Number of Clones	6	2	6	3	6	4	3	2	6	2	3	43

It is anticipated that reasonable quantities of buds will be available for distribution interstate in spring, 1967, to Forest Services co-operating in the programme.

Phenotypic Description

Evaluation of wood properties of the selected Portuguese phenotypes of *P. pinaster* is yet to be completed. A paper incorporating the preliminary results has been prepared for presentation to the Sixth World Forestry Congress by J. Nicholls of C.S.I.R.O. Forest Products Division.

From descriptions of external characteristics and measurements of spiral grain made in Portugal, at least 30 of the 86 trees cannot be faulted on the basis of local classification standards. The remainder all have a high potential within the breeding programme.

Progeny Testing

Extensive progeny trials incorporating half sib seed collected from 86 phenotypes in Portugal are in course of establishment.

In winter, 1965, the first full sib progeny trials in the breeding programme were established in the field. Planting on a much larger scale to test a further 20 progeny at two locations is at present under way.

Plants for full sib progeny testing are raised in tubes to ensure seedling uniformity and 100 per cent. survival in the field. In 1966 7,000 plants were raised in this manner. Preparations to raise 20,000 tubed plants for the 1967 progeny test plantings have been commenced.

Provenances

Twenty-four half sib lots of selected phenotypes of *Pinus pinaster* from Tunisia have been raised for incorporation in current test plantings. This provenance differs greatly in nursery appearance from that normally associated with the species. Results from the field trials promise to be most interesting.

Seed lots from 32 plus phenotypes of *Pinus pinaster* selected in France have been received for testing under local conditions.

Results from a pot trial comparing seedling characteristics of four provenances of *Pinus pinaster* (Portugal, France, Corsica and Italy) showed that under conditions of both high and low nutrition, the Portuguese provenance yielded the healthiest plants and the greatest dry weight.

The trial is being repeated to test more provenances and to provide a more realistic appraisal of drought resistance.

Controlled Pollination

A total of 937 cones were pollinated under pollen exclosures in spring, 1965. Eleven pollen sources and 30 female cone sources were employed. Current estimates indicate that the take exceeds 85 per cent. Hand pollinations were also made to receptive clones in the Joondalup seed orchard. The cone yield here should exceed 1,000 cones.

Seed from 20 crosses manipulated in 1963 was extracted and placed in storage. The gross seed weight amounted to 1,500 gm.

Seed Orchards

A further 500 grafts from Portuguese select trees were introduced into the Joondalup seed orchard in June. This second phase of the orchard establishment aims to increase the number of clones in the orchard from 16 to 46. Another 500 ramets will be planted in 1967 to complete establishment.

A further 30 acres of land has been prepared for the second seed orchard of *Pinus pinaster* in the Wanneroo Division.

Progress in Portugal

Senior Forester D. H. Perry returned to Western Australia in November following two years' work in Portugal. In this time it was possible to select, describe, sample and forward scions and half sib seed from 85 superior phenotypes. A bulletin covering the entire venture is in preparation.

Stand Tending

New record sheets and programmes are being compiled to enable all field data to be collated by computer.

The establishment of the initial basal area control thinning trial for *P. pinaster* was completed in August, 1965. Measurements to date show that there is an immediate response to thinning related to the degree of spacing provided.

Investigations of Potential Planting Country

A major research effort during the past year was directed at evaluating, as extensions for *P. pinaster* planting, the potential of the sand plain country north of the existing plantations in the Wanneroo Division.

The ultimate aim is a quantitative evaluation of the inter-relation:—

Environmental Factors { Natural Vegetation | Pine Growth

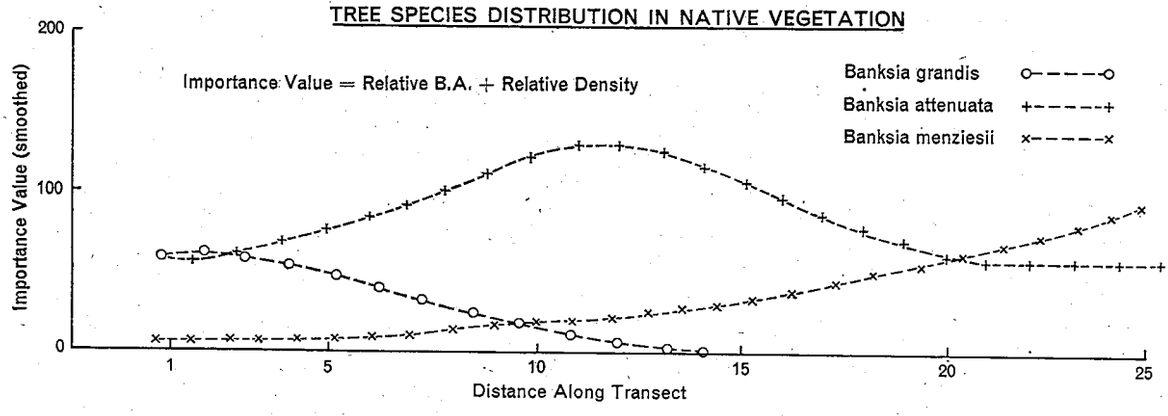
Preliminary investigations along the boundaries of older plantations showed that natural vegetation and *P. pinaster* responded similarly to variation in environment, chiefly topography, sand type and water availability.

An example of the similarity of response between the natural trees, viz. Banksia spp., and the pine crop can be seen along a transect covering topographic variation in the Yanchep area. This response is represented graphically in Figure 1.

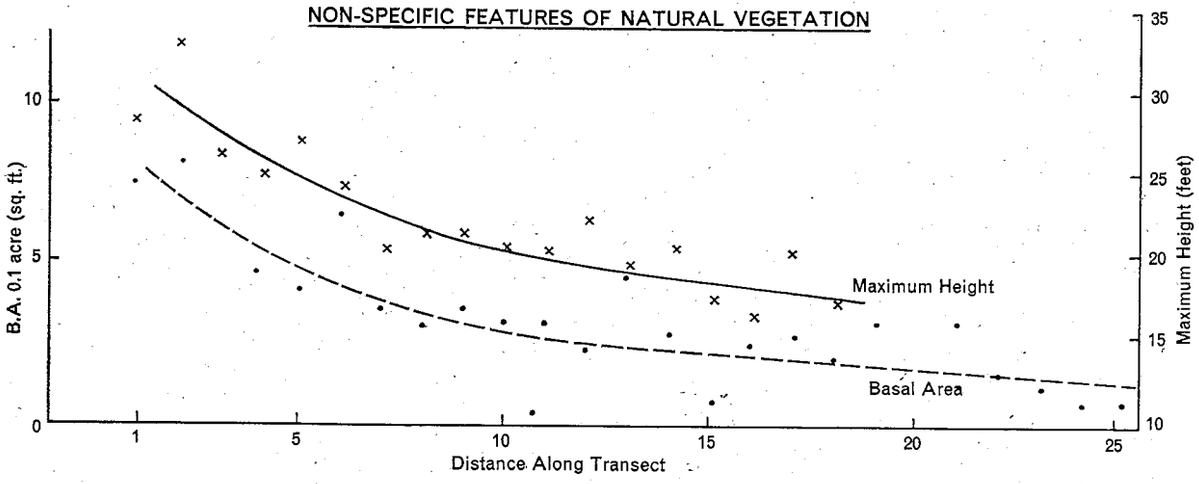
CORRELATION BETWEEN NATURAL VEGETATION AND PINE GROWTH

(Yanchep, 100 acre Block)

TREE SPECIES DISTRIBUTION IN NATIVE VEGETATION



NON-SPECIFIC FEATURES OF NATURAL VEGETATION



HEIGHT GROWTH OF PINE

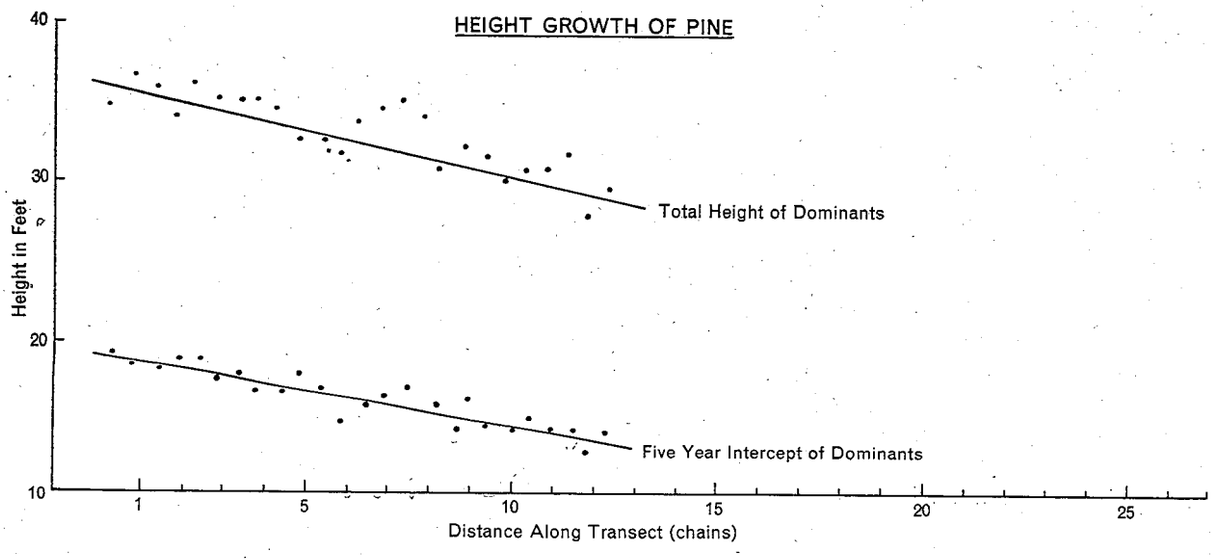


Fig. 1

The five year intercept mentioned in Figure 1 provides a means of evaluating or indexing the quality of the site from the point of view of pine growth. It is the height growth of dominants over a five year period of maximum growth—usually from 3–8 years of age. The intercept can be easily measured at any time and is relatively insensitive to age and stocking. The relationship between height intercept and the progressive height growth of dominants of *P. pinaster* on different sites is shown in Figure 2.

