Forests Department Western Australia

Annual Report 1968

Cover

The cover represents the timber, foliage and flowers of Marri (*Eucalyptus calophylla*)—the name *calophylla* signifies a beautiful leaf.

Apart from its value for timber, the high yield of nectar from its flowers makes the tree of considerable importance to apiarists, while its dense foliage and attractive shape make marri and excellent shade tree for the farmer.

REPORT

on the operations of the

FORESTS DEPARTMENT

WESTERN AUSTRALIA

for the year ended

30th JUNE, 1968

by

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

Conservator of Forests

☆

PRESENTED TO BOTH HOUSES OF PARLIAMENT

53997—(1)

Forests Department,
PERTH,
30th September, 1968

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, 1968.

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

A pure stand of marri (*Euc. calophylla*) some 12 miles south from Pemberton. Marri usually occurs mixed with jarrah or karri and pure stands are relatively rare.

CONTENTS

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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	W. H. EASTMAN, B.Sc. (For.), Dip. For. (Canb.), Dip. For. (Oxon.).
Chief of Division	J. C. MEACHEM, D.F.C., B.Sc., (For.), Dip. For. (Canb.).
Chief of Division	B. J. BEGGS, B.Sc. (For.), Dip. For. (Canb.).
Fire Control Superintendent	A. J. MILESI, B.Sc. (Adel.).
Utilization Officer	H. C. WICKETT, M.Sc. (Adel.), B. For. Sc. (N.Z.), A.I.M.E. (Aust.), Dip. For. (Canb.).
Superintendent	P. J. McNAMARA, M.A. (Oxon).
Superintendent	D. E. GRACE, B.Sc. (For.), Dip. For. (Canb.).
Chief Draftsman	R. M. DAVIS, E.D.
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

Eucalypts

Bald Island Marlock	*Euc. lehmanni*
Brown Mallet	*Euc. astringens*
Coral-flowered Gum	*Euc. torquata*
Dwarf Sugar Gum	*Euc. cladocalyx var. nana*
Grey Coast Box	*Euc. bosistoana*
Jarrah	*Euc. marginata*
Karri	*Euc. diversicolor*
Long-Leaved Box	*Euc. goniocalyx*
Marri	*Euc. calophylla*
Red Mahogany	*Euc. resinifera*
River Gum	*Euc. camaldulensis*
Silvertop Ash	*Euc. sieberi*
Southern Blue Gum	*Euc. bicostata*
Southern Blue Gum (Tasmanian Blue Gum)	*Euc. globulus*
Sugar Gum	*Euc. cladocalyx*
Sydney Blue Gum	*Euc. saligna*
Tallowwood	*Euc. microcorys*
Tingle (Red)	*Euc. jacksoni*
Tingle (Yellow)	*Euc. guilfoylei*
Tuart	*Euc. gomphocephala*
Wandoo	*Euc. wandoo*
W.A. Blackbutt (Yarri)	*Euc. patens*
Yellow Stringybark	*Euc. muelleriana*

Conifers

Cuban Pine	*Pinus caribaea*
Loblolly Pine	*Pinus taeda*
Maritime Pine (Pinaster Pine)	*Pinus pinaster*
Monterey Pine (Radiata Pine)	*Pinus radiata*
Pond Pine	*Pinus serotina*
Slash Pine	*Pinus elliottii*
.....	*Pinus insularis*
.....	*Pinus oocarpa*

Other

Bull Banksia	*Banksia grandis*
Sandalwood	*Santalum spicatum*
Sheoak	*Casuarina fraseriana*

I. STATISTICAL SUMMARY OF MAJOR OPERATIONS

Timber Production in Cubic Feet.

Total Production Sawn Timber	17,173,335
Exports—Interstate	1,999,845 (11·6 per cent)
Overseas	986,367 (5·8 per cent)
Local Consumption	14,187,123 (82·6 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	13,009,095	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*
1966–67	16,887,742	....	16,887,742	4,898,421	11,989,321	202	3,173*
1967–68	17,173,335	....	17,173,335	2,986,212	14,187,123	188	3,209*

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

Total Cut

		1967–68	1966–67
Log Volumes (in cubic feet)	Jarrah	38,784,533	39,032,591
	Karri	7,441,638	6,922,488
	Wandoo	1,902,528	2,074,504
	Pine	2,412,604	2,057,204
	Other	1,005,246	822,647
Total		51,546,549	50,909,434

Made up as follows:—

From State Forest and Crown Land	43,485,765 cubic feet (84·4 per cent.)
From Private Property	8,060,784 cubic feet (15·6 per cent.)

Value Produced

	1967–68	1966–67
Total Value of Timber (on mill skids)	$26,651,400	$25,690,000
Total Value of Other Forest Products	$6,666,350	$6,711,600

Forest Area

Additions to State Forest	4,575 acres
Excisions from State Forest	1,906 acres
Land Purchased for Pine Planting	1,269 acres
Total Area of State Forest	4,451,351 acres

Reforestation

Cut-over area treated for regeneration	126,119 acres

Afforestation

Area planted with pines, 1967		5,227 acres
Pinus radiata	2,198 acres	
Pinus pinaster	3,029 acres	
Total area of pine plantation established		52,976 acres
Pinus radiata	21,799 acres	
Pinus pinaster	30,678 acres	
Other species	499 acres	
Total experiment areas (additional)		968 acres

Management

Survey:—	
Theodolite surveys	5 miles
Other surveys	20 miles
Topographical mapping	1,406,000 acres
Air Photo Interpretation—	
Complete	53,500 acres
Preliminary	138,500 acres
Assessment—	
Area covered	536,565 acres
Type maps produced, covering	240,000 acres
Engineering, new works :—	
Roads and tracks	297 miles
Telephone lines	18 miles
Houses and buildings	15 (No.)

Protection

Controlled burning	1,096,142 acres
Fire Outbreaks—	
Number	248
Area burnt	4,774 acres

Nurseries (Hamel and Dryandra)

Trees produced for—	
Private buyers	201,619 (No.)
Forests Department	228,657 (No.)

Sandalwood

Quantity exported	620 tons

SOURCE AND USE OF FUNDS

	1967–68	1966–67
Source		
Revenue—		
Royalty on Timber etc.	3,167,665	3,002,379
Departmental Sales of Logs etc.	1,664,818	1,566,267
	4,832,483	4,568,646
General Loan Fund	400,000	400,000
Federal Aid Road Grant	190,000	170,000
	5,422,483	5,138,646
Use—		
Consolidated Revenue Fund	1,576,776	1,401,679
Reforestation Fund	3,376,024	2,896,034
General Loan Fund	400,000	400,000
	5,352,800	4,679,713

2. REVENUE AND EXPENDITURE

Revenue from all sources was $4,832,483 compared with $4,568,646 the previous year.

In the following, figures in brackets refer to 1966/67.

Of the net revenue $2,935,327 ($2,861,634) was transferred to Forests Improvement and Reforestation Fund. Expenditure charged against this Fund was $3,376,024 ($2,896,034) and the balance in the Fund at the 30th June, 1968, was $470,707 which includes reserves for Building $110,000 and Fire Control $201,000.

The return from thinning operations in Departmental pine plantations was $259,980 ($254,906).

3. THE FOREST AREA

(1) State Forests. (Forests Act, 1918-1954).

The total area of State Forest at 30th June, 1968, was 4,451,351 acres which is an increase of 2,669 acres compared with that at 30th June, 1967.

During the year, additions totalling 4,575 acres were made to State Forest and 1,906 acres were excised and reverted to the Lands Department. Comparative figures for the last two years are given below.

	June, 1967 Acres	June, 1968 Acres
Jarrah	3,190,220	3,194,304
Karri	171,441	171,441
Jarrah and Karri (mixed)	655,980	655,980
Jarrah and Wandoo (mixed)	163,785	163,785
Tuart	6,471	6,471
Tingle Tingle	10,687	10,697
Karri and Tingle (mixed)	13,885	13,885
Sandalwood	1,930	1,930
Pine Planting	177,778	177,778
Mallet	56,353	54,928
Miscellaneous	152	152
	4,448,682	4,451,351

(2) Timber Reserves. (Forests Act, 1918-1954).

The area held under timber Reserve ar 30th June, 1968, was 1,864,637 acres, which is an increase of 4,461 acres on the area at 30th June, 1967.

	June, 1967 Acres	June, 1968 Acres
Jarrah	96,653	97,297
Wandoo and Jarrah	61,320	71,682
Jarrah and Karri	78	78
Pine Planting	5,908	5,903
Mallet	475	475
Sandalwood	23,100	23,100
Mining Timber, Firewood, etc.	1,672,642	1,666,102
	1,860,176	1,864,637

(3) Land Alienations, etc.

During the year ended 30th June, 1968, 208 applications for land and road provisions and closures were received covering a total of 139,637 acres.

The Department agreed to the following:—

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	acres	acres	acres	acres	acres
60	31,130	7,176	568	11,289	....

No. of alienations approved 58
No. of leases approved 20

4. SAWMILLING, TIMBER INSPECTION AND FOREST PRODUCE

Timber Production

The production of 17,173,335 cubic feet of sawn timber was an increase of 285,593 cubic feet on last year's figure. Of the total production 2,685,546 cubic feet were from timber from private property which is a decrease of 623,799 cubic feet on last year's figure.

During the year ended 31st December 1967, there were 188 sawmills registered, of which 114 operated on Crown Land and 74 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 (1829–1968) is shown in Appendix 5.

Departmental pine plantations yielded 2,393,013 cubic feet of logs compared with 2,007,325 cubic feet last year.

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

	Cubic Feet
Karri	104,044
Jarrah and Other Hardwoods	2,101
Pine	108,410
	214,555

Sawn sleepers produced during the year amounted to 3,873,856 cubic feet of which 1,248,253 cubic feet were from private property.

Timber Inspection

All sleepers produced were inspected and 12,450 cubic feet were reinspected. Other sawn timber inspected totalled 1,114,485 cubic feet, making a total of 5,000,791 cubic feet inspected.

TIMBER PRODUCTION

PRODUCTION OF TIMBER FOR YEAR ENDED 30th JUNE, 1968
(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	32,395,836	7,027,194	789,995	324,275	9,781	402,169	2,393,013	143,502	43,485,765	14,487,789
Private Property....	6,388,697	414,444	1,112,533	84,611	1,225	23,954	19,591	15,729	8,060,784	2,685,546
Total	38,784,533	7,441,638	1,902,528	408,886	11,006	426,123	2,412,604	159,231	51,546,549	17,173,335

In addition to the above 43,766 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 at Mill Skids of Timber Obtained
	Sawn Timber other than Sleepers	Sawn Sleepers	Sawn Timber other than Sleepers	Swan Sleepers		
	cub. ft.	cub. ft.	cub. ft.	cub. ft.	cub. ft.	$
1966–67	10,419,306	3,159,091	1,892,430	1,416,915	16,887,742	25,690,000
1967–68	11,862,186	2,625,603	1,437,293	1,248,253	17,173,335	26,651,400

DISTRIBUTION OF SAWN TIMBER

Distribution	Sleepers	Other Sawn Timber		Total
	All Species	Karri	Jarrah and Other Species	
	cub. ft.	cub. ft.	cub. ft.	cub. ft.
Interstate	668,374	530,539	800,932	1,999,845
Overseas	402,037	216,416	367,914	986,367
Local	2,803,445	1,731,855	9,651,823	14,187,123
Total	3,873,856	2,478,810	10,820,669	17,173,335

Distribution of Timber

The sharp fall in the volume of timber exports, the marked increase in the value of imports and, as forecast, the greater local demand for sleepers, were the main features of the year's trading. Compared with 1966–67, the volume of timber exported fell by 1·9 million cubic feet (39 per cent.), and the value of imports of timber and manufactures of timber (excluding furniture, which is of *any* material, see Appendix 2B) rose by $1,716,000 (48 per cent.). The production of railway sleepers for local use increased by 877,000 cubic feet due mainly to their demand for the Mt. Newman iron-ore project in the north-west of the state.

Exports: The decline of 1·6 million cubic feet in overseas exports was fully accounted for by railway sleepers which fell from 2,073,000 cubic feet exported in 1966–67 to 402,000 cubic feet this year. Jordan (Hejaz railway) with 180,000 cubic feet and the United Kingdom with 176,000 cubic feet were the main buyers. Sales of other sawn jarrah and karri to overseas markets remained at much the same level as last year.

Interstate exports were again dominated by the South Australian market and compared with 1966–67 fell by 260,000 cubic feet. Although interstate deliveries of railway sleepers were up 92,000 cubic feet, the market for jarrah fell by 204,000 cubic feet and karri by 157,000 cubic feet. This reflects, to a degree, the further decline in home building activity in South Australia.

Imports: The value of imports from overseas rose by $1,136,000 and interstate by $580,000 when compared with the previous year.

Malaysia again dominated the market with increases of $750,000 in the value of sawn hardwood—nearly double the 1966–67 figure—and $151,000 in supplies of hardwood logs. Imports of plywood from overseas, of which Japan supplied some 66 per cent., rose by $64,000.

The increase of $580,000 in the value of interstate imports was accounted for by rises in " re-constituted wood " (particle board, etc.) $476,000, and plywood and veneer $104,000. The value of " re-constituted wood " imported from Victoria trebled when compared with 1966–67.

Local Use: The availability of timber for local use increased by 2,198,000 cubic feet. Of this, sleepers accounted for 877,000 cubic feet, karri, 31,000 cubic feet and jarrah and other species 1,290,000 cubic feet. The quantity of marri used locally rose sharply following the opening during the year of the first sawmill to produce marri exclusively.

Some 290,000 railway sleepers, 8ft. 6 in. long x 9 in. x 6 in., mostly jarrah with some wandoo and yarri, stockpiled at the Port Hedland depot of Mt. Newman Co. Nearly three times this number will be needed to complete the 280 miles of railway line between the iron-ore deposits of Mt. Newman and Port Hedland.

Stacks of rails can be seen in the left of the photograph.

Hardwood Chips

In the southern forest areas there is a considerable volume of marri, which has been little used in the past as a sawlog timber. This species has been tested by Japanese pulp interests who report most favourably on its suitability as a raw material for the pulp and paper industry. In addition the other two major species, jarrah and karri, have received favourable comment, either used singly or in mixture.

Because of the interest shown by possible importers the West Australian Government in December, 1967, called for proposals for the production and for processing of Eucalyptus wood chips from State Forest at the maximum rate of 500,000 tons per annum.

In all, six propositions were received, but in February, 1968, four were eliminated and negotiations are continuing with the remaining two, as at 30th June, 1968.

Notes on Marri

Marri (Eucalyptus calophylla) is one of the most widely distributed species in the south-west of the State and is recorded as growing near Port Gregory some 40 miles north from Geraldton, near Tinkurrin 30 miles east from Narrogin, and as far as Cape Riche on the south coast. Well known throughout the jarrah forest region, it reaches its best development in the higher rainfall areas south of the Blackwood River. Here, it is associated with jarrah and karri, and trees over 100 feet in height, with boles 40 feet to 50 feet in length and butt diameters of four feet or more, are common.

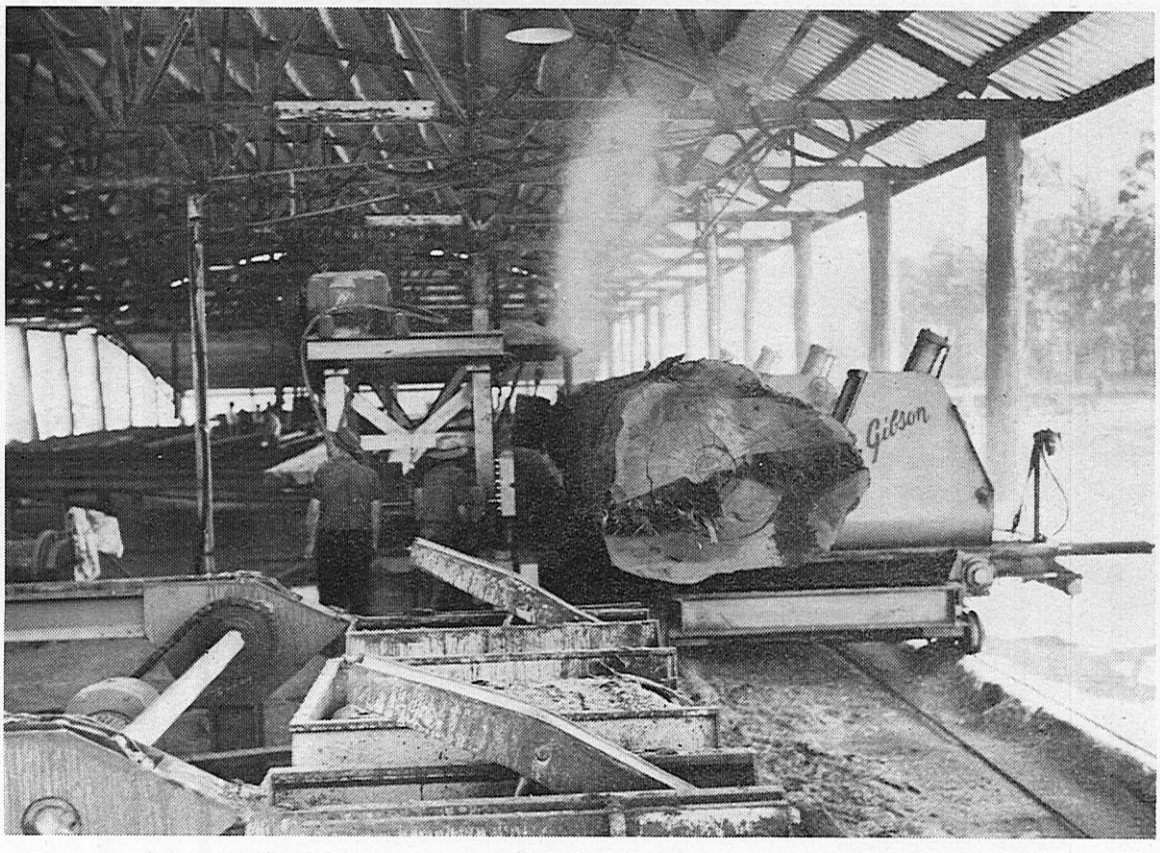
The timber is light brown in colour and easily worked, but the prevalence of gum veins and loose rings has, in the past, inhibited its use as a saw timber. Nevertheless, it is stronger than jarrah, seasons with much less shrinkage than jarrah or karri and takes paint well. One sawmill is now cutting marri exclusively for the production of building scantling. However, the timber is not very durable in the ground, although better than karri.

Marri is of particular interest because it shows little decay or fibre breakdown, even in the heart of the tree. This will enable the species to be chipped as a whole tree operation, avoiding costly segregation of faulty material. In this respect marri is unique among the hardwoods of Australia available for this purpose.

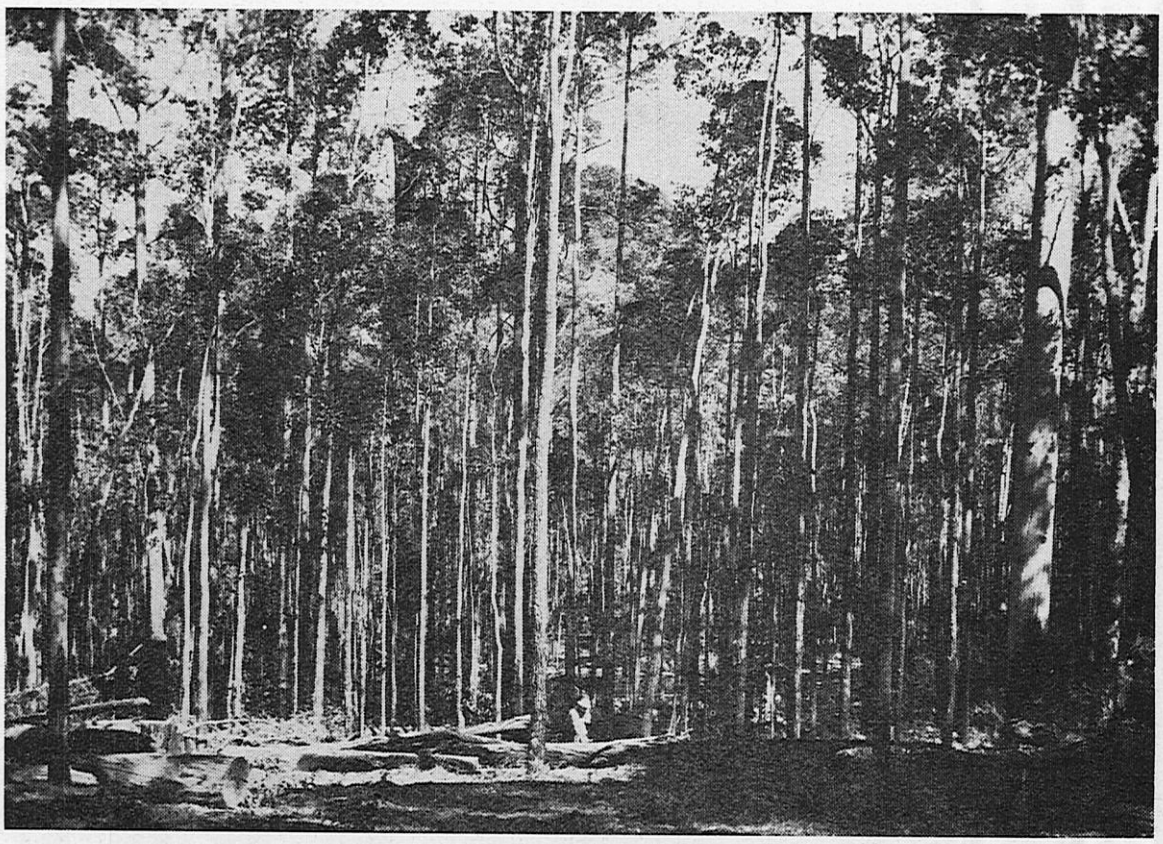
Partly because of good seasoning qualities and partly because of the depth of sapwood, marri poles can readily be treated with preservatives under pressure. For the past few years the P.M.G. have used only treated marri for their telephone poles.

The marri tree is well known to the apiarist and farmer. In suitable seasons it gives a copious supply of nectar, usually flowering in the summer months of February and March. For the farmer its shapely form, dense crown and large white flowers, make it an attractive and valuable shade tree.

Data of the mechanical properties of the timber are given in the accompanying tables.



A marri log being broken down by twin circular saws before conversion to building scantling.



A marri pole stand west of the Donnelly River. Poles from such stands, after treatment with preservative under pressure, are used almost exclusively by the P.M.G. for the construction and maintenance of telephone lines.

Mechanical Properties of Jarrah, Karri, Marri, W.A. Blackbutt, Tuart and Wandoo*

These data were obtained from small clear specimens in a **green** condition.