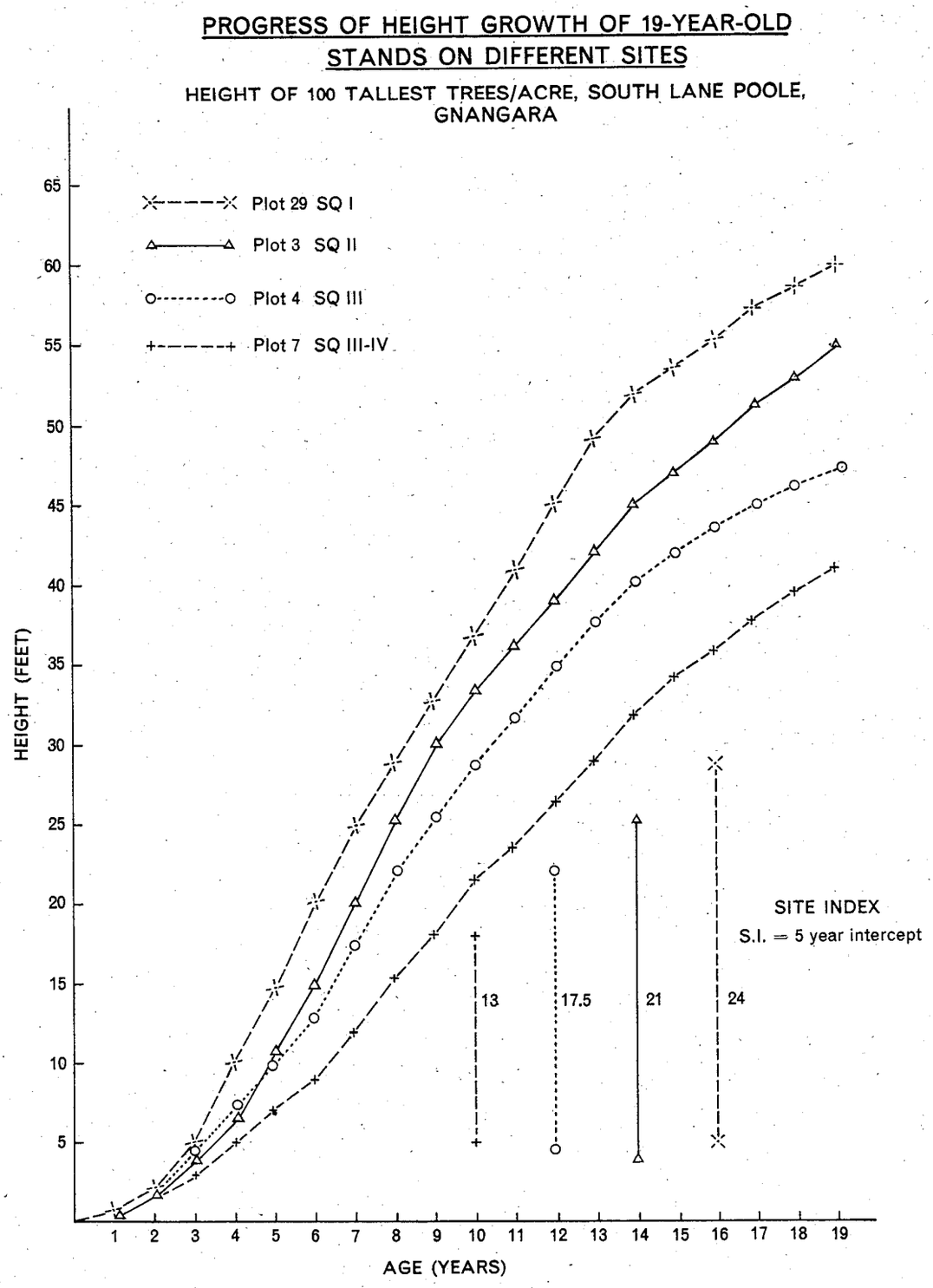


Fig. 2

Native ground vegetation as well as trees have been studied and their occurrence classified into eight types. The occurrence of these ground vegetation types has been found to fit the soil moisture regime.

Soil moisture sampling in the coastal sands north of Perth.

The bulk of the field work in connection with these studies, covering 68 pilot plots and their surrounds and nine transects totalling 151 chains, is now complete. Analysis by computer to verify and expand conclusions as above is progressing.

P. radiata Plantations

Tree Breeding

Five hundred grafts of *Pinus radiata* made during the year completed the initial requirement planned for seed orchard and arboreta planting.

The establishment of the *P. radiata* seed orchard at Chandler's Farm was completed in June this year.

Planting Stock

Size of Nursery Stock

A trial has been commenced testing four sizes of *P. radiata* 1/0 stock. The effect of plant size on survival and initial growth will be studied.

Clay Slurry Root Dip

Pilot trials in the 1965 planting season indicated that the technique was worth following up to reduce nursery handling costs and improve plant survival in marginal conditions. A large trial utilising a 5 x 2 factorial layout was commenced in May, 1966, to study the latter aspect.

Tending

Scrub Control

An extensive post-planting scrub control experiment has shown that there are pronounced seasonal differences in scrub susceptibility to low concentration foliar applications of 2,4,5-T in water. When sprayed in late winter excellent control has been achieved under research conditions, using concentrations of 0.1 to 0.4 per cent. a.e., without significant damage to young *P. radiata*.

Coppice Control

An extensive series of trials has been commenced to determine which is the most efficient, reliable and economical herbicide for pre-planting coppice control. Factors being studied include chemical concentration, season of application, method of spraying (high volume or low volume) and effect of surfactants. Herbicides at present under test are 2,4,5-T ester, Tordon 50-D, Kuron and Brushvert. Any effect of herbicide residues in the soil on pines planted on sprayed areas is also being examined.

Post-planting coppice control by basal spray applications of 2,4,5-T in distillate is being investigated, using a range of herbicide concentrations and treatments in all seasons of the year.

Effect of Herbicides on P. radiata

All herbicides at present being tested for use in proximity to planted pines are being screened by spraying young plants with a range of concentrations of the chemical at different seasons. Any new chemicals would also be tested in this way.

Thinning Studies

A comprehensive series of thinning projects is planned for *P. radiata*.

Early Thinning

Established on high quality *P. radiata* eight years old, this project investigates thinning for particle board material in advance of the normal first thinning.

Basal Area Control

A first thinning trial at the normal time has been established to study the growth trends at four levels of stand basal area.

Species Trials

In view of the limited availability and scattered occurrence of soils suitable for *P. radiata* in this State, a programme of species introduction trials has been commenced with the object of finding those better adapted to the poorer sites.

JARRAH SILVICULTURE

Thinning Plots

Pole Crops: Current measurements in a series of thinning plots have shown that improved breast height girth increment continues in the second year after thinning. Regular measurements will continue.

Coppice Crops: In 1964, 3-year-old coppice was thinned to 400 stems per acre. This treatment appears to have affected height growth, as two years after treatment the height of the unthinned coppice had increased by 4 ft. and the thinned coppice by only 2 ft.

Thinning Technique

Current practice in thinning pole stands is to inject a standard dose of " Tordon 50-D " in water at 5-inch intervals around the stem. Recent trials has shown that the dose cannot be safely reduced but it may be possible to increase the spacing of the injections around the stem using the standard dose. These trials are continuing.

Root Fusion in Jarrah

The use of systemic poisons in thinning techniques has shown that root fusion does occur in jarrah pole stands. Sampling over 270 acres indicates that 1 in 200 untreated stems are affected and may die or be severely retarded in growth.

Frost Damage

Severe frosts in late May, 1964, damaged the crowns of young jarrah saplings over large areas. A record has been maintained of 50 damaged and 57 undamaged stems over the past two years. Of the 50 damaged plants, 21 have formed major forks at or near the lower extent of the damage, while only three of the 57 undamaged stems have formed forks in the same period. It appears that frost may be one of the causes of forking in jarrah.

Other Investigations

Other investigations in progress are a study to determine the natural mortality of jarrah seedlings ; a jarrah planting trial to examine the effect of plant size and fertilizer treatment on growth and development ; and planting trials of eucalypts and pines on degraded jarrah sites.

Karri Blossom and Seeding

Present Position: In June, 1966, the majority of trees in stands which had commenced flowering 12 months earlier still carried blossom. Most of the trees still bore mature buds and abundant immature fruit.

The major seed fall will occur in the summer of 1967–68, but some seed on selected areas will be shed in the summer of 1966–67.

Ocular Appraisal: The present method of tray sampling to check on the floral cycle, although satisfactory, is time consuming and the work cumulative between seed years. The use of a telescope, coupled with observations of the floral parts on the ground, promises to speed up the task. A trial has been initiated to compare this method with the present technique.

Pollination to stimulate Seed Production: Prompted by the knowledge that bees have been successfully introduced into orchards to improve seed set, and the fact that karri blossom produces an abundant yield of high grade honey, a number of experiments have been laid down to determine the effect of the following factors on seed production:—

(i) thorough pollination by the agency of bees ;

(ii) the exclusion of all insects from pollination ;

(iii) artificial cross-pollination ;

(iv) artificial self-pollination.

To isolate the above factors, branches of two karri lookout trees were enclosed in fibreglass mesh cages. The flowers to be artificially pollinated were further protected with muslin bags.

These experiments were carried out in conjunction with officers of the Department of Agriculture, who supplied and installed hives of bees. Results, particularly of time and quantity of nectar flow, will be of interest to apiculturists.

Silvicultural Systems

(a) *Group Selection System:* As reported in some detail last year, a 25.6 acre plot was laid down in 1959, following normal logging operations. Within this plot four adjacent areas, each of 6.4 acres, carrying different levels of retained growing stock were measured at that time and again five years later.

This year, the plot as a whole was given further treatment aimed at determining the means by which the stand can be made most productive. Experiments were commenced to establish a fully stocked stand, and to compare the productivity of the different components, namely:—

(i) the retained stems of various size and arrangement ;

(ii) the advance growth groups ;

(iii) artificially regenerated karri ;

(iv) naturally regenerated karri.

(b) *Uniform Systems:* Trials of a number of systems, each approximately 100 acres in extent, and for the most part differing in basic concept from the Group Selection System, have been planned. Two of the areas have been treated to date.

Study over a period of time of the growth of the resulting crop, plus the economics of extraction, treatment and supervision, will enable comparisons to be made of the varying systems.

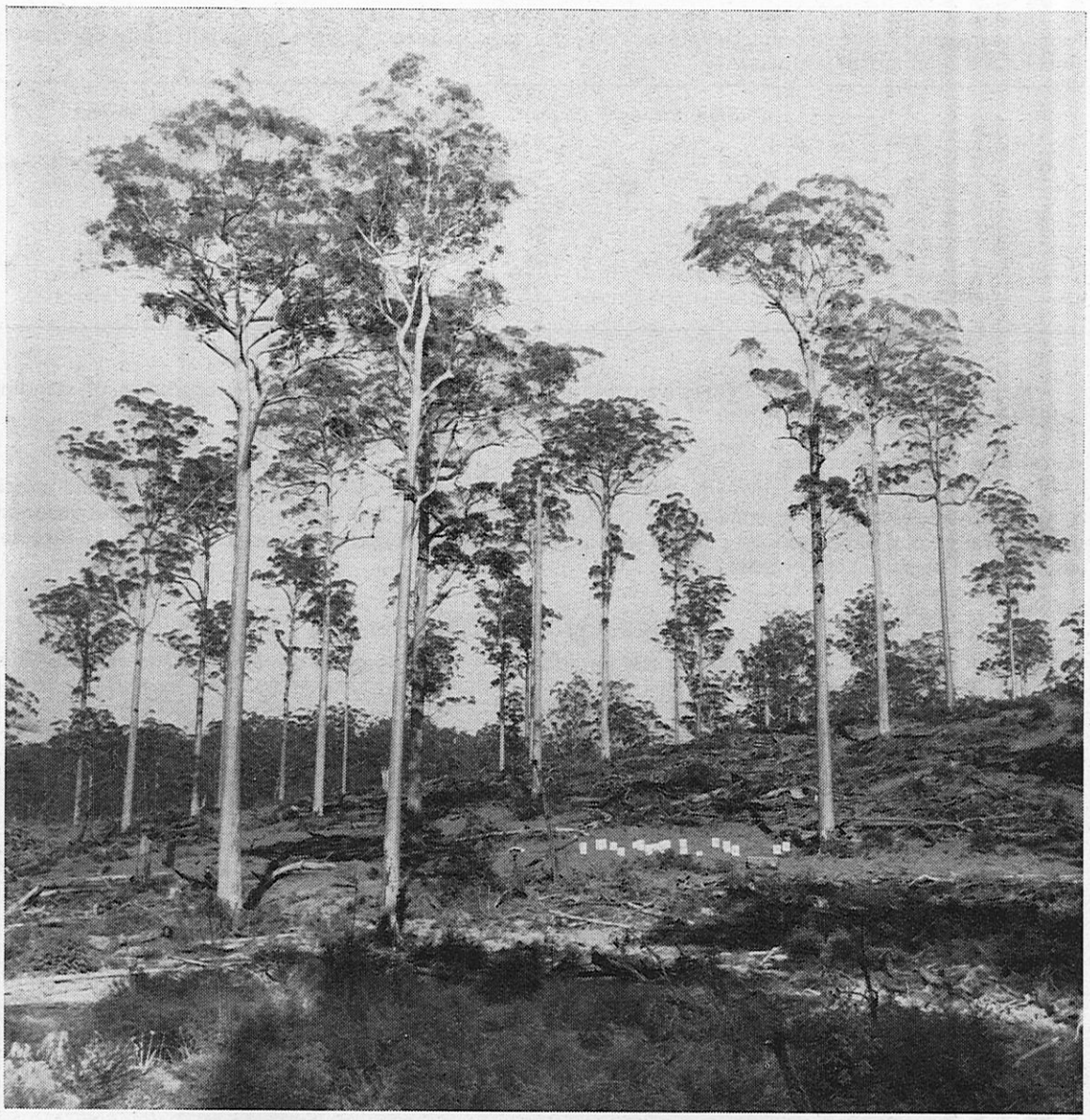
Remeasurement of Karri Regrowth Plots—Big Brook