	Jarrah	Karri	Marri	W.A. Blackbutt	Tuart	Wandoo
Density	lb. cub. ft. 73	lb. cub. ft. 73	lb. cub. ft. 76	lb. cub. ft. 70	lb. cub. ft. 78	lb. cub. ft. 79
Static Bending—	lb./sq. in.	lb./sq. in.	lb./sq. in.	lb./sq. in.	lb./sq. in.	lb./sq. in.
Fibre stress at limit of proportionality	6,440	6,600	7,630	6,990	8,290	9,180
Modulus of rupture	9,880	10,600	11,300	9,500	11,800	14,600
Modulus of elasticity	1,480,000	2,070,000	1,960,000	1,670,000	1,780,000	1,990,000
Compression Parallel to grain—						
Stress at limit of proportionality	4,240	4,180	4,130	4,560	5,290	6,070
Maximum crushing strength	5,190	5,250	5,880	5,300	6,680	8,020
Modulus of elasticity	1,700,000	2,200,000	2,270,000	1,810,000	1,980,000	2,470,000
Compression Perpendicular to Grain—						
Stress at limit of proportionality—						
Radial	1,160	956	1,550	1,140	2,120	1,720
Tangential	1,290	1,260	1,360	1,120	2,120	2,040
Hardness—	lb.	lb.	lb.	lb.	lb.	lb.
Radial	1,300	1,400	1,490	1,250	2,110	2,250
Tangential	1,270	1,320	1,480	1,220	2,120	2,210
End Grain	1,310	1,370	1,420	1,230	1,890	2,050
Shear	lb./sq. in.	lb./sq. in.	lb./sq. in.	lb./sq. in.	lb./sq. in.	lb./sq. in.
Radial	1,330	1,210	1,330	1,240	1,650	2,090
Tangential	1,320	1,460	1,330	1,300	1,840	2,120
Cleavage—	lb./in.	lb./in.	lb./in.	lb./in.	lb./in.	lb./in.
Radial	360	366	319	349	369	465
Tangential	385	460	399	383	504	456
Izod Impact (Toughness)—	ft./lb.	ft./lb.	ft./lb.	ft./lb.	ft./lb.	ft./lb.
Radial	9·2	15·2	14·2	9·3	12·0	15·3
Tangential	10·2	15·4	15·5	10·4	13·8	14·6

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These data were obtained from small clear specimens in the **dry** condition, 12 per cent. moisture content.

	Jarrah	Karri	Marri	W A Blackbutt	Tuart	Wandoo
Density	lb. cub. ft. 53·9	lb. cub. ft. 56·9	lb. cub. ft. 49·8	lb. cub. ft. 54·0	lb. cub. ft. 64·4	lb. cub. ft. 68·3
Static Bending—	lb./sq. in.	lb./sq. in.	lb./sq. in.	lb./sq. in.	lb./sq. in.	lb./sq. in.
Fibre stress at limit of proportionality	10,200	11,600	11,300	9,440	10,600	13,900
Modulus of rupture	16,200	19,200	18,200	14,300	18,100	20,600
Modulus of elasticity	1,880,000	2,760,000	2,410,000	1,850,000	2,370,000	2,420,000
Compression Parallel to Grain—						
Stress at limit of proportionality	4,120	7,260	5,860	5,790	5,850	7,740
Maximum crushing strength	8,870	10,400	9,590	9,480	10,400	11,900
Modulus of elasticity	1,990,000	2,980,000	2,660,000	2,210,000	2,390,000	2,700,000
Compression Perpendicular to Grain—						
Stress at limit of proportionality—						
Radial	1,600	1,280	1,330	1,480	2,040	3,040
Tangential	1,900	1,800	1,470	1,770	2,460	3,090
Hardness—	lb.	lb.	lb.	lb.	lb.	lb.
Radial	1,910	2,030	1,580	1,560	2,440	3,350
Tangential	1,920	2,030	1,620	1,550	2,360	3,240
End Grain	2,070	1,980	1,480	1,480	2,040	3,120
Shear—	lb./sq. in.	lb./sq. in.	lb./sq. in.	lb./sq. in.	lb./sq. in.	lb./sq. in.
Radial	2,100	1,810	1,890	1,980	2,230	2,270
Tangential	2,170	2,460	1,750	2,270	2,800	2,970
Cleavage—	lb./in.	lb./in.	lb./in.	lb./in.	lb./in.	lb./in.
Radial	427	236	389	306	391	425
Tangential	464	428	433	419	447	376
Izod Impact—	ft./lb.	ft./lb.	ft./lb.	ft./lb.	ft./lb.	ft./lb.
Radial	7·4	19·1	17·1	7·5	11·3	10·6
Tangential	8·1	17·0	17·4	8·3	11·7	13·0
Strength Group	C	B	B	C	B	A

* Data not to be used for designing.

Sandalwood

The overseas demand for sandalwood continued and 620 tons were exported compared with 648 tons for the previous year.

Sandalwood received at Fremantle during the year totalled 775 tons as compared with 741 tons for the year ended the 30th June, 1967, and this quantity was made up as follows:—

	Tons
Crown Land—	
Logwood (including roots and butts)	667
Pieces	99
Private Property—	
Logwood (including roots and butts)	9
	775

No orders for logwood were placed by distillers and no roots and butts were delivered to them for oil distillation purposes.

A total of 3,561 lb. of sandalwood oil from existing stocks was exported interstate and overseas.

Firewood Production and Consumption

The firewood consumption for the State was estimated at 704,866 tons of which 25 per cent. was used for industrial and mining fuel.

The following table accounts for 47 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)	65,541	....	65,541
Mill waste sold as firewood (estimated 50 per cent. of total)	47,307	9,513	56,820
Domestic Use on Goldfields	23,585	....	23,585
Total Domestic Firewood as shown by returns	136,433	9,513	145,946
Industrial Firewood—			
Pumping Stations	18,486	....	18,486
Factories, etc.	63,445	....	63,445
Mill waste sold as firewood (estimated 50 per cent. of total)	47,307	9,513	56,820
Mill Waste used as firewood	43,979	414	44,393
	173,217	9,927	183,144
Mining Firewood	2,409	....	2,409
Total Firewood Produced (as shown by returns)	312,059	19,440	331,499

Consumption—	(tons)	
Domestic (estimated)	507,100	(at 2 tons per dwelling)
Industrial	176,871	(ex Govt. Statistician)
Pumping Stations	18,486	(as per F.D. Returns)
Mining	2,409	(as per F.D. Returns)
	704,866	

Other Forest Produce

Piles and poles obtained from Crown Land during the year amounted to 1,015,173 lineal feet compared with 827,801 lineal feet for the previous year. Of this total 11,893 lineal feet were produced from Departmental operations. Returns received from private property show 257,577 lineal feet produced as compared with 91,223 lineal feet for the year 1966–67.

There were approximately 360,699 posts and strainers cut from Crown Lands of which 15,918 were produced by the Department. Records received show 55,304 posts and strainers 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 56 tons with a further 46 tons from other Crown Lands. The quantity obtained from private property was 54 tons making a total of 156 tons.

Apart from the sawn timber supplied by sawmills, 15,086 tons of mining timber were used. This was all from Crown Lands, 9,268 tons being from inland forests.

The number of Christmas trees sold was 9,623 compared with 7,342 the previous year. The revenue from sales was $4,841.

FOREST PRODUCE NOT ELSEWHERE INCLUDED IN PRODUCTION TABLES

Description of Forest Produce	South-West Division and Agricultural Areas			Goldfields Areas	Total
	Supplied by Department	Other Crown Lands	Private Property		
Mining timber .... Tons	....	5,818	....	9,268	15,086
Charcoal .... Tons	....	41,036	....	....	41,036
Piles, Poles and Bridges Timber .... Lin. ft.	11,893	993,535	257,577	9,745	1,272,750
Fence Posts and Rails .... No.	14,875	160,896	55,304	173,890	404,965
Strainer Posts .... No.	1,043	9,995	....	....	11,038
Mallet bark .... Tons	56	45	54	....	155
Wandoo timber for tannin extract .... Tons	....	39,346	4,420	....	43,766
Beansticks, etc. .... No.	....	42,300	....	4,100	46,400
Boronia blossom .... lbs.	....	2,606	1,617	....	4,223
Gravel and stone .... Cu. yds.	....	285,888	....	....	285,888
Sand .... Cu. yds.	....	2,597	....	....	2,597
Scout staves .... No.	500	....	....	....	500
Sawdust consumed as fuel .... Tons	....	129,942	....	....	129,942

5. FORESTS MANAGEMENT

Working Plans

During the year, hardwood forest inventory was concentrated on the karri and marri areas of the southern region. Over 1,100 plots were measured on 2,300 acres enabling volume figures to be prepared for 499,000 acres of State Forest. Results were processed by computer, which allowed more information to be prepared from the original data than by hand methods at no extra cost. Forty plots were measured to relate assessors' estimates to actual volumes present in both karri and jarrah types and these indicated a close correlation. Further work was carried out on the assessment of round mining timber in the Collie area.

Over 2,500 angle count plots were measured in the pine inventory programme at six major plantation centres. For the first time this included permanent plots established on the angle count principle. Plot data was processed by computer and the results used for yield prediction and the determination of cutting priorities.

Air photos covering 138,000 acres of eastern jarrah forest were searched for evidence of *Phytophthora* root rot. Little evidence of it was found. In the southern jarrah forests large scale 70 mm. colour photographs, taken at low altitude, were used to identify areas affected by *Phytophthora* root rot, and gave promising results. Standard air photo interpretation covering 53,000 acres of eastern jarrah was also carried out.

Close liaison has been maintained with the management research section which has been concerned with the complete enumeration of a single pine compartment to test sampling efficiency; the collection of sectional volume data from logs of utilisable length for volume and utilisation table compilation; and the establishment of rate of spread and intensification plots on *Phytophthora* root rot sites.

Mapping and Surveys

The topographical mapping of the forest was further advanced with the completion of 41 map sheets covering an area of 1,406,000 acres. Of these maps nine sheets covering 240,000 acres were completed with forest type mapping.

Multi-coloured maps, Chudalup, Perup and Gleneagle were published at a scale of 80 chains to an inch, while Chudalup and Gleneagle are also available as 40 chain map sheets. The maps Collie and Muja are in the final stages of preparation and work is proceeding on maps Dwellingup, Harvey and Busselton.

Large scale mapping was completed of 60,230 acres of pine plantations and their surrounds. This included the plantation groups Lewana, Mungalup, Grimwade, Brunswick and Hamel. In progress is the balance of Harvey and Collie Divisions and the re-mapping of Mundaring plantations. Where required, mapping was completed with contours having a vertical interval of 20 feet. Some 9,000 acres were mapped to this degree.

Field surveys were mainly confined to obtaining mapping control for the Wild B8 Aviograph. This consisted of photo-identifying 75 points which were tied to cadastral surveys. Barometric heights were obtained of 106 points required for vertical control.

In addition 20 miles of compass traverse were completed for the location of minor roads and lease boundaries.

Project mapping required the preparation of 212 special maps for Departmental purposes. In addition 16,387 items of a general nature were finalised.

Forest Engineering

During the year, 297 miles of forest roads, tracks and firelines were constructed and 4,990 miles maintained. A total of 18½ miles of new telephone line were erected.

Plant and Equipment

All plant and equipment was satisfactorily maintained during the year and over 20 major items of equipment were fabricated. The latter included nine fire tanks, three jib cranes, a planting machine, a lining out machine, standard gang truck canopies, a portable flame thrower, and other small items for field and research work.

Five apprentices completed their training and two more were engaged bringing the total at the end of the year to twenty.

Departmental Buildings

Five new houses were erected, six purchased and one dismantled bringing the total number of Departmental houses to 490. Eight houses from small outlying settlements were transferred to larger centres of population. Of these, four were from Heartlea, two from Gleneagle and one each from Contine and Glenoran.

The new regional research station at Manjimup was completed and in April 1968 was occupied by staff of the silviculture, fire research and soil survey sections. The buildings and land of the Agricultural Research Station at West Manjimup were purchased and will be used as a school for forest trainees and by the research branch for the establishment of a seed orchard etc. At Dwellingup, work on the new research building was well under way at the end of the year.

Two automotive workshops were constructed, one at Ludlow and the other at Jarrahdale, while a prefabricated office was erected at Narrogin.

Two offices at Barlee Brook and Ellis Creek were sold and the Tallanalla office transferred to Harvey.

Shortly after World War II, a number of schools of short duration were held for Departmental field officers The photograph, taken in 1947 by the Telecommunications Officer, C. A. Pinkus, shows those who attended the first school on radio.

Standing: L. to R.:—C. H. Robins, P. E. Russell (deceased), O. R. Loxton, R. Witnish (deceased), P. H. Barrett, J. S. McPhee, H. G. Clover, A. J. Milesi, F. H. Collins, T. Mavric, J. H. Currie, J. N. Percival.