In 1955, five plots, each 1 acre in extent, were laid down in 25-year-old karri regrowth and thinned at varying intensities to determine suitable thinning schedules for second growth karri. An unthinned plot was retained as a control.

In 1965, 10 years later, the plots were remeasured. The results are briefly summarised below:—

	1	2	3	4	5*	Control
Stem/acre retained	20	40	59	79	59	70
Mean G.B.H.U.B. (ins.)—1955	43·9	35·9	32·3	32·0	33·3	33·4
Mean G.B.H.U.B. (ins.)—1965	56·3	46·4	40·4	38·9	39·7	38·6
Basal Area—U.B. (sq. ft.)—1955	21·3	28·3	34·1	44·8	36·2	41·6
Basal Area—U.B. (sq. ft.)—1965	35·0	47·5	53·2	65·7	51·5	56·2
C.A.I.—Girth U.B.	1·24	1·05	0·81	0·69	0·64	0·52
C.A.I.—Basal Area U.B.	1·37	1·92	1·91	2·09	1·53	1·46
B.A. Increment—Rate Per Cent.	6·4	6·8	5·8	4·7	4·2	3·5

* Thinned from above—Nos. 1-4 from below.



An experimental area of clear felling with seed trees in the karri forest west of Manjimup.

Early Thinnings of Karri Regeneration

Where a regeneration burn has been successful in cutover karri, the young crop is always subject to intensive competition from either scrub or between the young karri themselves. Very early freeing of well-spaced and well-formed individual seedlings promises benefits of fast growth and ease of early controlled burning.

Earlier attempts at hand slashing and poisoning produced favourable results but the cost of this operation was prohibitive. Recently, a knapsack type power operated misting device containing 2,4,5-T in water plus white oil has been employed. Trials were conducted aimed at determining optimum concentration of solution, time of spraying, vegetation age and spraying method to achieve thinning effect.

It is too early to assess fully the results of the investigation, but it has already been shown that spraying must be done during the spring following germination, i.e. at age 6–8 months. At this age both karri seedlings and scrub are at a height of 6–12 inches. Spraying at age 18 months gave insufficient wetting and unsatisfactory kill.

Utilisation of Marri

When a mixed karri–marri stand is logged for karri only, the composition of the resultant stand favours marri which is the less desirable species. To allow effective space for the development of karri regeneration some marri should be removed, preferably those trees which will provide marketable sawlogs.

In an attempt to find what proportion of marri in a karri–marri stand is recoverable as sawlogs, four 1 acre plots were completely felled and the logs obtained sawn under mill study conditions. Results are summarised as follows:—

Plot No.	Standing Vol/Acre (Loads)*		Acceptable Marri Sawlogs	
	Karri	Marri	Vol./Acre (Loads)	Per Cent of Standing Volume
1	8·6	46·7	14·5	31·1
2	54·1	27·5	Nil	Nil
3	95·1	61·3	12·5	20·4
4	30·0	31·3	16·1	51·4

* 1 Load = 50 cu. ft.

In addition to the above figures valuable experience was gained in the recognition of standing utilisable marri.

Trial Plantings of Exotics

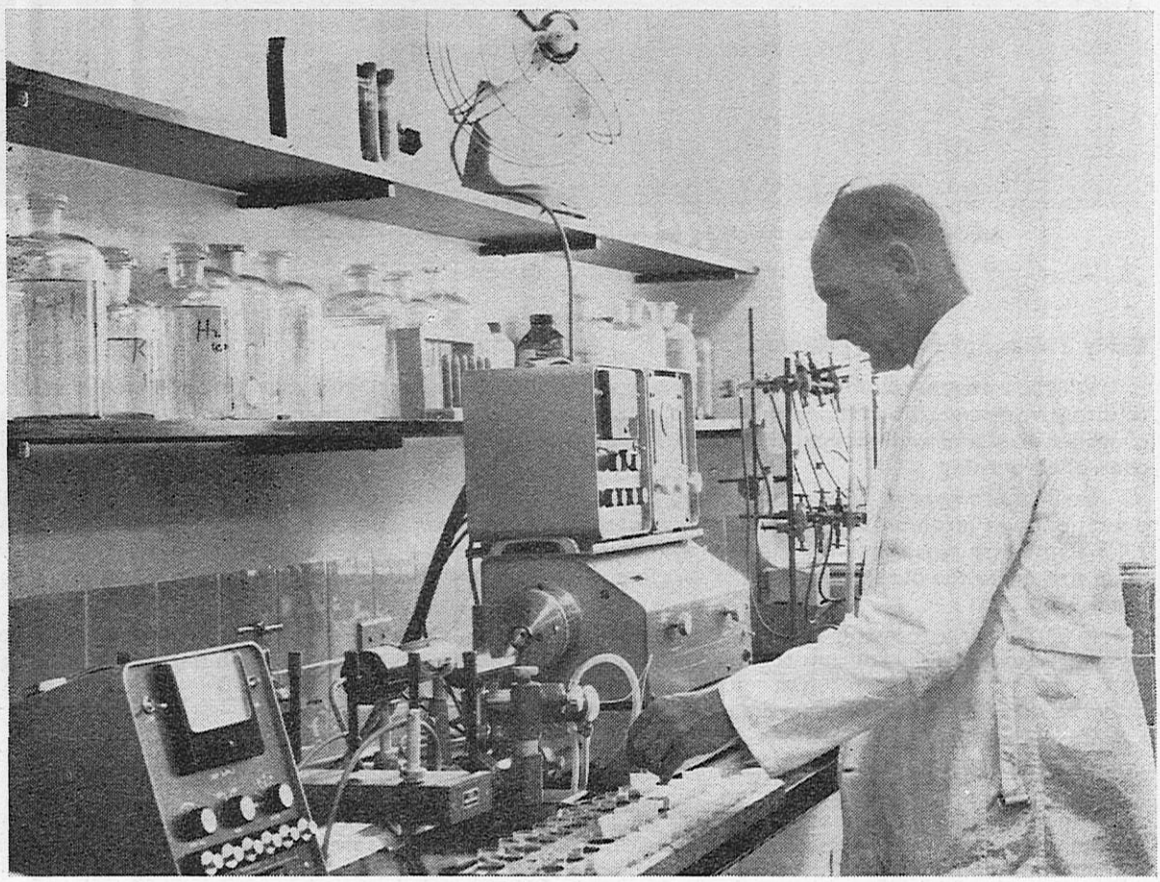
A long term project to provide information on the establishment and growth of selected exotic species on various sites has commenced in the southern Divisions of Manjimup, Pemberton and Shannon. A wide range of species will be planted on sites ranging from treeless plains to high quality forested country and abandoned farmlands.

SOILS AND NUTRITION

There was a very large increase in the number of chemical analyses carried out, and this aspect of the work became the major function of the laboratory during the year. The work carried out in this section included:—

Wanneroo Division Soil Study	2,800	analyses
,, ,, Pot Trial	480	,,
Harvey Division Nursery Research	480	,,
Soil Survey Samples	89	,,

In addition, a number of minor analyses were carried out for both Manjimup and Hamel nurseries, and the testing of Departmental water supplies continued throughout the year.



Zinc analysis with the Atomic Absorption Spectrophotometer.

Other major lines of work investigated were:—

Soil Phosphorus Studies—Gnagnara (*P. pinaster*)

The Gnangara plantation is situated on the leached grey sands of the Bassendean Soil Association, and an acute phosphorus deficiency occurs throughout the area. The pine crop is given 2 oz. of superphosphate per tree at the time of planting but subsequent applications of fertilizer have been found necessary to maintain satisfactory growth.

In these highly leached sands there are no phosphate fixing mechanisms present in the soil, so any phosphate applied is only available to the crop for a single growing season. The free-growth plots established in North Gironde Block provide a very good series for the study of the effect of superphosphate applications on foliar phosphorus levels.

These plots were planted in 1953, and by 1962 the health and vigour of the trees had declined considerably. In the spring of that year superphosphate was applied at the rate of 4 cwt. per acre.

Foliar samples were collected from randomly selected plots in this area from 1963–66, and the changes in foliar phosphorus observed. The pooled phosphorus values for this experiment are tabulated below:—

FREE GROWTH PLOTS, NORTH GIRONDE—
FOLIAR PHOSPHORUS LEVELS

Treatment	Stocking Stems/Acre	Per Cent. P.			
		Year			
		1963	1964	1965	1966
Initial Application for Superphosphate 1953	Control (Unthinned)	0·082	0·044	....	0·032
Initial Application of Superphosphate : 1953, plus 4 cwt. super, 1962	100	0·255	0·127	0·116	0·090
	200	0·256	0·138	0·114	0·093
	300	0·229	0·147	0·121	0·098
	400	0·275	0·136	0·101	0·082
	500	0·240	0·132	0·113	0·084
	600	0·235	0·132	0·102	0·094
	Control (Unthinned)	0·215	0·105	0·116	0·074

There was a rapid, marked response to the superphosphate application, and the first evidence of this was an increase in needle length from 4 to 8 inches during the spring of 1962, and the growth response has continued until this year.

It is evident from the data that no soil reserves of phosphate are available for growth in the years following the application of fertilizer. This lack of soil phosphorus is indicated by the rapid decline in foliar phosphorus between 1963 and 1964, hence the growth stimulus is maintained solely by the initial phosphorus uptake.

It is anticipated that growth on these plots will commence to decline during 1966 or 1967, and steps must be taken to treat these areas before this occurs.

This short term effect of superphosphate requires careful consideration, and research is necessary to find a more persistent source of phosphorus.

Cultivation Experiment—Gnangara

This area was planted in 1958, and a cultivation experiment was established during 1960. Strips of pines were cultivated in 1960 and again in 1963. There was a marked improvement in tree vigour as a result of the cultivation, and the increased height growth was still evident in 1966. Foliar samples were collected from a series of paired plots covering a range of topographic situations throughout the area, and foliar analyses carried out on samples from the cultivated and adjacent control areas.

Considerable differences were observed throughout the area due to topography, but the overall mean heights were:—

Cultivated .... 10.1 feet
Non-cultivated .... 7.8 ,,

Cultivation has caused a significant increase in foliar phosphorus and potassium levels, but the nitrogen levels were not affected.

The mean foliar levels for the plots were:—

	Cultivated per cent.	*Non-Cultivated* per cent.
N	0.686	0.660
P	0.064	0.058
K	0.672	0.613

FIRE RESEARCH

In September, 1965, the fire research section at Dwellingup was divided to permit work to commence on the problems of the Karri or Southern Forest Region. This area is more complex in forest type and weather pattern. Fire behaviour studies and controlled burning techniques will be the main lines of early research in the region.

Fire Behaviour Studies

(a) *Jarrah Forest*

Experimental fires and fuel moisture content studies were continued at Dwellingup and the data obtained was added to that of previous years. The fire danger rating and controlled burning guide were further tested in practice and proved to be valuable aids to the planning and execution of the rotational controlled burning programme.

(b) *Karri Forest Region*

Experimental fires in southern jarrah and jarrah–marri forests indicated, at this early stage, that the danger and guide tables can be readily adjusted to fit these forest types.

Fuel moisture content studies have been initiated in the karri and jarrah forests of the region and results from these will assist in modifying the above tables.

(c) *Pine Plantations*

Experimental fires, to study behaviour of mild intensity burns under *P. pinaster* stands, were lit and measured in Gnangara, Somerville and Margaret River plantations. The ranges of conditions and intensities of the Gnangara fires are given below as an indication of those suitable for controlled burning under *P. pinaster*. (The stands were 13 years old, low pruned, but not thinned.)

TABLE 1

Item	Range
Temperature (°F)	58–70
Relative Humidity (per cent.)	47–65
Profile moisture content of needles (per cent.)	92–00
Surface needle moisture content (per cent.)	5–17
Amount of needle fuel (tons/acre O.D.W.)—Before lighting	1·5–5·6
Amount of needle fuel (tons/acre O.D.W.)—After the fire	1·0–3·3
Wind velocity at 4 feet in forest (m.p.h.)	1·5–2·1
Average rate of forward spread of head fire (ft./min.)	0·3–1·3
Average flame height of head fire	9 ins.–33 ins.
Average flame depth of head fire	3 ins.–19 ins.

These studies will be continued in future seasons and similar experiments under *P. radiata* will also be carried out.

Effect of Fire in the Forest

(a) *On Growth and Damage to Jarrah Poles*

Comparisons were made of the effects, on girth increment and damage, of two intensities of fires and unburnt controls.

Results after one year indicated mean breast high girth increments of 0.593 ins. after burning at wildfire intensity, 0.57 ins. after burning at mild (controlled burning) intensity, and 0.423 ins. in the unburnt controls.

It must be realised, however, that stem damage and death in trees subjected to high fire intensity offsets any added girth increment. Of 30 trees subjected to this treatment, all suffered full crown scorch, four were killed, 20 were stem-damaged in varying degrees and six only were undamaged in the bole.

The significant result so far is that poles in the controlled burning area were not damaged and have maintained growth equal to or even slightly higher than the unburnt trees.

(b) *On Crown Scorch and Recovery of Jarrah Saplings*

Further comparisons were made of the recovery of crowns of jarrah saplings of varying heights after subjection to mild intensity controlled fires. The bulk of the crown damage was restricted to saplings under 9 feet in height. Results indicate that regeneration in cutover forests must be protected from fire until it is over 10 feet in height.

(c) *On Karri Poles*

Experiments to test the effect of mild burning on small karri poles have been initiated, but no results are yet available.

(d) *On* P. pinaster *in* 13-*yrs.-old Plantation*

Measurement of diameter increment at breast height of trees burnt in the controlled intensity fires of the behaviour studies were compared with those in unburnt portions of the same stand. After 12 months the mean increment in the burnt trees was 0.704 ins. and that in the unburnt 0.593 ins.

There was no butt damage evident on trees in the burnt area, but eventually sample trees will be felled and inspected to certify this observation. Cambial damage is not expected as measurements made during the fires by C.S.I.R.O. officers showed that temperatures at the cambium rarely exceeded 40°C.

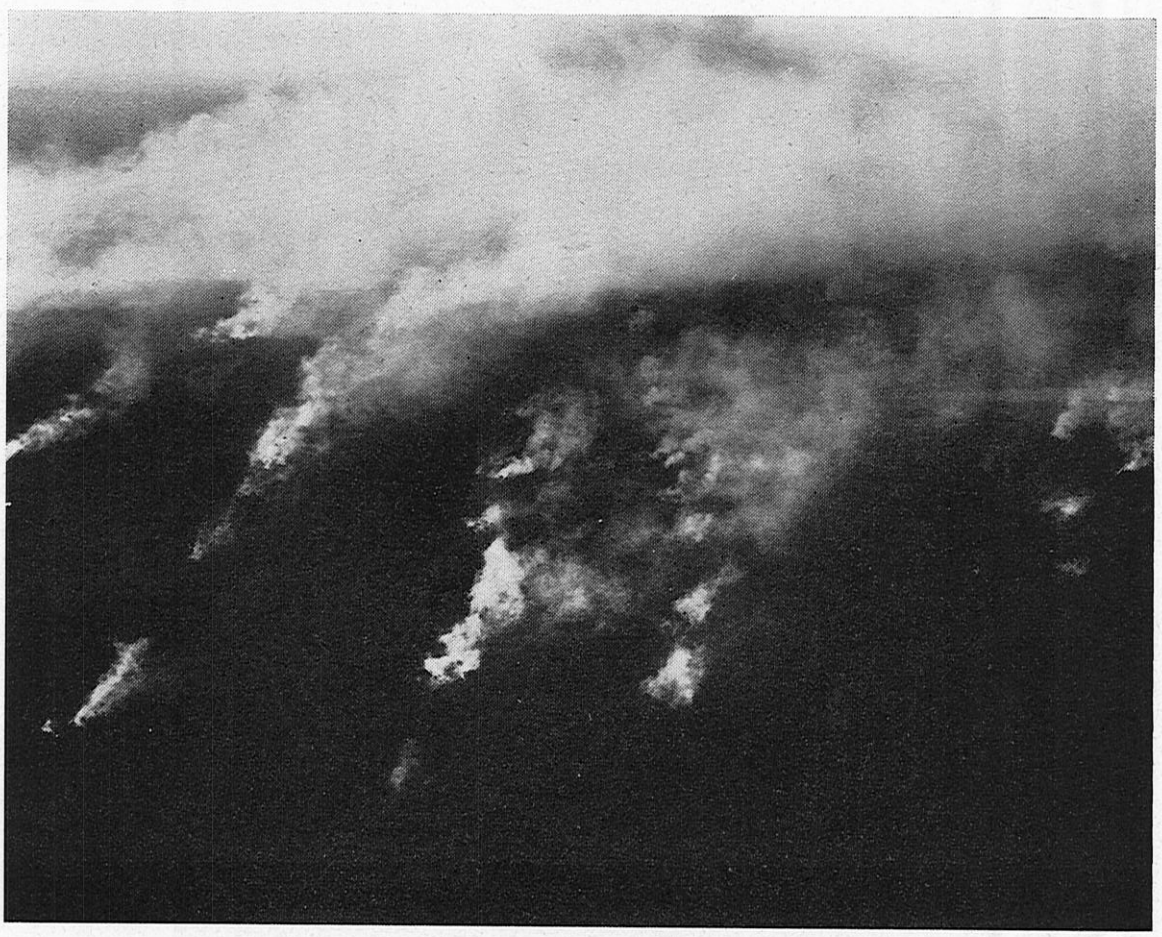
Measurements of the trees will be continued to test long term effects on growth rates, and studies of soil nutrient status in the burnt and unburnt areas have been initiated to measure fire effect on the soil.

Methods of Controlled Burning

A joint project, on controlled burning by incendiary-drop from aircraft, was entered into with C.S.I.R.O. and the Aeronautical Research Laboratories in the spring of 1965.

Following investigations into low flying and ground marking techniques, incendiaries were dropped over approximately 53,000 acres of forest. This area was covered in six days and the grid pattern of spot fires necessary for controlled burning was achieved without serious difficulty.

Using a 10 chain grid of spot fires, area coverage was 2,000 to 3,000 acres per hour. The pattern of spots, area production, and costs were generally superior to that achieved by ground crews in the forest burnt.



A grid pattern of spot fires lit by dropping incendiaries from an aircraft.

The importance of this method of lighting, in areas where dense scrub makes foot access difficult and dangerous and where road and track access is sparse, is obvious. In the other more accessible forest, however, it still has the distinct advantages of enabling quick lighting over large areas when conditions for burning are ideal and where manpower is a limiting factor for on-foot burning and control.

Following the trials of 1965 the C.S.I.R.O. have further improved the incendiary, the machine used for timing the dropping interval, and the ground marking techniques. These improvements as well as the other organisational aspects will be further tested in spring, 1966.

OTHER RESEARCH

The tests in connection with marine borers and soft rot in cooling towers carried on in conjunction with C.S.I.R.O. were continued during the year with no changes in the patterns previously established.

10. LIBRARY

For the first time the number of publications (new titles only) received by the library exceeded 1,000. This resulted in an increase in the size of Accession Lists leading to an increase of over 800 Accession List requests. Apart from this " Loans and Queries " doubled during the year.

The increasing time spent by the staff in attending to loans, queries and accession list requests caused some reduction in circulation of journals compared with last year.

		1964–65	1965–66
1.	Journal Loans	7,344	6,234
2.	Accession List Requests	1,902	2,756
3.	Loans and Queries	1,944	3,813
4.	Publications Received	675	1,008

11. EDUCATION AND PUBLICITY

Education

Thirteen applicants were accepted for the trainee course which commenced at Dwellingup on 3rd August, 1965.

A system of In-Service Training was commenced whereby six Forest Guards, who completed their trainee course in 1965, will be given intensified field training over a period of two years.

Trainees being instructed in the operation of a heavy duty fire fighting outfit.

Training courses in fire operations and workers' safety methods were conducted by various divisions.

Two State and one Commonwealth forestry scholarships were awarded in 1966. The present position is as follows :—

	Commonwealth Scholarship	State Scholarship	Independent
*4th Year—Canberra	1	1	....
3rd Year—Canberra	1	2	....
2nd Year—University of W.A.	3	1	....
1st Year—University of W.A.	....	2	†1

* To graduate in 1966. † Suspended scholarship.

Publicity

The Department contributed to the Technical Training Year, 1966, by the revision and printing of the booklet " Careers in Forestry " and the preparation of various displays.

The revised edition of Bulletin 63 " Forestry in Western Australia," is in the hands of the printer.

During the year the Department was represented on various public bodies such as the Bush Fires Board, Government Tender Board, Wundowie Charcoal-Iron Board, Fauna Protection Committee, Water Protection Committee, Joint Timber Committee of the Standards Association of Australia, Timber Industry Safety Committee of the National Safety Council, and the State Advisory Committee of the C.S.I.R.O.