Seated: L. to R.:—F. E. Crawford, F. H. Crockenberg, R. J. Donovan, W. T. Walton, E. E. Brown, R. S. Meldrum, C. H. J. Williams, D. W. R. Stewart.

Communications

Radio

Only one new fixed station and one mobile were added to the radio network during the year and the opportunity was taken to complete outstanding modifications, particularly to repeater stations which have been subject to instability and overheating during periods of high service demand.

All repeater stations are now equipped with wind generators and the Single-Side-Band installations have been modified with significantly improved results.

Forty V.H.F. vehicle installations were made and a 24 ft. telescope top hat vertical aerial was developed to improve the range of marker beacon vehicles during prescribed burning from the air. The improved range achieved during rests should benefit aerial burning operations in the coming spring.

Two severe lightning strikes occurred during summer, putting Mt. Wells and Solus repeaters "off the air" for a few days. The strikes were so severe that aerial elements were burnt off and copper cables volatilised.

A pilot radio telephone system consisting of five stations is expected to be in operation in the Kelmscott division by the end of the year. It is becoming increasingly difficult to service and maintain the "earth-return" bush telephone system. Costs taken out point to eventual savings by replacing the present network with currently available transistorised V.H.F. radio telephones coupled to specially adapted calling systems. The chief advantages are—not vulnerable to bushfires and overloading is impossible.

Telephone

The Ludlow telephone system was converted to metallic return for improved efficiency and the Kirup Settlement was completely re-installed, all cables now being underground. Plans are well in hand to replace the Settlement telephone system at Harvey.

The Collie and Mungallup bush telephone systems were modified and brought up to date and following lightning strikes, Solus and Mt. William lookout towers were re-wired.

6. REFORESTATION

Logging operations in the northern Jarrah forest have been concentrated as far as possible on areas affected by dieback. The timber industry has co-operated in the implementation of measures designed to prevent the transmission of the fungal disease to healthy forest. Extraction routes are specified and arrangements are in hand for the washing down of logging equipment where transit from affected to disease-free forest becomes necessary.

Regeneration of dieback areas is at this stage limited to the establishment of *Pinus pinaster*, a relatively resistant species and to the experimental planting of a range of local and introduced Eucalypts following resistance trials in the laboratory. Large scale planting is deemed to be unwise until such time as the species under trial have been fully evaluated as having commercial forest potential.

During the year 59,146 acres of virgin State Forest were cut over. This area was made up of jarrah forest 46,230 acres, karri 8,684 acres, wandoo 2,624 acres and other species 1,608 acres. In addition 66,973 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:—

Jarrah .... 2,429,571 acres
Karri .... 127,778 acres

7. AFFORESTATION

Pine Plantations

The area of pines planted in the year 1967–68 was 5,227 acres, of which 26 acres were for experimental purposes. This is the highest planting rate on record and exceeded the target of 5,000 acres aimed at under the Softwoods Forestry Agreement Act. The total planted area, including roadside and experimental plantings and allowing for 104 acres of clear felling, now amounts to 53,944 acres.

The distribution of these plantations by Divisions was, at 30th September 1967, as follows:—

Division	*P. radiata*	*P. pinaster*	Other Species	Total
	acres	acres	acres	acres
Wanneroo	53	18,832	154	19,039
Metropolitan	41	2,221	30	2,292
Mundaring	2,379	1,307	148	3,834
Kelmscott	131	1,119	24	1,274
Harvey	2,826	3,798	31	6,655
Collie	3,275	4	....	3,279
Kirup	5,135	193	....	5,328
Nannup	5,265	31	21	5,317
Busselton	1,312	3,115	54	4,476
Manjimup	524	....	....	524
Pemberton	858	58	37	953
Plantation Total	21,799	30,678	499	52,976
* Experimental Areas	229	671	68	968
Grand Total	22,028	31,349	567	53,944

* Some experimental areas now absorbed into plantations.

The 1967 planting was distributed over the following Divisions:—

Division	*Pinus radiata* (acres)	*Pinus pinaster* (acres)	Total (acres)
Wanneroo	....	2,644	2,644
Mundaring	99	27	126
Kelmscott	68	202	270
Harvey	495	127	622
Collie	214	....	214
Kirup	456	....	456
Nannup	600	....	600
Busselton	29	25	54
Manjimup	183	....	183
Pemberton	30	2	32
Plantation Total	2,174	3,027	5,201
Experimental Planting	24	2	26
Grand Total	2,198	3,029	5,227

Roundwood Production

The total roundwood production from Departmental plantations, mainly in the form of thinnings, was 2,393,013 cubic feet, an increase of 385,688 cubic feet or 19·2 per cent. on last years record figure.

The following figures show the increase in pine log removals 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	1,958,345
1967	2,007,325
1968	2,393,413

Removals by category and by species were as follows :—

Category	*P. radiata* cub. ft.	*P. pinaster* cub. ft.	Total cub. ft.
Sawlogs	1,014,174	576,706	1,590,880
Particle Board Logs	76,558	504,499	581,057
Peeler Logs	108,410	....	108,410
Fence Posts	23,518	67,856	91,374
Woodwool Logs	....	17,095	17,095
Poles (various)	....	4,197	4,197
Total	1,222,660	1,170,353	2,393,013

Major increases in supply were; particle board logs 267,808 cubic feet (85 per cent.), fence posts 68,979 cubic feet (308 per cent) and peeler logs 34,588 cubic feet (47 per cent.). The demand for sawlogs showed little change, supplies of woodwool logs increased, and the number of various sized poles showed a reduction when compared with last year.

The second particle board plant, as expected, expanded its operations towards the end of the year with a corresponding increase in the demand for pine logs of small size. For the first time, plantations more distant from the Metropolitan area were able to dispose of pine fence posts.

Roundwood removals from the various plantations were as follows :—

	cub. ft.	cub. ft.
Wanneroo (Gnangara)	....	258,026
Metropolitan	....	320,838
Collier	189,598	
Somerville	130,400	
Scaddan	840	
Mundaring	....	640,074
Kelmscott*	....	46,714
Harvey	....	216,861
Harvey Hills	114,249	
Myalup	102,612	
Collie	....	3,201
Kirup (Grimwade)	....	324,171
Nannup	....	3,029
Busselton	....	563,921
Keenan	303,578	
Ludlow	260,343	
Pemberton (Pimelea)	....	16,178
		2,393,013

* Includes Gleneagle and Carinyah.

Sawn Production

The total sawn production from all sources was 583,706 cubic feet, a decrease of 19,578 cubic feet on last year's figures. The lower figure resulted from a reduction in demand for pine case material.

Sawn production by species was:—

P. radiata	410,694 cub. ft.
P. pinaster	173,012 cub. ft.

Mallet Plantations

During the year thinnings yielded 56 tons of mallet bark. No extensions were made to the plantations which remain at 19,111 acres.

Inland Arboreta

Work during the year was confined to the normal maintenance of existing arboreta. In this work, the assistance of local farmers, the Department of Agriculture and various local Government bodies is gratefully acknowledged.

Tree Nurseries

During the year the Dryandra Nursery was transferred to a new site in Narrogin where better facilities are available.

The demand for young trees by private buyers on farms and in country towns continues at a high level. Sales from the Hamel and Dryandra Nurseries totalled 201,619 plants. In addition, 78,062 plants—mostly pine seedlings were sold by other Nurseries which concentrate on raising stock for Departmental requirements.

The most popular species, apart from pines, were—River Gum (36,535 sold), Dwarf Sugar Gum (12,183), Blue Gums (10,400), Tuart (10,200), Bald Island Marlock (7,700) and Coral-flowered Gum and Sugar Gum both exceeded 5,000 plants sold.

The distribution of plants from the Hamel and Dryandra Nurseries was as follows:—

Nursery	Number of Plants Sold				Departmental Use			Number of Species
	Potted Stock	Tray Stock	Open Rooted Stock	Total	Pines	Other	Total	
Hamel	50,593	17,104	62,563	130,260	134,816	86,615	221,431	162
Dryandra	65,244	6,115	....	71,359	120	7,106	7,226	100
Total	115,837	23,219	62,563	201,619	134,936	93,721	228,657	....

The Department, in their various nurseries, raised 4·3 million plants for their own use, of which nearly 4·2 million were young pines.

8. PROTECTION

Fire Protection

State Forests Under Protection

Indigenous Forest	4,451,351 acres
Pine Plantations	53,944 acres
Mallet Plantations	19,111 acres

The Fire Season

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

	Jarrah	Karri
Rainfall	Generally above average. There were 226 wet days as against 135 for the previous year	Slightly above average with a dry Spring—202 wet days.
Temperature	Generally above average with a hot peak in January	Generally above average except March and April.
	Highest Maximum 106° F.	Highest Maximum 105.5° F.
	4 days over 100° F.	3 days over 100° F.
	18 days over 90° F.	6 days over 90° F.
	Mean Maximum 74.7° F.	Mean Maximum 71.6° F.
Relative Humidity	One day with RH of 10 per cent.	2 days with 10 per cent. or less.
	6 days between 11 per cent. and 15 per cent.	3 days between 11 per cent. and 15 per cent.
	16 days between 16 per cent. and 25 per cent.	4 days between 16 per cent. and 25 per cent.
Fire Hazard	14 days Dangerous.	1 Day of Dangerous Hazard.
	25 days Severe Summer.	2 days of Severe Summer.
	Mean Hazard 5·8	Mean Hazard 3·2
	Mean all Seasons 5·4	Mean all Seasons 4·4

Controlled Burning

Autumn burning this year was somewhat curtailed but the overall results were very good with a total of over one million acres burnt compared with 894,000 acres last year.

The aerial burning was stepped up resulting in a total of 448,238 acres burnt by this method and continued experimental burning under pines resulted in approximately 3,000 acres of successful fuel reduction in the plantations.

Prescribed Burning—	(acres)
Hand burning	595,022
Aircraft burning	448,238
	1,043,260
Advance Burns and Top Disposal	52,882
	1,096,142

Detection

Manning of Towers:

	Jarrah	Karri
First Watch	21/9/67	20/10/67
Last Watch	9/4/68	10/4/68

Communications

V.H.F. radio operated successfully during the year and less reliance is now placed on having extensive earth-return telephone systems.

Fires and Fire Damage

The total number of fires attended by Departmental gangs during the season was 248 compared with 365 last year and an overall average of 350.

The following table lists fire causes for the season.

Escapes from settlers burning	50
Deliberately lit	40
Escapes from prescribed burning	34
Travellers and hunters	28
Children	18
Householders	12
Mill surroundings	10
W.A.G.R. locomotives	10
Lightning	10
Bush workers	8
Other Government employees	6
Stockmen	4
Mine surroundings	2
Mill locomotives	1
Unknown	15
	248

Once again the greatest cause of fires requiring attention by Departmental gangs was escapes from settlers burns at 50 fires or 20 per cent. of the total but this is the lowest percentage for a number of years.

Forty fires, or 16 per cent., were deliberately lit, of which 15 were in Metropolitan plantations, eleven at Collie and six in the Kelmscott Division.

The police were called upon to investigate many of these deliberately lit fires and a successful prosecution was launched at Collie resulting in a marked drop in this type of fire at that centre.

A youth was apprehended in the Metropolitan area for frequent fire lighting and was committed to the care of the Child Welfare Department.

Travellers and hunters caused 28 fires or 11 per cent. of the total which is a little above average.

The total area burnt was 4,774 acres made up as follows:

Pines—salvageable	1 acre
Pines—mild scorch only	4 acres
Natural forest	4,769 acres
	4,774 acres

Date of first fire 27th September, 1967.
Date of last fire 9th April, 1968.

During the year Departmental gangs assisted at serious fires in four sawmills when buildings were threatened and in the farming areas several dwellings were saved.

Public Relations

Public relations were generally good but some Shires still leave much to be desired in the way of co-operation.