Senior officers of the Department again gave lectures and talks to various Societies and Public Bodies.

12. TIMBER INDUSTRY REGULATION ACT, 1926-1950

The number of mills registered under the provisions of the Act at 31st December, 1965, totalled 203 (121 Crown Land and 82 Private Property).

The average number of persons employed in timber mills each month throughout the year was 3,518, approximately 100 less than the previous year.

The District and Workmen's Inspectors made 1,607 inspections of timber holdings. There were 981 notifiable accidents, three of which were fatal. The number of accidents per 100 persons employed was 28 compared with 24.5 for last year.

Two meetings of the Timber Industry Committee of the National Safety Council were held, also five meetings of the Forests Department Safety Committee. Divisional Safety Committees have been formed in 12 Divisions and are functioning actively.

A start has been made to bring the Timber Industry Regulation Act into conformity with modern logging and sawmilling practice.

The cost of administering the Timber Industry Regulation Act for the year ending 30th June, 1966, was as follows :—

Salaries	$6,394
Mileage, Travelling Allowances and Sundries	$3,943
	$10,337

13. FOREST OFFENCES

A total of 50 forest offences were reported during the year. Legal proceedings were taken in six cases and all resulted in conviction. Fines and costs amounted to $674 and $9.80 respectively.

Warnings were issued in 19 instances and the remainder dealt with by charging royalty, forfeiture of deposits, collection of damages or confiscation and sale of timber illegally cut. The amount received by the Department in this way totalled $1,184.53.

14. EMPLOYMENT IN FORESTRY AND THE TIMBER INDUSTRY

The number of wage earners directly employed in Forestry and the Timber Industry was estimated at 5,275, made up as follows :—

Forestry—		
Professional Officers	46	
General Field Staff	203	
Clerical and Drafting	71	
Wages Employees	621	
Contractors and Employees (estimated)	20	
		961
Timber Industry—		
Sawmill employees including bush workers at 31st December*		3,518
Firewood cutters and pole getters, working under permits		314
Sandalwood workers		83
Apiarists, estimated (798 sites registered)		399
Total		5,275

* Includes employees of registered sawmills only but excludes persons employed in associated yards in the metropolitan area.

15. STAFF MATTERS

Public Service Act

With the retirement of Mr. G. E. Brockway in December, 1965, the Department lost a valued officer. He specialised in trees for drier areas and was responsible for the street tree planting programme at Kalgoorlie and later the experimental aboreta at various centres throughout the wheatbelt.

In 1955 he was made available for a period of two years as a Forestry Consultant to the Pakistan Government under the Colombo Plan.

His services to forestry will be commemorated by the name Eucaluptus brockwayi given to Dundas Mahogany, specimens of which were first collected by him in 1940. This is a popular tree for dry country planting, both in Australia and many other parts of the world.

Mr. W. H. Eastman was promoted to Chief of Division, in charge of Pine Plantations and Research.

Other promotions during the year included Dr. E. R. Hopkins and A. C. van Noort to Inspectors and F. J. Campbell to Fire Operations Officer.

Mr. G. S. McCutcheon was appointed as an Assistant Divisional Forest Officer.

Advantage was taken of a visit to this State by Dr. D. A. N. Cromer, Director of Forest Research Institute, Canberra, to arrange a meeting of the Institute of Foresters (W.A. Branch) and present to F. Batini the Schlich Medal for forestry awarded to him as a joint winner in 1962.

A.D.F.O. A. J. Williamson returned from study leave at the University of Michigan where he was successful in obtaining the degree of Master of Forestry.

It is of interest to record that in recent years the following officers have gained higher degrees :—

O. W. Loneragan	M.Sc.	University of W.A.	1963
I. S. Ferguson	M.F.	(Yale)	1963
A. B. Hatch	M.Sc.	University of Sydney	1965
E. R. Hopkins	Ph.D.	University of Melbourne	1965

A.D.F.O. R. J. Underwood was granted study leave to attend the University of Washington.

Resignations included D.F.O. I. G. Morison, A.D.F.O. M. J. Clark, R. J. Terrell, H. A. Adie Cooper, and Miss L. M. McBurney. Mr. D. C. Hardinge retired.

Mr. R. M. Davis was appointed Assistant Chief Draftsman.

Two cadet draftsmen (cartographic) and one trained drafting assistant commenced duty during the year.

By a decision of the Public Service Appeal Board gazetted on the 17th June, 1966, following a Group Appeal against the Reclassification, classifications in our Drafting Branch were amended with effect from 1/1/63 as follows :—

	From	To
Chief Draftsman	P–II–11	P–I–1
Assistant Chief Draftsman	P–II–8/9	P–II–9/10
Senior Draftsmen	P–II–6/7	P–II–7/8
Draftsmen	P–II–1/5	P–II–1/6

As a result of a reclassification, D. W. Arnold's position in the Management Branch was amended from C–II–2 to C–II–3.

Mr. P. Trainer was appointed to Registration Branch as a replacement for Mr. H. F. Rosling.

Several officers were transferred to other Departments during the year mainly by way of promotion, and these included H. F. Rosling to the Department of Industrial Development and M. McAuliffe to Town Planning.

Following negotiations between the Civil Service Association of Western Australia (Incorporated) and the Public Service Commissioner, a Public Service (Clerical Division) Salaries Agreement was signed and registered in accordance with the provisions of the Industrial Arbitration Act, 1912-1963. The new salary rates for the Clerical Division were retrospective to the 7th January, 1966. New salary rates were also determined for officers classified in Group I and Special Classes in the Administrative Division.

Negotiations in respect of salary rates for officers in the General and Professional Divisions are proceeding.

It is with deep regret that I have to report that Mr. G. W. M. Nunn, who retired on the 25th October, 1963, passed away on the 30th March, 1966. Mr. Nunn had been an outstanding forester for 40 years and made important contributions to the forestry profession, inspiring the younger generation of foresters with his zeal and insight.

Forests Act

Senior Forester D. H. Perry returned from Portugal and resumed duty on the 22nd November, 1965, following two years outstanding work on tree breeding there in *Pinus pinaster*.

Additions to the staff during the year included the following :—

13 " Forest Trainees " who commenced the course Two Clerical Assistants, 1 Forest Assistant, 12 Technical Assistants (Male), 2 Technical Assistants (Female), 1 Research Assistant (Female), 6 Forest Guards, 1 Forest Officer, 1 Publicity Officer, 1 Plant Inspector.

Mr. R. S. Meldrum was promoted to the vacant item of Senior Timber Inspector.

Other promotions included 6 officers to Forest Ranger, 3 to Assistant Forester, 1 to Senior Forester (Fire Control)

Four officers were reclassified from Technical Assistant F–IV to Technical Assistant F–II–1 /2, and one officer from Technical Assistant F–II–1 /2 to Technical Officer Grade 2 F–II–3 /4.

Resignations accounted for :

Two Clerical Assistants, 1 Forest Assistant, 5 Forest Trainees, 3 Forest Guards, 3 Technical assistants (Male), 3 Technical Assistants (Female), 1 Technical Officer, 1 Plant Inspector, 1 Forester and 2 Forest Officers.

During the year the Department lost the services of Forest Guard E. V. Foot who passed away on the 17th August, 1965, after long and valuable service to forestry for 40 years.

16. AUSTRALIAN FORESTRY COUNCIL

Two meetings of this Council were held during the year—the first at Bulolo, New Guinea, August, 1965, the second at Brisbane, Queensland, in March, 1966.

The principal business dealt with proposals for the increased Australian pine planting programme, which is to be raised to 75,000 acres per year. Financial arrangements proposed by the Commonwealth were thoroughly discussed and progress reported.

The Council's Standing Committee had several meetings to provide data for the Council's consideration. These meetings were held in Canberra where the Commonwealth Forestry and Timber Bureau provides Secretarial facilities.

The first Forest Resources Newletter published by the Council was received favourably and provides valuable information for the public along the lines of the publication issued by the Water Resources Council.

17. SIXTH WORLD FORESTRY CONGRESS

This Congress, under the auspices of the Food and Agriculture Organisation (F.A.O.) of the United Nations, was held in Madrid, commencing on 6/6/66. The Australian contingent included the Hon. David Fairbairn, D.F.C., (Minister for National Development)—Leader of the Australian Delegation, and 15 others from Australian forest services and industry.

Mr. A. C. Harris, Conservator of Forests, attended and contributed a paper on " Pinus pinaster in W.A. " especially setting out the W.A. Forests Department work on tree breeding in Portugal. He also read a paper on " Plywood Developments " by Mr. D. M. Cullity of Westralian Plywoods.

Both before and after the Congress, forestry tours were undertaken in Spain and Portugal.

In Portugal, special attention was directed to the W.A. Forests Department's work on tree breeding in *Pinus pinaster*.

An invitation was given by the U.S.S.R. for the next Congress to be held in Russia in 1972 (approximately).

APPENDIX 1A

Statement of Revenue and Expenditure of the Consolidated Revenue Fund for the Year ended 30th June, 1966

1964/65	Revenue	1965/66	1964/65	Expenditure	1965/66
$	*Royalties*	$	$		$
1,950,512	Logs	2,061,200	414,136	Salaries	431,268
118,064	Sleepers	145,420	112,126	Incidentals	122,316
4,166	Sawn Timber	3,771	4,206	Timber Industries Regulation Act	3,944
149,078	Piles and Poles	145,428	184,254	Hardwood Conversion	165,811
17,460	Mining Timber	16,509	388,576	Pine Conversion	434,670
23,380	Firewood	34,666	97,840	Recoupable Projects	79,473
11,278	Posts	14,830	24,830	Tree Nurseries	39,777
12,082	Sandalwood	16,613	21,672	Arboreta	19,623
9,204	Miscellaneous	4,205	2,142,086	Excess of Revenue over Expenditure distributed as follows :—	
2,295,224		2,442,642		9/10 to Reforestation Fund	2,352,665
			232,008	Transferred to Treasury	267,671
	Pine Conversion				
379,044	Pine Logs	425,298			
184,002	Sawn Pine	255,994			
563,046		681,292			
	Hardwood Conversion				
55,518	Sawn Hardwood	105,095			
146,750	Logs	133,784			
12,972	Piles and Poles	16,465			
215,240		255,344			
	Other Sales and Fees				
38,206	Seeds and Trees	46,843			
75,294	Inspection Fees	86,417			
34,166	Rent and Leases	31,312			
287,108	Miscellaneous	268,277			
434,774		432,849			
	Recoupable Projects				
91,830	Specific Roads	66,493			
21,620	Other	38,598			
113,450		105,091			
3,621,734		3,917,218	3,621,734		3,917,218

APPENDIX 1B

Forests Improvement and Reforestation Fund Account for Year ended 30th June, 1966

1964/65		1965/66	1964/65		1965/66
$		$	$		$
170,842	Balance as at 1st July	412,904	2,405,492	Expenditure	3,049,925
2,142,086	9/10 Revenue	2,352,665	311,812	*Less* Recoups	336,731
42,656	Rents	47,928	2,093,680		2,713,194
152,000	Federal Aid Road Grant	170,000	201,000	Reserve Fire Control	201,000
200,000	Reserve Fire Fighting	201,000	412,904	Balance Working Account	270,303
2,707,584		3,184,497	2,707,584		3,184,497

DETAILS OF EXPENDITURE

1964/65		1965/66
$	*Divisional*	$
945,958	Divisional Wages, Materials, etc.	1,155,398
	Head Office	
558,200	50. Salaries and Allowances	602,370
33,972	51. Incidentals	45,403
129,102	52. Purchase of Plant and Vehicles	319,260
399,294	53. Plant Operations	436,076
31,146	54. Purchase of Land	94,090
9,750	55. Fire Equipment	23,404
54,924	56. Como Buildings	107,487
13,020	57. Como Headquarters	16,093
60,248	58. Communications	25,443
17,118	59. Research	36,530
16,016	60. Drafting	6,908
5,678	61. Surveys	4,484
6,972	62. Training Staff	23,510
62,040	63. Insurance	88,868
40,550	64. Pay Roll Tax	44,648
21,504	65. Utilisation	19,953
1,459,534		1,894,527
2,405,492	Total Reforestation Fund	3,049,925

APPENDIX 1C

Statement of Afforestation Expenditure for the Year ended 30th June, 1966

1964/65	Expenditure	1965/66	1964/65	Source of Funds	1965/66
$		$	$		$
238,472	Plantation Establishment	331,227	300,000	General Loan Fund	360,000
167,118	Plantation Management	206,777	116,110	Reforestation Fund	154,656
62,904	Houses and Buildings	74,391	563,046	Sale of Pine Logs and Timber	681,292
18,004	Road Construction and Maintenance	30,964			
32,074	Fire Prevention and Suppression	34,245			
17,226	Research	17,929			
1,474	Surveys and Plans	1,973			
23,950	Essential Services and Communications	23,419			
29,358	Administration	40,353			
388,576	Direct Conversion of Pine	434,670			
979,156		1,195,948	979,156		1,195,948

APPENDIX 1D

Statement Showing Distribution of Forests Department Expenditure

	Details
	$
Consolidated Revenue Fund	1,296,881
Reforestation Fund	2,730,825
General Loan Fund	360,000
	$4,387,706
Distribution of Expenditure—	
	$
1. Busselton	355,240
2. Mundaring	254,173
3. Dwellingup	365,014
4. Collie	298,252
5. Kirup	293,016
6. Manjimup	324,419
7. Narrogin	52,051
8. Gleneagle	162,692
9. Metropolitan	120,308
10. Harvey	478,693
11. Pemberton	246,284
12. Nannup	310,216
13. Shannon River	202,296
14. Kalgoorlie—Esperance	25,910
15. Wanneroo	300,480
Head Office	598,662
	$4,387,706

APPENDIX 2A

COMMONWEALTH BUREAU OF CENSUS AND STATISTICS

Exports from Western Australia of Timber, Furniture, Tanning Substances and Essential Oils for Year ended 30th June, 1966

	Item and Destination	Quantity	Value
	TIMBER	cub. ft.	$
1	*Softwood Logs—*		
2	*Hardwood Logs—*		
	Christmas Island	181	451
3	*Sleepers—*		
	Bahrain Island	286	594
	Belgium—Luxembourg	23	52
	Greece	1,341	2,371
	Kenya	8,017	13,354
	Mauritius	363	308
	Netherlands	3,153	5,602
	New Zealand	173,001	224,668
	St. Helena and Ascension	156	234
	South Africa, Republic of	39,939	46,908
	United Kingdom	118,291	251,159
	United States of America	327	1,053
		344,897	546,303
	Australian States: cub. ft. $		
	Victoria 788 1,053		
	South Australia 322,205 464,047		
	Northern Territory 248 374		
		323,241	465,474
	Total	668,138	1,011,777
	Hardwoods, Sawn, Undressed—		
4	*Jarrah:*		
	Belgium—Luxembourg	145	352
	Christmas Island	143	446
	Cocos Island	83	216
	Italy	1,004	1,874
	Mauritius	3,043	4,868
	Netherlands	12,876	21,697
	New Zealand	50,512	74,653
	Solomon Islands	489	752
	South Africa, Republic of	22,445	36,340
	United Kingdom	84,759	162,120
	United States of America	1,802	4,657
		177,301	307,975
	Australian States: cub. ft. $		
	New South Wales 1,469 2,708		
	Victoria 105,542 152,086		
	South Australia 506,147 648,249		
	Northern Territory 18,484 36,446		
		631,642	829,489
	Total	808,943	1,714,464
5	*Karri:*		
	Belgium—Luxembourg	179	324
	Germany, Federal Republic of	13,814	24,752
	Italy	500	566
	Mozambique	8,152	15,100
	Netherlands	34,389	58,134
	New Zealand	149,534	247,527
	South Africa, Republic of	62,614	122,584
	United Kingdom	921	2,004
	United States of America	2,894	4,861
		272,997	475,852
	Australian States: cub. ft. $		
	New South Wales 4,033 4,442		
	Victoria 3,808 4,714		
	South Australia 440,887 580,208		
	Northern Territory 48,700 91,252		
		497,428	680,616
	Total	770,425	1,156,468
6	*Other:*		
	Cocos Island	40	160
	New Zealand	83	162
	Malaysia	....	3,478
	Singapore	....	2,748
	Not Stated	1,471	2,716
		1,594	9,264
	Australian States: cub. ft. $		
	Victoria 5,080 9,872		
	South Australia 3,637 6,129		
	Northern Territory 139 412		
		8,856	16,413
	Total	10,450	25,677

	Item and Destination	Quantity	Value
		cub. ft.	$
7	*Timber, Dressed or Moulded—*		
	Flooring:		
	Christmas Island	279	685
	Gilbert and Ellice Islands	167	409
	New Zealand	2,702	12,214
	United Kingdom	12,389	33,712
	United States of America	20	72
		15,557	47,092
	Australian States: cub. ft. $		
	New South Wales 44,926 90,016		
	Victoria 27,045 54,879		
	Queensland 176 1,102		
	South Australia 73,293 126,664		
	Northern Territory 4,732 13,449		
		150,172	286,110
	Total	165,729	333,202
8	*Other:*		
	United Kingdom	1,421	2,786
	United States of America	3,568	6,939
		4,989	9,725
	Australian States: cub. ft. $		
	South Australia 459 700		
	Northern Territory 1,934 5,962		
		2,393	6,662
	Total	7,382	16,387
9	*Plywood and Veneers—*	sq. ft.	
	Cocos Island	960	276
	Malaysia	768	772
	New Zealand	1,857	156
		3,585	1,204
	Australian States: sq. ft. $		
	New South Wales 334,748 57,969		
	Victoria 2,242,168 319,518		
	Queensland 42,968 2,152		
	South Australia 1,934,716 257,537		
	Tasmania 190,101 15,904		
	Northern Territory 68,356 15,568		
		4,813,057	668,648
	Total	4,816,642	669,852
	Total, Timber Exports	....	**4,361,278**
	WOOD MANUFACTURES		
10	*Casks and Vats, empty—(a)*	No.	
	United Kingdom	655	7,013
	United States of America	12	98
	Total	667	7,111
11	*Manufactures of Wood (except furniture) N.E.I.—*		
	Christmas Island	....	108
	Germany, Federal Republic of	....	60
	Netherlands	....	196
	Sweden	....	388
	United States of America	....	1,000
		....	1,752
	Australian States: $		
	New South Wales 120		
	Victoria 20,535		
	Queensland 4,991		
	South Australia 24		
	Northern Territory 25,264		
		....	50,934
	Total	....	52,686

COMMONWEALTH BUREAU OF CENSUS AND STATISTICS

Exports from Western Australia of Timber, Furniture, Tanning Substances and Essential Oils for Year ended 30th *June*, 1966

	Item and Destination	Quantity	Value
12	*Furniture of any Material*—		$
	Christmas Island		454
	Cocos Island		72
	Kenya		368
	Malaysia		27,519
	Mauritius		14,681
	Saudi Arabia		914
	Singapore		11,086
	Thailand		27,003
	United Kingdom		18
	United States of America		250
			82,365
	Australian States:	$	
	New South Wales	321,127	
	Victoria	347,078	
	Queensland	267,102	
	South Australia	225,744	
	Tasmania	38,463	
	Northern Territory	23,231	
	Australian Capital Territory	534	
			1,223,279
	Total		1,305,644
13	*Tanning Substances of Natural Origin*—	cwt.	
	Austria	403	2,608
	Canada	400	2,778
	Denmark	605	5,000
	Germany, Federal Republic of	4,595	20,735
	Hong Kong	90	804
	Italy	760	6,272
	Jamaica	760	5,766
	Netherlands	105	680
	Trinidad and Tobago	809	6,069
	United Kingdom	5,421	36,309
	United States of America	24,880	169,508
		38,828	256,529
	Australian States (*b*):	cwt.	$
	New South Wales	1,595	15,657
	Victoria	195	5,243
	Queensland	380	5,504
	South Australia	333	4,388
	Tasmania	200	2,520
		2,703	33,312
	Total	41,531	289,841

	Item and Destination	Quantity	Value
14	*Essential Oils, Natural, Non-spirituous*—	lb.	$
	Ceylon	694	634
	China, Republic of (Formosa)	84	824
	France	14,706	13,682
	Germany, Federal Republic of	17,061	16,130
	Greece	14	150
	Hong Kong	6,924	13,183
	India	441	412
	Italy	1,814	8,905
	Japan	2	720
	Malaysia	56	420
	Netherlands	4,605	1,151
	New Zealand	6,419	7,200
	Singapore	2,063	3,886
	Switzerland	56	693
	Thailand	5,279	2,404
	United Kingdom	5,565	8,600
	United States of America	32,508	120,445
		98,291	199,439
	Australian States:	lb.	$
	New South Wales	31,345	60,223
	Victoria	20,287	33,739
	Queensland	2,261	489
	South Australia	14,342	20,927
		68,235	115,378
	Total	166,526	314,817
	Total Value of all Exports on this Return	....	**6,331,377**

(*a*) Interstate Exports included in Item 11.
(*b*) Includes synthetic tanning materials and tanning oils.
N.E.I.—Not elsewhere included.
Basis of Value—F.O.B. port of shipment.