During the year the two fire protected areas, in the Mundaring district and around Collie, were cancelled. These were established many years ago under old legislation and are now deemed redundant.

As far as possible all meetings of bush fire control organizations are attended by officers of the Department and several public demonstrations of fire fighting equipment and methods were held.

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

9. RESEARCH

PINE SILVICULTURE

Pinus Pinaster Plantations

Tree Breeding

Grafting—Vegetative propagation was restricted to 300 grafts of local clones established in the seed orchard. These were planted out in the Neaves Road arboretum to facilitate future pollination work: the older grafts in the arboretum have become too large for economical working. Stocks were prepared for the first 1,000 grafts of the proposed Mullaloo Orchard.

Progeny Testing—Twenty thousand tubed stock containing material for progeny and provenance testing were raised at Wanneroo during the year. Forty full-sib progeny groups were raised and trials were planted at Gnangara, Yanchep, Mundaring, Hamel, Collie and Manjimup. A total of 24 acres of progeny trials planted in June brought the area of established progeny trials to 90 acres. The oldest, planted in 1964, will be measured for the first time in 1969.

Tubed stock of two provenances of *P. taeda*, three provenances of *P. elliottii* and eight provenances of *P. caribaea* was raised at Wanneroo for trials at Dwellingup and Manjimup. A number of South American pines were also raised as open rooted stock at Wanneroo for arboreta planting.

Controlled Pollination—Eight hundred and thirteen cones were pollinated in 1967 with only fifty per cent. take. This is the poorest result obtained since the commencement of the improvement programme. The result appears to reflect a general failure in fruit set throughout the State in 1967. Within the 1967 programme, 23 of the imported Portuguese clones were pollinated for the first time and 39 successful crosses between locally selected French and Portuguese " plus " trees were obtained.

The proposed pollination of locally selected " plus " trees was virtually completed in 1967. Within the next four years it should be possible to complete the necessary manipulation for the imported Portuguese clones.

During the year eleven kilograms of full-sib seed were collected from the 1955 controlled pollinations in the Neaves Road Arboretum and the Joondalup Orchard. Abundant seed from the orchard pollination provided an excess over the requirement for progeny testing. From the surplus, thirty grams of seed for each of twenty progeny groups were despatched to South Africa, New Zealand and Victoria for testing over the potential range of the species within the Southern Hemisphere.

Seed Orchards—Half of the clones in the Joondalup Orchard produced some pollen in 1967. It is anticipated that pollen production in 1968 should be adequate to produce the first significant seed yield from the area. Fertilizer trials were commenced in the orchard in autumn 1968 with the objective of increasing seed yields.

A thirty acre area at Mullaloo in the Wanneroo Division was burnt in preparation for a second seed orchard. Planting will commence in 1969.

Investigations of Potential Planting Country

In the period under review, the investigations on site quality assessment on the northern Swan Coastal Plain were completed. A brief summary of this work was published as a contribution to the 1968 Commonwealth Forestry Conference in India, and the full bulletin is now ready for printing. The methods developed have been applied on a large scale in the Wanneroo Division using a combination of ground survey and interpretation of aerial photographs. To date approximately 48,000 acres have been covered in sufficient detail to provide a basis for boundary demarcation, and an overall estimate of plantable country has been made for the whole Division.

The methods developed in the Wanneroo Division have now been applied to the study of site factors, plant indicators and potential for pine growth, as far south as Collie. A complete series of computer programmes has been completed which will handle the entire investigation, from raw field data, through principal component analysis to the graphical screening of indicator species. Data collected during the year are now being processed by this method. A set of 120 temporary sample plots has been measured to provide information on the productivity of *P. pinaster* on the main soil and vegetation types of the jarrah forest. The analysis of these indicates that the differences in productivity of the various sites are even more acute than on the coastal plain.

Nursery Investigations

Investigations into problems encountered at the Gnangara nursery were reported in last year's Report. Since then data collected by means of recurrent stocktakes and soil sampling were analysed by means of multiple regression. The organic matter content of the soil was shown to be the main factor determining optimum growth, followed by seed stratification and rate of sowing. The influence of organic matter on seedling production was primarily exercised through its effect on moisture retention, and to a lesser degree on fertilizer retention. Experiments of factorial and split plot design were used to study the optimum size of planting stock, the effect of watering, green cropping, sterilization and fertilization on seedling production, and the optimum methods of chemical weed control. Currently, experiments have been initiated to study the effect of continuous cropping and the addition of peat on the organic matter content and productivity of nursery soils. Further experimental work on soil sterilization by formalin has led to a reduction in the rate of its application and in the waiting period after application, and has made possible its incorporation in routine nursery practice. A reliable estimate of seedling production has been provided to assist in plantation planning.

Environmental Influences

A pot trial dealing with the interaction of soil type fertilization and irrigation on the growth of seedlings, elucidated the influence of the main environmental factors on productivity. In its field counterpart, the effect of fertiliser type and the rate and timing of application on phosphate nutrition is being studied on the highly leached sands of the Bassendean Dune System. The possibility of boron deficiency in young plantations is being examined.

A series of pot trials investigating aspects of drought resistance of *Pinus pinaster* were completed during the year. Results from seedling performance confirm that the species is significantly superior to *P. radiata*, *P. elliottii* and *P. taeda* with respect to survival under prolonged drought. Considerable variation in drought response was found between provenances of *P. pinaster*. The Portuguese provenance in both the natural and improved form performed satisfactorily.

A programme commenced in 1964, investigating patterns of height and radial growth within the species, was completed during the year.

Thinning Trials

Basal area thinning trials at both Yanchep and Gnangara were remeasured and thinned down to prescribed levels. Equipment, including a neutron probe, was purchased to commence hydrological studies within the plot series in spring 1968.

Measurement data for both the late thinning trial in the 1941 stand in South Lane Poole Block, Gnangara and a dendrometer study in the Gnangara basal area thinning plots were processed during the year.

Pinus Radiata Plantations

Tree Breeding

Scions of ten " plus " trees from New South Wales were grafted and planted in the Wellbucket arboretum east of Mundaring. Preparation for grafting at Manjimup, to establish a seed orchard at that centre, was commenced. It is proposed to continue the *P. radiata* breeding work in the south, operating from the new Manjimup research building. The recently purchased research area at West Manjimup provides ideal conditions for a scion and seed orchard.

Thinning was commenced on a 200 acre seed production area at Grimwade Plantation. The area is to be thinned to 50 stems per acre and clear felled in five annual coupes at least four years after thinning. Fertilizer treatments will be used in an endeavour to promote maximum cone production prior to clear felling.

Weed Control

Trials with low volume applications of weedicides prior to planting were commenced in 1967. Several machines were tested for operational use and a satisfactory unit was purchased. Large scale operational studies, testing a range of low volume applications and concentrations of 245 T were established in both the Collie and Harvey Divisions. Early results suggest that general applications will greatly reduce weeding costs in *P. radiata* plantations.

Nursery Investigations

A long term trial comparing the effect of green cropping and rotation with continual pine cropping was commenced in the Collie nursery. The use of different green crops, pine needle mulches, soil sterilization and several fertilizer levels will be examined. Time of sowing and spacing trials were also initiated to see if production per unit nursery area can be increased.

A further trial testing the efficiency of planting stock from different nurseries was established in June.

Species Trials

In order to ensure satisfactory plants of the lesser known pine species, arrangements were made to raise 8,000 tubed plants at Collie each year. These will be planted at Bussell's and Asplin's arboreta and the aim for these arboreta is to compare as many coniferous species as possible on high quality sites. A new arboretum area at Tonebup, near Tone River, to test a wide range of coniferous species on sites marginal for *P. radiata* was prepared during the year. Plans to extend the Pemberton arboretum were also finalized.

JARRAH SILVICULTURE

Jarrah Pole Stands

Field work for the study of the relationship between stand stocking and stand increment in jarrah pole stands was completed. A technique of stem analysis was used in this study in an attempt to gain information more rapidly than that obtained from conventional thinning experiments.

The analysis of the results is not complete but, it is already evident that stand increment increases steadily with increasing basal area stocking to a peak around 110 to 120 square feet per acre basal area. At stockings above this level stand encrement declines, presumably due to the onset of stagnation.

Jarrah Pile Stands

Studies to determine the effect of various stocking levels on stand increment and individual tree increment have been expanded, over 350 piles now being located in eight plots, No results are available as yet.

Natural Regeneration

Measurements of seedfall in various stand types continued for the fourth year. Collections of seed will continue until a complete cycle between two seed years has been completed.

Mortality among natural seedlings continued to be high as indicated by the following table:—

Mortality of Natural Seedlings

Original Number	Losses			
	1st Year	2nd Year	3rd Year	4th Year
537 100%	223 41·5%	72 13%	112 21%	46 9%

At the end of the fourth year, 84 seedlings remained alive, only 16 per cent. of the original count. Most of the fourth year losses were associated with a fire.

Fertilizer Investigations

The effect of nitrogen (N), phosphorus (P), potassium (K) and trace element (TE) fertilizers was investigated in a pot trial. Jarrah seedlings were grown in a typical lateritic gravel collected from a good jarrah site. The seedlings were fertilized when they had formed two true leaves. Four months after treatment a very strong NxP interaction was observed as indicated by the following table.

Effect of N, P, K and Trace Elements* on Jarrah Seedlings

Seedlings 4 months After Fertilizing

Treatment	Mean Height (Inches)		Oven Dry Weight (gm)	
	+TE	—TE	+TE	—TE
Control	4·28	4·08	1·93	1·89
P	3·50	3·58	1·81	1·43
K	3·98	4·04	2·35	2·60
PK	3·48	3·75	1·81	1·78
N	3·79	3·83	2·82	3·16
NK	4·18	4·56	3·80	3·60
NP	20·68	18·38	19·39	16·37
NPK	21·50	20·69	21·15	17·06

* +TE = Trace elements added —TE = Without trace elements

Phosphorus alone showed a tendency to depress growth, while Nitrogen alone had little effect on height but increased the weight of the plant remarkably. Potassium appeared to be neutral by itself but there is slight evidence of an NxK interaction. Trace elements resulted in a small but significant increase in growth when applied with N and P, but this was reflected in the weight of the plants and not in their height. The trace element aspect is at present being investigated further by a more sensitive experiment.

A second comprehensive pot trial has been started to determine the proportions of nitrogen and phosphorus giving the maximum NxP interaction.

Other experiments include a field trial of N, P and K fertilizers in all combinations applied to both thinned and unthinned jarrah pole stands and a factorial fertilizer trial on *P. radiata* growing in lateritic gravels. Both experiments were laid down in September 1967 and will be reported on in 1969.

Rehabilitation of Dieback Areas

Nine acres of moist gully-head and swamp in the headwaters of Yarragil Brook were cleared and planted to *Eucalyptus microcorys*. The gully had a mild *Phytophthora* infection and the clearing was taken well beyond symptoms of fungus activity into healthy forest. A similar trial in a drier area, and using pine planting stock, was reported last year.

The aim of both trials is to determine whether *Phytophthora* is capable of moving via a relatively disease-tolerant host.

In the Yarragil gully an 0·1 acre plot of *Pinus serotina* was planted in addition to the eucalypts.

Species trials on both die-back infected and healthy forest areas were maintained and measured. Some of the best performances among earlier plantings are listed below—

Species	Age (years)	Mean Height (ft.)		
		All Stems	Tallest 100 Stems/acre	Tallest 40 Stems/acre
E. sieberi	3	13·8	22·3	24·0
E. globulus	3	18·5	23·1	24·5
E. resinifera	3	9·9	15·4	16·4
E. goniocalyx	3	9·6	17·2	18·7
Pinus elliottii	3	4·1	6·1	6·7
P. taeda	3	5·1	7·9	8·3
P. insularis	3	3·3	5·1	6·0
P. caribaea (Honduras)	3	3·0	5·7	6·4
E. saligna	2	5·3	9·9	11·3
E. bicostata	2	7·7	12·0	12·9
E. bosistoana	2	6·5	11·1	12·5
E. muelleriana	2	5·1	9·5	11·3
Pinus oocarpa	2	2·8	4·8	5·5
P. caribaea (Bahamas)	2	1·7	3·0	3·4

Additional plots were planted using *Eucalyptus pilularis* (three different provenances) and *E. citriodora*.

Planting in Wet Sites

Species trials at Cameron Dam have been reported on previously. This site is seasonally waterlogged and the soil is one to two feet depth of coarse sand over clay.

Among the pines tested, some establishment success has been achieved with *P. pinaster*, *P. caribaea* and *P. taeda*. The pine failure to date has been *P. insularis*. Wandoo and a hybrid, or "cross" of *Euc. camaldulensis* have both been successful.

Enrichment Planting

Planting of *Eucalyptus microcorys* in gaps in good jarrah forest areas has been only marginally successful. Establishment of the plants in unprepared ground has presented little difficulty with survivals of between 75 and 85 per cent. However, wallabies and kangaroos obviously have a predilection for *E. microcorys* and over a quarter of the plants have suffered severe browsing damage.

Jarrah Dieback

Over the year the equivalent of six full time professional officers has been concentrated on this problem. New research laboratories completed or near completion at Manjimup and Dwellingup will greatly assist the Como centre with identification and other laboratory aspects of the investigation. Research fellowships at the Australian National University and the University of Western Australia have been sponsored by the Department to assist the local research effort. The A.N.U. Fellowship was taken up in May and the W.A. Fellowship should be advertised in September.

In conjunction with the Commonwealth Forest Research Institute two world authorities on *Phytophthora cinnamomi*, the casuative pathogen, were brought to Western Australia as consultants in May. They were Dr. G. Zentmeyer, Professor of Plant Pathology at the University of California, U.S.A. and Dr. F. Newhook, Professor of Plant Pathology at the University of Auckland, New Zealand. Their reports are yet to be received but generally the Departmental activities in dieback investigations were considered to be sound. It is anticipated that the consultation will open up several new lines of research and provide far greater confidence in work in progress.

Departmental activity at present embraces the three aspects of aetiology, control and rehabilitation.

Environmental Studies—In August a large experiment was commenced at Dwellingup to investigate the influences of site, season and inoculum level on the establishment of new infections. Plots covering a transect from a ridge top to a wet gully have been inoculated at two monthly intervals. A standard inoculum using an infected lupin root as the unit is employed at two levels of root numbers per spot and two levels of spots per plot. Detailed investigations of soil moisture and soil temperature are in progress over the transect. Inoculation will cease in September and the first analyses of the trial will be carried out in Autumn 1969.

Further studies have been implemented to determine the influence of litter cover and forest cover on soil temperatures. Duplication of the Dwellingup inoculation and environmental studies have commenced at Manjimup.

Rate of Spread

Plots to measure the rate of spread of the disorder are now established in both the northern (Dwellingup) and southern (Manjimup) regions. It will be several years before meausrement data are of sufficient reliability to compare with the trends established from previous air photo interpretation.

Fungal Identification

Lupin baiting techniques to positively identify the presence of the pathogen continued at a high level. To date, all identifications have been carried out at the Commonwealth Forest Research Institute laboratory at Kelmscott. Equipment is on order to provide this service at both the Dwellingup and Manjimup centres.

Species Screening

Preliminary screening in pot trials of a wide range of eucalypts and relevant conifers has been completed. Associated field trials testing for long term resistance have been established in both northern and southern forest areas. Two glasshouse trials to investigate the resistance of *P. pinaster* were completed during the year. Inoculation with *P. cinnamomi* of one and two year old plants tested under two levels of watering and two levels of nutrition, had no significant effect. A further trial with younger pine and jarrah produced high mortality in the jarrah with no effect on the pine. In this trial it was apparent that waterlogging alone can cause greater mortality in jarrah than can the pathogen in well drained soil.

Rehabilitation of Dieback Areas

A leader trial was established in 1967 to determine the possible difficulties of direct seeding *Pinus pinaster* on to old dieback areas.

The factors tested in the trial were as follows:—

(a) Deep ripping and no ground preparation.

(b) Sowing in May and sowing in August.

(c) Inoculating with mycorrhizal material, and no inoculation.

(d) Control of ground vegetation, and no control.

(e) Sowing seed on the surface, and sowing it approximately $\frac{1}{2}$ in. deep.

The results can be summarized as follows:—

(a) Deep ripping was highly beneficial (28 per cent. of sown seed yielded established plants) compared with unprepared ground (7·3 per cent.)

(b) Sowing in May (30 per cent. success) proved better than sowing in August (17 per cent.)

(c) Inoculation with mycorrhizal material failed to increase the number of established seedlings but resulted in vastly superior plants. Inoculated plants were bushy, bright bluish green and averaged 2·83 in. in height in May 1968. Plants from uninoculated seed were very pale, had few needles, and were only 2·25 in. high.

(d) Control of the ground vegetation was of value only when no ground preparation was practised. Vegetation control had no effect on seedling numbers in deep-ripped plots.

(e) Surface sowing (29 per cent success) was superior to covering the seed (19 per cent.)

The best treatment combination of deep ripping and sowing the seed on the soil surface in May resulted in 50·5 per cent. of the sown seed yielding established seedlings. Seeds were spot sown at three per spot. The 50·5 plant per cent gave a stocking of 78 per cent. of the sown spots—a very satisfactory result.

The trial is being maintained to observe further development of the seedlings.

Ecological Survey

A detailed ecological assessment of the northern jarrah forest to determine types susceptible to dieback and the general rehabilitation potential was commenced in October. Over 260 plots were established during the year and the data are currently being processed by the computer. Early results are promising and in future it should be possible to carry out dieback investigations within the knowledge of the ecological range of the disorder. Ecological typing is essential to a full appreciation of the various hazards associated with control and rehabilitation measures.

KARRI SILVICULTURE

Karri Seeding Cycle

There was ample seed in the karri crowns throughout the year to permit successful regeneration burns. Sampling indicates that adequate seed remains for further regeneration burning in spring, 1968. However, it is doubtful whether there will be sufficient in autumn, 1969, and careful checks will be made.

Extensive use was made of sampling by shooting down seed-bearing branches by rifle to confirm seed supplies in the crowns. This method allows a greater number of trees to be sampled, thus providing a more accurate estimation of seed availability.

All research information to date has been summarised in the form of a graph which permits a prediction to be made of the final seed crop at any intermediate stage in the floral cycle.

Thinning and Fertilizer Trials

Experimental results indicate that in one year old karri regeneration, the release of individuals or groups by the use of weedicide results in their increased growth and in the suppression of competing scrub. The individual or group to be released is protected by covering, while the surrounding trees and scrub are eliminated by spraying with the weedicide 2·4·5–T, applied with a mist blower.

Increased growth also is obtained by the application of a general fertilizer in the first year.

A demonstration trial area of 10 acres has been established which will provide 2·5 acres each of the following treatments:—

1. Thinned to individual trees at 10 ft. x 10 ft. spacing.
2. Thinned to individual trees at 10 ft. x 10 ft. spacing and fertilized.
3. No thinning—individual trees at 10 ft. x 10 ft. spacing fertilized.
4. Control—no thinning or fertilizer.

This trial will provide a substantial area for continued observation and measurement over a period of years.

Silviculture of Mixed Stands

An extensive (100 acres) trial has been established near Quinninup to test the practical possibilities of manipulating the composition of the regrowth resulting from the logging of a mixed marri-karri stand. Treatments include the leaving of seed trees of karri only, marri only, a known proportion of marri and karri, and, no seed trees. The felling operation with the retention of seed trees is complete and the regeneration burn is programmed for December, 1968, when there will be adequate seed in the crowns. This trial has an important application. The advent of a hardwood chip industry based largely on the utilization of marri, will permit the economic removal of this species which hitherto had not been possible.

A similar trial is planned for a typical mixed jarrah-marri stand.

Exotics in the Southern Region

A further four mixed species trials were established in the region bringing the total number of such trials to 28. The number established in the various sites are as follows:—

Flat and non-forest	15	
Jarrah forest	7	(5 containing Phytophthora)
Karri ,, ...	4	
Marri ,, ...	1	
Coastal dunes	1	

Further trials, aimed at increasing representation on marri-dominant sites, are planned for coastal dunes and a wider sample of poor quality jarrah.

Utilization of Marri

A study to investigate the potential of marri for sawmilling was conducted in April, 1968, in conjunction with the sawmilling industry.

The study demonstrated that a considerable volume of marri of a quality suitable for sawmilling is available within the karr-marri and marri-karri forest types. Over the six one-acre sample plots, 33 per cent of the standing marri volume provided suitable sawlogs. However, the study also highlighted the difficulty of selecting marketable logs from observable defects in the standing trees.

SOILS AND NUTRITION

There was again an increase in the analytical work carried out for major experimental projects and some 6,600 analyses were made in this regard. In addition a large number of minor analyses were completed.

Two interesting lines of investigation were commenced during the year. They were as follows:—

The Nutrient Status of Native Vegetation on Dying Jarrah Areas

A series of foliar samples were collected from susceptible native species on dying jarrah and adjacent healthy areas to test nutrient differences on the two sites. The mean values for the more common inorganic constituents are shown in Table 1.

TABLE I—NUTRIENT STATUS OF VEGETATION ON DYING AND ADJACENT HEALTHY JARRAH AREAS

Species	Per cent										ppm	
	N		P		K		Ca		Mg		Mn	
	H*	D†	H	D	H	D	H	D	H	D	H	D
Banksia grandis	0·70	0·75	0·035	0·033	0·456	0·403	0·294	0·356	0·180	0·191	243	225
Dryandra nivea	0·48	0·44	0·024	0·022	0·294	0·224	0·289	0·249	0·186	0·164	258	135
Eucalyptus calophylla....	0·99	0·91	0·040	0·037	0·799	0·739	0·477	0·507	0·351	0·292	54	82
Eucalyptus marginata	0·74	0·89	0·034	0·029	0·383	0·324	0·476	0·456	0·406	0·380	143	121
Leucopogon verticillata	0·90	0·89	0·031	0·030	0·665	0·719	0·867	0·645	0·219	0·254	28	42
Macrozamia reidlii	1·49	1·55	0·057	0·046	0·573	0·499	0·109	0·103	0·136	0·145	38	39
Persoonia longifolia	0·71	0·79	0·033	0·067	0·763	0·771	0·210	0·229	0·342	0·376	64	67
Xanthorrhoea	0·54	0·55	0·024	0·023	1·556	1·418	0·292	0·405	0·180	0·207	26	20

* H—Healthy area † D—Dying area

There was no significant differences observed between the two sites, but there was considerable variation between the different species. The nutrient status of the plants was not correlated with the presence or absence of the disorder.

The Effect of Controlled Burning on the Forest Floor and Soils of Pinus radiata Plantations

Surface soil and litter samples were collected from under a 14 year old *P. radiata* stand at Grimwade. The experimental area was sub-divided into 10 plots, five of which were unburnt and the remainder burnt twice, in October 1966, and April 1967.

The only significant difference observed as a result of the burning was a slight increase in soil pH and hydrochloric acid soluble phosphorus. It is important to notice that the controlled burning has caused no detrimental effects to the surface soils of the plantation. This work is being extended into *Pinus pinaster* plantations and the preliminary data indicate that controlled burning has not caused any changes in surface soil properties.

FIRE RESEARCH

Fire research over the past year concentrated on scrub fuels, rates of litter accumulation, and on litter inflammability and growth responses in pine plantations. The opportunities for experimental fires were limited by the time devoted to aerial burning operations in spring and by unsuitable weather in autumn, but about fifty experimental fires were completed.

Scrub Fuels

Useful information was gathered on the variables affecting scrub foliage as fuels. Experiments in a partially controlled environment showed foliar moisture content and bulk density to be important for regulating the amount of available fuel and burning rate of scrub foliage. Seasonal and diurnal trends in foliar moisture content were influenced by species, season and time of day.