APPENDIX 2B

COMMONWEALTH BUREAU OF CENSUS AND STATISTICS

Imports into Western Australia of Timber, Furniture, Tanning Substances and Essential Oils for the Year ended 30th June, 1966

	Item and Origin	Quantity	Value
1	*Hardwood Logs—*	cub. ft.	$
	Burma	92	384
	Dominican Republic	42	994
	Fiji	20,722	17,816
	France	208	840
	Ghana	2,198	7,804
	Ivory Coast	633	1,058
	Malaysia	640,736	491,441
	Thailand	2,242	14,054
	United Kingdom	1,215	1,512
		668,088	535,903
	Australian States: cub. ft. $		
	Tasmania 3,020 4,454	3,020	4,454
	Total	671,108	540,357
2	*Softwoods, Sawn, Undressed—*		
	Redwood and Western Red Cedar (a):		
	Canada	480	536
	United States of America	138	584
	Total	618	1,120
3	*Douglas Fir (a):*		
	United States of America	57,179	91,952
4	*Other:*		
	United States of America	10,653	25,032
5	*Hardwoods, Sawn, Undressed—*		
	Fiji	1,765	2,790
	Ghana	4,354	10,814
	Kenya	214	676
	Malaysia	558,615	724,818
	Philippines	646	1,126
	United Kingdom	106	1,086
		565,700	741,310
	Australian States: cub. ft. $		
	Victoria 343 1,186		
	Queensland 694 2,288		
	South Australia 15,618 26,887	16,655	303,61
	Total	582,355	771,671
6	*Shooks and Staves, Undressed—*		
	Malaysia	1,337	1,456
7	*Beadings and Mouldings—*		
	United Kingdom	....	878
8	*Sawn Timber, Dressed or Moulded—*		
	Flooring (b):		
	Sweden	3,491	5,407
9	*Other:*		
	Australian States: cub. ft. $		
	New South Wales 13 32		
	Queensland 191 624		
	South Australia 789 1,912		
	Tasmania 1,187 2,824	2,180	5,392
10	*Plywood and Veneers—*	sq. ft.	
	China, Republic of (Mainland)	57,240	2,694
	Gabon	26,637	1,375
	Ghana	66,519	1,424
	Ireland, Republic of	3,730	1,348
	Japan	412,040	50,074
	Malaysia	3,840	68
	Netherlands	36,008	608
	Papua and New Guinea	22,400	1,892
	United Kingdom	146,457	6,726
		774,871	66,209
	Australian States: sq. ft. $		
	New South Wales 217,768 25,137		
	Victoria 201,267 19,187		
	Queensland 2,707,250 418,228		
	Tasmania 41,421 3,536	3,167,706	466,088
	Total	3,942,577	532,297

	Item and Origin	Quantity	Value
11	*Reconstituted Wood, also known as Particle Board, Chip Board, Sliver Board, etc.—*	sq. ft.	$
	Australian States: sq. ft. $		
	New South Wales 1,130,627 146,971		
	South Australia 1,097,338 177,905	2,227,965	324,876
12	*Match Splints—*		
	Finland	....	47,968
13	*Rulers, any material—*		
	Germany, Federal Republic	....	58
	Japan	....	80
	United Kingdom	....	2,467
	Total	....	2,605
14	*Table Mats, Wooden (c):*		
	China, Republic of (Mainland)	....	242
	Japan	....	124
	United Kingdom	....	1,104
	Total	....	1,470
15	*Wood Flour (c):*	cwt.	
	United States of America	732	9,024
16	*Manufactures of Wood (except Furniture), N.E.I.—*		
	Canada	....	1,836
	China, Republic of (Formosa)	....	1,626
	China, Republic of (Mainland)	....	136
	Czechoslovakia	....	392
	Denmark	....	1,088
	Finland	....	....
	France	....	24
	Germany, Federal Republic of	....	371
	Greece	....	88
	Guatemala	....	10
	Hong Kong	....	1,785
	India	....	790
	Ireland, Republic of	....	99
	Italy	....	4,014
	Japan	....	25,312
	Kenya	....	1,476
	Korea, Republic of	....	44
	Malaysia	....	8
	Mauritius	....	34
	Netherlands	....	100
	New Zealand	....	4,965
	Norway	....	283
	Poland	....	20
	South Africa, Republic of	....	2
	Spain	....	248
	Sweden	....	80,620
	Switzerland	....	96
	Thailand	....	118
	United Kingdom	....	6,048
	United States of America	....	550
		....	132,183
	Australian States: $		
	New South Wales 132,598		
	Victoria 154,476		
	Queensland 33,977		
	South Australia 27,523		
	Tasmania 2,290	....	350,864
	Total	....	483,047

APPENDIX 2B—*continued*

COMMONWEALTH BUREAU OF CENSUS AND STATISTICS

Imports into Western Australia of Timber, Furniture, Tanning Substances and Essential Oils for the Year ended 30th June, 1966

	Item and Origin			Quantity	Value
					$
17	*Furniture of any Material— (d)*				
	Austria			....	46
	China, Republic of (Formosa)			....	156
	China, Republic of (Mainland)			....	204
	Denmark			....	2,352
	France			....	12
	Germany, Federal Republic of			....	912
	Greece			....	2
	Hong Kong			....	40,860
	India			....	516
	Italy			....	5,389
	Japan			....	23,669
	Korea, Republic of			....	16
	Malaysia			....	418
	Netherlands			....	428
	New Zealand			....	120
	Norway			....	1,975
	Singapore			....	830
	South Africa, Republic of			....	260
	Spain			....	4,346
	Sweden			....	98
	Thailand			....	24
	United Kingdom			....	55,747
	United States of America			....	18,663
	Yugoslavia			....	705
				....	157,748
	Australian States:		$		
	New South Wales		438,697		
	Victoria		549,342		
	Queensland		413		
	South Australia		747,933		
				....	1,736,385
	Total			....	1,894,133
18	*Clothes Pegs, Wooden—*			gross	
	Czechoslovakia			4,000	864
	Sweden			900	314
				4,900	1,178
	Australian States:	gross	$		
	New South Wales	936	730		
	Victoria	6,601	5,045		
	Tasmania	52,319	32,330		
				59,856	38,105
	Total			64,756	39,283
19	*Tool Handles, Wooden—*				
	Canada			....	606
	Poland			....	8
	United Kingdom			....	5,910
	United States of America			....	2,034
				....	8,558
	Australian States:		$		
	New South Wales		40,478		
	Victoria		10,931		
	Queensland		15,230		
	South Australia		1,069		
	Tasmania		1,856		
				....	69,564
	Total			....	78,122

	Item and Origin			Quantity	Value
					$
20	*Tanning Substances, Natural—*				
	Wattle Bark Extracts:			cwt.	
	South Africa, Republic of			3,126	21,875
21	*Other Etxracts:*				
	Mozambique			158	1,206
	Norway			197	436
	United Kingdom			54	2,030
	Total			409	3,672
22	*Tanning Substances, Natural and Synthetic Origin—*			cwt.	
	United Kingdom			250	15,826
	Australian States:	cwt.	$		
	New South Wales	544	4,508		
	Victoria	855	12,111		
	South Australia	201	2,971		
				1,600	19,590
	Total			1,850	35,416
23	*Essential Oils, Natural, Non-spirituous—*			lb.	
	Belgium-Luxembourg			....	....
	Ceylon			413	286
	China, Republic of (Formosa)			13,136	4,149
	China, Republic of (Mainland)			25,780	12,938
	France			1,258	2,125
	India			2,037	2,582
	Indonesia			112	542
	Italy			638	2,526
	Madagascar			5,820	4,241
	Netherlands			119	150
	Seychelles			487	494
	South Africa, Republic of			80,725	32,398
	Swaziland			80,093	32,543
	United Kingdom			....	....
	United States of America			1,712	9,060
				212,330	104,034
	Australian States:	lb.	$		
	New South Wales	17,191	11,978		
	Victoria	4,768	10,852		
	South Australia	6,912	5,998		
				28,871	28,828
	Total			241,201	132,862
	Total Value of all Imports on this Return			....	**5,049,915**

(*a*) Interstate Imports included in item 4.
(*b*) Interstate Imports included in item 9.
(*c*) Interstate Imports included in item 16.
(*d*) Only a small proportion of wooden furniture involved.
N.E.I.—Not elsewhere included.
Basis of Value—
Oversea—F.O.B. Port of Shipment.
Interstate—Landed cost in Western Australia.

APPENDIX 3

Summary of Exports of Forest Produce since 1836

Year	Timber		Year	Timber		Wood Manufactures	Tanning Materials	Essential Oils
	Cub. ft.	Value		Cub. ft.	Value	Value	Value	Value
		£			£	£	£	£
1836 (a)....	10,000	2,500	1901	7,150,600	572,354	....	....	....
1837	....	....	1902	6,256,750	500,533	....	....	....
1838	....	....	1903	7,748,450	619,705	....	859	....
1839	....	....	1904	8,072,300	654,949	....	32,876	....
1840	....	....	1905	8,709,500	689,943	....	154,087	....
			1906	(c) 8,830,700	708,993	....	140,720	....
1841	....	....	1907	(c) 6,409,550	511,923	....	98,773	....
1842	....	....	1908	(c) 9,869,509	813,591	....	79,934	....
1843	....	....	1909	(c) 10,830,450	867,419	....	59,633	....
1844	(b)	163	1910	(c) 12,074,100	972,698	....	93,733	....
1845	....	....						
1846	2,550	255	1911	(c) 12,449,500	986,341	....	83,470	....
1847	12,200	1,120	1912	(c) 11,297,100	903,396	....	49,004	....
1848	3,350	333	1913	(c) 13,619,850	1,089,481	....	47,377	....
1849	....	....	1914 (d)	(c) 6,279,750	502,153	....	18,197	777
1850	10,500	1,048	1915 (e)	(c) 9,968,500	808,392	....	6,127	381
			1916 (e)	5,432,100	441,991	....	10,208	1,102
1851	1,250	268	1917 (e)	3,890,650	310,893	....	18,959	2,060
1852	7,050	806	1918 (e)	3,436,250	274,141	....	16,886	3,995
1853	52,200	5,220	1919 (e)	4,135,750	332,584	11,535	18,875	3,987
1854	58,500	7,023	1920 (e)	5,065,300	465,731	21,935	22,121	3,704
1855	76,900	12,076						
1856	70,500	9,671	1921 (e)	9,816,250	1,137,819	24,916	23,073	10,107
1857	69,200	9,449	1922 (e)	8,309,750	1,041,047	22,248	13,328	6,878
1858	29,250	2,340	1923 (e)	7,911,310	997,454	12,377	21,161	20,075
1859	67,250	6,051	1924 (e)	11,126,861	1,367,517	11,505	29,606	39,877
1860	54,800	4,932	1925 (e)	11,844,303	1,477,997	13,298	40,136	42,057
			1926 (e)	12,001,384	1,522,958	10,072	15,056	47,819
1861	27,750	2,497	1927 (e)	12,580,262	1,651,149	8,727	15,818	26,544
1862	68,800	7,151	1928 (e)	10,384,784	1,265,383	7,783	27,662	39,131
1863	32,900	2,963	1929 (e)	7,635,237	960,435	6,603	35,850	63,307
1864	58,300	5,508	1930 (e)	6,579,743	807,425	4,687	40,628	77,510
1865	183,950	15,693						
1866	85,650	6,849	1931 (e)	4,127,856	507,382	26,615	35,333	56,170
1867	56,750	4,541	1932 (e)	3,062,673	361,700	85,488	42,016	59,301
1868	8,000	638	1933 (e)	2,235,540	262,617	80,332	33,352	26,331
1869	179,900	14,273	1934 (e)	4,060,830	487,248	76,107	20,904	26,720
1870	157,200	17,551	1935 (e)	5,326,117	636,466	65,494	15,284	35,363
			1936 (e)	5,598,180	697,522	50,665	12,237	27,526
1871	218,500	15,304	1937 (e)	5,673,903	699,684	52,338	14,491	38,185
1872	37,000	2,590	1938 (e)	7,545,744	932,420	47,934	13,865	35,128
1873	68,150	4,771	1939 (e)	5,704,250	722,310	43,518	17,842	25,550
1874	345,600	24,192	1940 (e)	5,049,585	634,859	62,796	19,485	47,736
1875	342,350	23,965						
1876	219,050	23,743	1941 (e)	6,091,187	790,876	74,935	13,686	59,867
1877	336,150	26,979	1942 (e)	5,244,634	700,474	64,454	6,896	74,904
1878	580,900	63,902	1943 (e)	3,516,566	605,327	32,426	1,598	70,523
1879	627,250	69,742	1944 (e)	3,645,354	613,994	25,324	1,294	72,704
1880	662,550	66,252	1945 (e)	2,851,475	570,028	27,307	2,795	103,055
			1946 (e)	3,373,025	722,061	(f) 2,618	4,872	128,050
1881	792,750	79,277	1947 (e)	3,458,628	865,255	(f) 13,118	12,056	151,768
1882	936,500	93,650	1948 (e)	3,584,405	1,099,073	(f) 6,572	9,556	116,465
1883	997,000	79,760	1949 (e)	3,198,212	993,152	(f) 6,639	5,112	75,395
1884	861,700	68,936	1950 (e)	2,857,946	974,493	(f) 13,525	8,243	78,550
1885	848,150	67,850						
1886	626,150	50,902	1951 (e)	2,342,492	(g) 918,485	(f) 25,101	16,581	125,833
1887	354,800	28,384	1952 (e)	2,373,553	(g) 1,032,909	(f) 47,689	19,120	119,109
1888	525,570	42,060	1953 (e)	3,965,188	(g) 2,074,421	(f) 120,095	34,136	70,852
1889	788,500	63,080	1954 (e)	3,858,956	(g) 2,248,320	(f) 59,360	80,248	55,273
1890	1,172,200	82,052	1955 (e)	3,477,249	(g) 1,935,019	(f) 79,893	37,338	80,822
			1956 (e)	4,568,034	(g) 2,818,716	(f) 119,459	554,760	90,928
1891	1,273,950	89,179	1957 (e)	4,684,017	(g) 3,256,719	(f) 78,934	588,544	58,993
1892	1,082,650	78,419	1958 (e)	5,572,681	(g) 3,875,705	(f) 39,762	337,655	101,814
1893	512,950	33,888	1959 (e)	6,461,535	(g) 4,373,218	(f) 41,612	259,046	52,843
1894	1,063,700	74,804	1960 (e)	6,133,240	(g) 4,160,354	(f) 20,549	366,606	63,905
1895	1,255,250	88,146						
1896	1,545,600	116,420	1961 (e)	5,533,847	(g) 3,838,387	(f) 25,305	201,957	95,475
1897	2,393,300	192,451	1962 (e)	5,660,937	(g) 3,993,663	(f) 194,380	281,364	81,506
1898	4,086,150	326,195	1963 (e)	5,484,259	(g) 3,966,697	(f) 255,190	254,726	70,402
1899	6,913,550	553,198	1964 (e)	5,266,329	(g) 3,686,732	(f) 272,187	322,916	88,666
1900	5,725,400	458,461	1965 (e)	4,716,296	(g) 3,545,627	(f) 523,596	326,156	76,019
			1966 (e)	2,431,248	(g) $4,361,278	(f) $1,365,441	$289,841	$314,817
			Total	457,010,705	$180,319,216	$7,201,063	$10,662,475	$6,174,637