Trials have commenced to observe the effect of controlled burning on scrub regeneration.

Litter Accumulation

Jarrah Forest

Studies were completed in both the northern and southern jarrah forest to measure the weight of litter accumulation under a range of canopy covers and number of annual leaf falls. An example of these results showed that after four annual years of leaf fall the weight of litter ranged from 1·7 to 4·8 tons per acre (equivalent oven dry weight). The variation is explained by the regression:—

$$Y = 0{\cdot}733 + 0{\cdot}059x$$

where Y = litter weight in tons per acre
x = canopy cover per cent.

Karri Forest

A similar study has commenced in karri forest and present indications are that the rates of litter accumulation, by weight, approximate twice that of jarrah.

Growth Studies

Pole Sizes

Girth growth responses after treatment by fire were measured in plots of *P. pinaster*, *P. radiata*, jarrah, and karri. Results showed that there was no significant difference between the burnt and control trees for any of the controlled burning treatments, but crown scorching of *P. pinaster* had a pronounced reduction effect on girth growth.

Sapling Sizes

Jarrah saplings under 11 feet in height were damaged by fires of intensities of 9 to 18 British Thermal Units (B.T.U.) per second per foot. Within this range the number of killed crowns was related to fire intensity.

Karri saplings averaging 12 feet in height were killed by a fire intensity of 22 B.T.U. per second per foot, but 30 feet high saplings withstood 12 B.T.U. per second per foot without apparent bole damage or loss in girth growth.

Advance Growth

Tests being made on the response to cutting, fertilizing or controlled burning, on the formation of dynamic, or leading shoots, from jarrah lignotuberous advance growth have so far given negative results. However, a wider range of sites have yet to be tested before conclusions can be drawn.

Fire Operations

Prescribed burning using aircraft covered nearly 450,000 acres and in the southern forest new lighting techniques were used where mixed fuels were encountered in the one block. This involved a number of lightings according to the fire danger ratings specified for the different forest or fuel types.

10. LIBRARY

A feature of the past few years has been the significant increase in the use of the library by non-professional officers of all ranks and from all Divisions. There are now approximately 125 officers (both professional and non-professional) regularly receiving library services. This increase in the number of regular borrowers is reflected in the following statistics which indicate the increase in all phases of library work for the year 1967/68.

	1967/68	1966/67
Journal Loans	8,633	7,651
Accession List Requests	3,784	2,922
Loans and Queries	4,054	3,560
Publications received	1,390	1,124

A field in which library activity has increased tremendously over the past year has been that of inter-library loans. During the current year 248 requests for the loan of publications were made outside the Department on behalf of Departmental officers. Of these, 85 per cent were borrowed from libraries within the State; the others coming mainly through forestry agencies in the Eastern States.

A new catalogue card cabinet was designed and installed during the year.

11. EDUCATION AND PUBLICITY

Education

Following the replacement of State Forestry Scholarships by Forestry Cadetships, three former scholarship holders were granted cadetships while two new cadetships were awarded in 1968. The present position is as follows:—

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

* To graduate in 1968. † Suspended Scholarship. ‡ Includes 2 suspended Cadetships.

Of the 15 lads selected to undergo preliminary training prior to acceptance for the Forest Field Cadet Course in August 1967 only eleven remain. It is possible that this number will be further reduced before the Course ends in 1969.

Emphasis has been placed on the training of personnel in safety methods during the year.

An administrative training school for Assistant Divisional Forest Officers of one week's duration was held in June, 1968.

Publicity

During the year the Conservator of Forests, Mr. A. C. Harris, was elected a Councillor of the Australian Conservation Foundation and became Federal President of the Institute of Foresters of Australia. The Institute will hold its 5th Triennial Conference in Perth in October, 1968.

In September, 1967, the Conservator visited Japan to make a study of the paper pulp industry especially with regard to possible wood-chip exports from Western Australia.

In January 1968 the Conservator attended the 9th Commonwealth Forestry Conference held in New Delhi.

Bulletin No. 74, "A Fire Danger Rating and Controlled Burning Guide for the Northern Jarrah (*Euc. marginata*) Forest of Western Australia", and Bulletin No. 75, "Importation of Breeding Material of *Pinus pinaster*, Ait. from Portugal", were published. A leaflet on the habit, distribution and properties of Marri (*Euc. calophylla*) is in the course of preparation.

12. TIMBER INDUSTRY REGULATIONS ACT, 1926-1950

The number of mills registered under the provisions of the Act at 31st December 1967, totalled 188 (114 Crown Land and 74 Private Property).

The average number of persons employed in the Timber mills each month throughout the year was 3,209 a slight increase on last year's figure of 3,173.

The District and Workmen's Inspectors made 1,292 inspections of timber holdings.

There were 650 notifiable accidents, one being fatal.

The number of accidents per 100 persons employed was 20 compared with 25 the previous year.

It is hoped that the redrafted Timber Industry Regualtion Act will be passed during the present session of Parliament. This Act was the result of joint study by the Forests Department, the Timber Industry and the Timber Workers Union.

The cost of administering the Timber Industry Regulation Act for the year ending 30th June, 1968 was as follows:—

Salaries	$7,315
Mileage, Travelling Allowances, Office Rent, Plant Cost and Sundries	$5,880
	$13,195

Staff

In October 1967, Mr. B. Boettcher retired after capably carrying out the duties of District Inspector for the past 20 years.

Mr. Eric Wells was appointed as the new District Inspector.

Mr. G. Kennedy the Workmens Inspector resigned in June, 1967, and after an election Mr. N. Crawford was elected to fill the vacancy.

13. FOREST OFFENCES

A total of 49 forest offences were reported during the year.

Legal proceedings were taken in three cases and all resulted in conviction. Fines and costs amounted to $475 and $108·10 respectively.

Warnings were issued in 24 instances and the remainder dealt with by charging royalty, forfeiture of deposit, collection of damages or confiscation and sale of timber illegally cut. The amount received by the Department in this way totalled $1,633.76.

14. EMPLOYMENT IN FORESTRY AND THE TIMBER INDUSTRY

The number of wage earners directly employed in Forestry and the Timber Industry was estimated as 4,915 made up as follows:—

Forestry—		
Professional Officers	52	
General Field Staff	247	
Clerical and Drafting	70	
Wages Employees	649	
Contractors and Employees (estimated)	20	
		1,038
Timber Industry—		
Sawmill employees, including bush workers at 31st December, 1967		*3,143
Firewood cutters and pole getters, working under permit		267
Sandalwood workers		70
Apiarists, estimated (794 sites registered)		397
		4,915

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

15. STAFF MATTERS

Public Service Act

Promotions during the year included Mr. A. B. Hatch to Senior Research Officer, Mr. G. B. Peet to Research Officer, Messrs. A. L. Clifton, A. J. Hart, J. J. Havel and P. C. Kimber to Silviculturists, Messrs. E. A. Jenkins, A. D. Mather, J. A. W. Robley and J. K. Smart to Divisional Forest Officers and Mr. A. J. Williamson to Working Plans Officer. Mr. R. M. Davis was promoted to Chief Draftsman.

During the four months of July to October, 1967, Mr. A. B. Hatch attended the Rubber Research Institute at Kuala Lumpur, Malaysia where, under a Churchill Fellowship he studied problems of plant nutrition.

Appointments included four Assistant Divisional Forest Officers, Messrs. N. G. Ashcroft, P. E. S. Christensen, A. R. Gobby and G. Malajczuk, and Mr. E. J. Wells as District Inspector.

Congratulations are extended to Mr. N. G. Ashcroft who was awarded the Schlich Medal for 1967. The Medal is awarded annually to the student who both in his theoretical and practical work shows the greatest promise as a forester.

Forestry cadetships were awarded to Messrs. D. F. Meehan and M. E. Sanderson (1st Year) and G. McArthur and A. W. Walker (2nd Year), and Drafting cadetships were awarded to C. R. Thurley and J. Van Dyke.

Under a determination made by the Public Service Commissioner in connection with the Public Service (Administrative and Clerical Officers) Salaries Agreement, 1967, and gazetted on the 19th April, 1968, Mr. K. K. F. Webster was reclassified to C–II–3.

Mr. A. J. Burrell retired from the position of Chief Draftsman on the 28th May, 1968, after more than 41 years' service with the Department and Mr. B. Boettcher, District Inspector, Timber Industry Regulation Act, retired on the 31st October, 1967.

Resignations included Dr. I. S. Ferguson, Research Officer, and Assistant Divisional Forest Officer F. H. McKinnell.

Following negotiations between the Civil Service Association of Western Australia (Incorporated) and the Public Service Commissioner, the Public Service (Administrative and Clerical Officers) Salaries Agreement, 1967, was signed on the 22nd December, 1967, and the amended rates were applied as from that date.

A determination of salaries or salary ranges in respect of offices covered by this agreement was published in the *Government Gazette* of the 19th April, 1968. A determination in respect of the Special Division was promulgated in the *Government Gazette* of the 29th December, 1967, to have effect from the 1st January, 1968.

The Public Service (General Division Officers) Salaries Agreement, 1968, was signed on the 15th March, 1968, and the amended rates have applied as from that date.

Salaries for the Professional Division had not been finalised by the 30th June, 1968.

Forests Act

New appointments during the year included the following:—

20 Technical Assistants (F–IV), 3 Technical Assistants (F–II–1/2), 1 Workmen's Inspector, (Timber Industry Regulation Act), and 1 Forest Ranger.

Promotions included 1 officer to Forester, 6 officers to Assistant Forester, 6 officers to Forest Ranger and 1 officer to Technical Assistant (F–II–1/2).

One officer was reclassified to Forester, one officer to Technical Officer (F–II–3/4), and 2 officers to Technical Assistant (F–II–1/2).

Resignations accounted for 7 Technical Assistants (F–IV), 4 Technical Assistants (F–II–1/2), 1 Forest Officer (F–II–/5), 1 Technical Officer (F–II–5/6), 3 forest Guards, 1 Assistant Forester, and 1 Workmen's Inspector, Timber Industry Regulation Act.

Four officers reached the retiring age during the year, namely Senior Foresters H. G. Clover, D. H. Perry and W. H. Redwood and Assistant Forester F. Gorringe. Mr. Perry had completed more than 50 years' service with the Department during which time he specialised in the growing of *Pinus pinaster*. He was selected to go to Portugal for two years to procure cuttings and seeds from outstanding trees in the native *Pinus pinaster* forests of that country. It is confidently expected that, as a result of his work in Portugal and subsequent tree breeding in this State, there will be a marked improvement in future stands of *Pinus pinaster*.

16. AUSTRALIAN FORESTRY COUNCIL

One meeting of the Council was held in Mt. Gambier in December 1967.

The Standing Committee met in Canberra on three occasions, November 1967, March 1968 and May 1968.