(a) The exports up to the year 1834 consisted only of supplies to shipping, of which no record is kept.
(b) Not available.
(c) Approximate figures only.
(d) Six months ended 30th June.
(e) Year ended 30th June.
(f) Excludes Casks (principally empty returns) previously included in this item.
(g) Includes items for which the quantity in cub. ft. is not available.

APPENDIX 4

Summary of Imports of Timber, Furniture, Tanning Materials and Essential Oils, since 1848

Year	Timber, Woodware, etc.	Tanning Materials	Essential Oils	Year	Timber, Woodware, etc.	Tanning Materials	Essential Oils
	£	£	£		£	£	£
1848	464	....	....	1900	56,266	1,416	1,105
1849	....	....	....	1901	80,134	1,740	1,546
1850	189	....	....	1902	97,810	3,418	1,751
1851	3,216	....	....	1903	102,383	3,556	1,348
1852	2,479	....	....	1904	157,856	1,322	2,122
1853	790	....	....	1905	98,494	582	1,592
1854	831	....	....	1906	95,229	1,412	1,915
1855	1,464	....	....	1907	122,016	2,767	1,549
1856	1,124	....	....	1908	93,205	2,392	4,584
1857	744	....	....	1909	90,502	4,129	4,033
1858	1,528	....	....	1910	171,280	3,531	3,686
1859	690	....	....	1911	152,133	2,912	4,938
1860	2,005	....	....	1912	167,244	3,089	4,598
1861	1,459	....	....	1913	202,640	2,651	5,392
1862	1,920	....	....	1914	78,736	629	2,823
1863	1,568	....	....	1914–15	107,763	2,082	4,988
1864	894	....	....	1915–16	76,849	3,313	4,788
1865	548	....	....	1916–17	75,681	2,848	3,848
1866	1,442	....	....	1917–18	58,305	2,020	4,358
1867	1,727	....	....	1918–19	62,824	1,181	4,168
1868	1,451	....	....	1919–20	100,083	3,748	10,043
1869	1,408	....	....	1920–21	171,654	*4,899	6,106
1870	1,518	....	....	1921–22	92,448	5,865	6,577
1871	736	....	....	1922–23	109,428	6,991	4,033
1872	1,660	....	....	1923–24	133,983	2,790	3,301
1873	1,008	....	....	1924–25	161,893	2,670	4,429
1874	1,774	....	....	1925–26	144,989	5,826	4,449
1875	2,707	....	....	1926–27	162,193	8,971	4,254
1876	3,098	....	....	1927–28	183,196	9,648	6,955
1877	2,036	....	....	1928–29	241,601	6,894	4,413
1878	2,947	....	....	1929–30	197,532	10,825	3,980
1879	2,340	....	....	1930–31	76,533	4,145	3,160
1880	3,061	....	....	1931–32	164,496	4,705	3,505
1881	3,639	....	....	1932–33	197,916	4,903	3,421
1882	3,692	....	....	1933–34	183,944	4,310	3,888
1883	6,667	....	....	1934–35	211,056	4,076	5,040
1884	2,930	....	....	1935–36	228,451	5,401	3,921
1885	11,479	....	....	1936–37	257,164	5,267	4,810
1886	17,888	....	....	1937–38	270,126	4,777	6,560
1887	8,136	....	....	1938–39	254,315	3,974	7,014
1888	4,461	....	....	1939–40	259,399	6,802	23,027
1889	7,686	....	....	1940–41	249,111	3,798	32,399
1890	14,979	....	....	1941–42	283,611	15,846	33,828
1891	18,406	....	....	1942–43	163,480	6,250	47,718
1892	26,713	....	....	1943–44	149,928	7,883	68,871
1893	14,493	....	....	1944–45	148,838	9,264	75,449
1894	17,964	....	....	1945–46	†219,466	19,573	56,295
1895	47,128	....	....	1946–47	386,465	12,395	78,091
1896	5,381	....	....	1947–48	345,508	8,019	96,769
1897	164,552	....	....	1948–49	470,755	8,662	42,926
1898	55,566	....	....	1949–50	521,815	24,923	51,197
1899	45,689	....	....	1950–51	640,059	21,147	161,358
				1951–52	1,037,499	18,494	167,697
				1952–53	509,667	21,493	69,804
				1953–54	923,367	45,202	58,019
				1954–55	816,052	27,395	76,464
				1955–56	839,581	27,315	131,758
				1956–57	830,700	35,403	99,863
				1957–58	873,520	28,310	101,680
				1958–59	815,300	9,365	62,983
				1959–60	895,845	14,608	74,199
				1960–61	1,203,641	12,621	60,942
				1961–62	1,236,106	13,853	130,876
				1962–63	1,978,937	9,868	63,739
				1963–64	1,903,772	19,412	37,494
				1964–65	2,289,999	21,677	69,741
				1965–66	$4,856,090	$60,963	$132,862
				Total	$57,478,254	$1,265,469	$4,408,430

* This and subsequent years include tanning extracts, not previously recorded.
† This and subsequent years include values for furniture, bamboo, cane, etc., not previously included.

APPENDIX 5

SUMMARY OF LOG VOLUMES PRODUCED IN WESTERN AUSTRALIA SINCE 1829

Year	*Crown Land	Private Property	Total	Year	*Crown Land	Private Property	Total
	Cubic feet	Cubic feet	Cubic feet		Cubic feet	Cubic feet	Cubic feet
1829–1916†	....	....	663,267,850	1939 (c)	29,247,650	11,086,000	40,333,650
1917 (a)	19,333,100	2,144,500	21,477,600	1940 (c)	27,660,100	9,139,550	36,799,650
1918 (b)	7,665,550	504,950	8,170,500	1941 (c)	28,089,200	10,289,000	38,378,200
1919 (c)	19,987,050	3,390,450	23,377,500	1942 (c)	26,636,650	5,633,400	32,270,050
1920 (c)	28,292,200	5,762,900	34,055,100	1943 (c)	23,604,900	4,322,950	27,927,850
1921 (c)	29,308,950	7,018,450	36,327,400	1944 (c)	22,252,500	4,456,200	26,708,700
1922 (c)	36,122,400	15,640,150	51,762,550	1945 (c)	21,970,000	4,309,550	26,279,550
1923 (c)	26,807,300	9,867,050	36,674,350	1946 (c)	21,126,500	5,482,350	26,608,850
1924 (c)	42,004,450	9,342,800	51,347,250	1947 (c)	21,948,550	7,831,950	29,780,500
1925 (c)	43,832,900	18,142,250	61,975,150	1948 (c)	22,251,350	8,871,900	31,123,250
1926 (c)	48,823,750	25,037,600	73,861,350	1949 (c)	20,261,800	9,814,300	30,076,100
1927 (c)	46,887,600	31,356,100	78,243,700	1950 (c)	21,081,150	9,932,650	31,013,800
1928 (c)	42,781,250	23,334,450	66,115,700	1951 (c)	25,391,450	10,713,050	36,104,500
1929 (c)	32,289,750	11,098,950	43,388,700	1952 (c)	28,942,550	11,938,300	40,880,850
1930 (c)	31,654,150	11,653,600	43,307,750	1953 (c)	34,223,400	13,021,400	47,244,800
1931 (c)	18,822,600	12,148,500	30,971,100	1954 (c)	37,485,950	13,562,000	51,047,950
1932 (c)	11,742,850	4,115,950	15,858,800	1955 (c)	37,467,650	15,195,450	52,663,100
1933 (c)	13,165,650	2,456,650	15,622,300	1956 (c)	39,811,350	13,773,350	53,584,700
1934 (c)	21,263,100	6,330,400	27,593,500	1957 (c)	39,426,100	11,585,350	51,011,450
1935 (c)	27,458,250	11,451,750	38,910,000	1958 (c)	39,069,500	12,397,450	51,466,950
1936 (c)	31,400,600	13,436,150	44,836,750	1959 (c)	40,533,471	13,756,198	54,289,669
1937 (c)	31,703,850	15,902,200	47,606,050	1960 (c)	38,882,048	12,017,553	50,899,601
1938 (c)	31,737,450	15,928,950	47,666,400	1961 (c)	37,752,774	10,818,790	48,571,564
				1962 (c)	39,243,552	9,789,268	49,032,820
				1963 (c)	38,671,715	9,831,552	48,503,267
				1964 (c)	39,431,089	10,220,000	49,651,089
				1965 (c)	41,430,800	9,815,867	51,246,667
				1966 (c)	42,224,817	10,105,791	52,330,608
				Total	....	....	2,728,247,085

* Includes State Forest Timber Reserves, Crown Land and Private Property (Timber Reserved).
† Estimated.
(a) Year ended 31st December.
(b) Six months ended 30th June.
(c) Year ended 30th June.

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