APPENDIX IA

Statement of Revenue and Expenditure of the Consolidated Revenue Fund for the Year ended 30th June, 1968

1966/67	Revenue	1967/68	1966/67	Expenditure	1967/68
$	*Royalties*	$	$		$
2,608,431	Logs	2,791,833	484,080	Salaries	524,683
177,236	Sleepers	164,770	117,613	Incidentals	100,043
5,725	Sawn Timber	7,069	4,011	Timber Industries Regulations Act	5,880
110,885	Piles and Poles	110,828	176,319	Hardwood Conversion	167,664
23,042	Mining Timber	18,333	469,219	Pine Conversion	623,017
33,406	Firewood	25,634	87,388	Recoupable Projects	92,083
11,984	Posts	12,958	36,288	Tree Nurseries	47,260
12,386	Sandalwood	14,359	21,018	Aboreta	9,448
3,287	Miscellaneous	6,731		Printing and Stationery	6,698
				Excess of Revenue over Expenditure distributed as follows:—	
2,986,382		3,152,515	2,861,634	9/10 to Reforestation Fund	2,935,327
	Pine Conversion		311,076	Transferred to Treasury	320,380
436,897	Pine Logs	538,415			
287,228	Sawn Pine	344,582			4,832,483
724,125		882,997			
	Hardwood Conversion				
132,625	Sawn Hardwood	132,704			
99,569	Logs	122,684			
13,688	Piles and Poles	20,094			
245,882		275,482			
	Other Sales and Trees				
60,965	Seeds and Trees	47,975			
78,487	Inspection Fees	74,647			
46,805	Rent and Leases	47,165			
333,403	Miscellaneous	257,180			
519,660		426,967			
	Recoupable Projects				
73,462	Specific Roads	71,267			
19,135	Other	23,255			
92,597		94,522			
4,568,646		4,832,483	4,568,646		

APPENDIX IB

Forest Improvement and Reforestation Fund Account for Year ended 30th June, 1968

1966/67	Source of Funds	1967/68	1966/67	Expenditure	1967/68
$		$	$	*Divisional*	$
270,303	Balance as at 1st July	458,339	1,379,189	Wages, Materials, etc.	1,551,061
2,772,858	9/10 Revenue	2,932,479		*Head Office*	
88,776	Bauxite Areas Compensation	2,848	684,709	Salaries and Allowances	717,572
59,473	Rents	62,065	54,495	Incidentals	58,799
170,000	Federal Aid Road Grant	190,000	215,644	Plant and Vehicles	282,781
201,000	Reserve Fire Fighting	201,000	520,442	Plant Operations	502,725
			91,043	Purchase of Land	98,205
			19,571	Fire Equipment	50,751
			49	Como Buildings	....
			....	Head Office Housing and Buildings	167,743
			19,221	Como Headquarters	14,305
			14,292	Communications	20,216
			45,420	Research	46,259
			9,569	Drafting	12,622
			3,279	Surveys	1,141
			14,352	Training Staff	30,978
			64,727	Insurances	100,179
			50,444	Payroll Tax	53,564
			53,522	Utilisation	17,750
			1,860,779		2,175,590
			3,239,968	Total	3,726,651
			336,897	*Less* Recoups	350,627
			2,903,071		3,376,024
			201,000	Reserve Fire Control	201,000
			458,339	Balance Working Account	269,707
3,562,410		3,846,731	3,562,410		3,846,731

APPENDIX 1C

Statement of Afforestation Expenditure for the Year ended 30th June, 1968

1966/67	Source of Funds	1967/68	1966/67	Expenditure	1967/68
$		$	$		$
400,000	General Loan Fund	400,000	414,216	Plantation Establishment	476,224
222,150	Reforestation Fund	354,299	237,157	Plantation Management	256,271
724,125	Sale of Pine Logs and Timber	882,997	75,896	Houses and Buildings	60,456
			23,607	Road Construction and Maintenance	72,343
			51,830	Fire Prevention and Suppression	48,911
			24,658	Research	15,688
			1,917	Surveys and Plans	10,525
			36,154	Essential Services and Communications	39,439
			11,621	Administration	34,422
			469,219	Direct Conversion of Pine	623,017
1,346,275		1,637,296	1,346,275		1,637,296

APPENDIX 1D

Statement Showing Distribution of Forests Department Expenditure

	$
Consolidated Revenue Fund	1,576,776
Reforestation Fund	3,376,024
General Loan Fund	400,000
	5,352,800

Distribution of Expenditure—	
1. Busselton	456,697
2. Mundaring	327,600
3. Dwellingup	442,433
4. Collie	296,785
5. Kirup	447,368
6. Manjimup	379,095
7. Narrogin	73,906
8. Kelmscott	193,894
9. Metropolitan	120,627
10. Harvey	561,731
11. Pemberton	311,903
12. Nannup	412,143
13. Shannon River	234,343
14. Kalgoorlie-Esperance	26,246
15. Wanneroo	375,961
Head Office	692,068
	5,352,800

APPENDIX 2A

Exports *from Western Australia of Timber, Furniture, Tanning Substances and Essential Oils for the Year ended 30th June, 1968*

	Item and Destination			Quantity	Value
	TIMBER			cub. ft.	$
1	*Softwood Logs*—				
2	*Hardwood Logs (including poles, posts, piling and other wood in the rough)*—				
	Australian States	cub. ft.	$		
	Victoria	19,087	19,158		
	South Australia	810	696		
	Total			19,897	19,854
3	*Sleepers*—				
	Christmas Is.			1,136	2,275
	Hong Kong			2,693	4,478
	Iran			738	1,064
	Jamaica			1,333	2,412
	Jordan			179,933	253,104
	Kenya			20,035	36,551
	New Zealand			1,126	1,965
	South Africa			12,901	16,027
	Tanzania			6,188	11,393
	United Kingdom			175,954	421,919
				402,037	751,188
	Australian States:	cub. ft.	$		
	South Australia	658,994	998,936		
	Northern Territory	9,380	13,171		
				668,374	1,012,107
	Total			1,070,411	1,763,295
4	*Hardwoods Sawn, Undressed— Jarrah: (d)*				
	Bahrain			1,253	2,689
	Greece			299	996
	Kenya			83,736	144,854
	Mauritius			1,730	2,940
	Netherlands			8,840	16,750
	New Zealand			38,246	64,710
	Sierra Leone			1,102	1,891
	South Africa			25,677	44,441
	South Arabia, Federation of			338	703
	Tanzania			19,626	33,833
	United Kingdom			142,686	328,106
				323,533	641,913
	Australian States:	cub. ft.	$		
	New South Wales	701	1,451		
	Victoria	103,408	189,030		
	South Australia	485,248	658,702		
	Northern Territory	7,423	13,718		
				596,780	862,901
	Total			920,313	1,504,814
5	*Karri: (a)*				
	Belgium-Luxembourg			140	279
	Germany, Federal Republic of			263,325	49,348
	Japan			291	155
	Mozambique			1,461	2,571
	Netherlands			17,982	37,357
	New Zealand			83,825	137,368
	South Africa			76,554	139,306
	South-West Africa			1,028	2,511
	United Kingdom			1,801	4,527
	United States of America			7,009	20,039
				216,416	393,461
	Australian States:	cub. ft.	$		
	New South Wales	4,220	5,562		
	Victoria	4,204	6,246		
	South Australia	453,681	587,067		
	Northern Territory	68,434	125,173		
				530,539	724,048
	Total			746,955	1,117,509
6	*Other:*				
	Japan			9,011	4,810
	United States of America			186	918
				9,198	5,728
	Australian States:	cub. ft.	$		
	New South Wales	3,442	13,217		
	Victoria	2,534	4,484		
	Queensland	1,042	2,536		
	South Australia	6,407	5,983		
	Northern Territory	234	760		
				13,659	26,980
	Total			22,857	32,708
7	*Timber, Dressed or Moulded— Flooring: (b)*				
	United Kingdom			358	1,097
	Australian States:	cub. ft.	$		
	New South Wales	66,396	143,453		
	Victoria	42,493	117,025		
	South Australia	50,912	110,831		
	Northern Territory	9,100	42,999		
				168,901	414,308
	Total			169,259	415,405
8	*Other:*				
	Belgium-Luxembourg			805	1,766
	Christmas Is.			1,942	3,803
	Cocos Is.			13	168
	Germany, Federal Republic of			74	1,387
	Greece			2,839	6,575
	Netherlands			1,005	2,762
	New Caledonia			648	2,705
	United Kingdom			21,031	49,642
	United States of America			5,798	19,061
				34,824	87,869
	Australian States:	cub. ft.	$		
	Victoria	1,006	2,989		
	South Australia	689	606		
				1,695	3,595
	Total			36,519	91,464
9	*Plywood and Veneers—(c)*			sq. ft.	$
	New Zealand			14,000	502
	Total, Timber Exports			cub. ft. **2,986,211**	**4,947,595**
10	*Casks, Vats, Barrels, etc., empty—(c)*				
	United Kingdom			....	10,752
11	*Manufactures of Wood (except Furniture) N.E.I.*—				
	Canada			....	8,231
	Christmas Is.			....	956
	Hong Kong			....	101
	Italy			....	670
	Japan			....	6
	Malaysia			....	227
	Netherlands			....	60
	Saudi Arabia			....	18,122
	Singapore			....	15,025
	Thailand			....	5
	United Kingdom			....	213
	United States of America			....	31,988
				....	75,604
	Australian States:		$		
	New South Wales		352,300		
	Victoria		756,521		
	Queensland		8,332		
	South Australia		290,544		
	Tasmania		24,581		
	Northern Territory		28,973		
				....	1,461,251
	Total			....	1,536,855

APPENDIX 2A—*continued*

Exports *from Western Australia of Timber, Furniture, Tanning Substances and Essential Oils for the Year ended* 30th *June,* 1968

	Item and Destination	Quantity	Value
12	*Furniture of any Material—(d)*		$
	Bahrain	....	21,024
	Cocos Is.	....	170
	Christmas Is.	....	2,563
	Denmark	....	31
	Malaysia	....	40,691
	Mauritius	....	6,561
	New Hebrides	....	100
	New Zealand	....	122
	Singapore	....	10,718
	Thailand	....	16,866
	United States of America	....	500
		....	99,231
	Australian States-:		$
	New South Wales		281,272
	Victoria		360,458
	Queensland		284,449
	South Australia		304,922
	Tasmania		14,936
	Northern Territory		123,655
		....	1,370,192
	Total	....	1,469,423
13	*Tanning Substances of Natural Origin—*	n.r.s.	n.r.s.

	Item and Destination	Quantity	Value
14	*Essential Oils, Natural, Non-Spirituous—*	lb.	$
	Ceylon	32	288
	France	41,013	66,246
	Germany, Federal Republic of	21,912	8,197
	Hong Kong	862	7,860
	India	728	640
	Italy	19,011	32,282
	Malaysia	866	1,050
	Netherlands	8,514	1,930
	New Zealand	1,026	836
	Singapore	3,874	8,348
	Switzerland	10,886	2,546
	Thailand	1,880	980
	United Kingdom	17,817	14,842
	United States of America	37,466	24,476
		165,887	170,521
	Australian States: lb. $		
	New South Wales 77,657 53,136		
	Victoria 27,675 38,481		
	Queensland 2,363 756		
	South Australia 13,995 17,912		
		121,690	110,285
		287,577	280,806
	Total Value of Exports on this Return	....	**8,245,251**

(*a*) Excludes timber cut to size for making boxes or staves.
(*b*) Conifer flooring only.
(*c*) Interstate exports included item 11
N.E.I. " Not Elsewhere Included "
N.R.S. " Not Recorded Separately "
(*d*) Only a small porportion of wooden furniture involved.
Basis of Value—F.O.B. port of shipment.
(Information supplied by Commonwealth Bureau of Census and Statistics)

APPENDIX 2B

Imports *into Western Australia of Timber, Furniture, Tanning Substances and Essential Oils for the Year ended 30th June, 1968*

	Item and Origin	Quantity	Value
		cub. ft.	$
1	*Hardwood Logs (including posts, poles, piling and other wood in the rough)—(a)*		
	Dominican Republic	41	391
	Germany, Federal Republic of	1	76
	Ghana	822	3,403
	Indonesia	8,499	7,009
	Ivory Coast	6,115	10,794
	Malaysia	853,390	645,241
	Spain	9	122
	Thailand	1,895	15,995
	United States of America	1	110
	Total	870,773	683,141
2	*Softwoods, Sawn, Undressed (excluding shooks and staves)—*		
	Redwood and Western Cedar (b)		
	United States of America	1,024	1,984
3	*Douglas Fir (b)*		
	New Zealand	43,338	58,765
	United States of America	69,780	117,770
	Total	113,118	176,535
4	*Other:*		
	Malaysia	5,342	7,654
	New Zealand	1,835	2,859
	United States of America	5,306	13,142
		12,483	23,655
	Australian States: (c) cub. ft. $		
	Victoria 42 47	42	47
	Total	12,525	23,702
5	*Hardwoods, Sawn, Undressed (excluding Shooks and Staves)—*		
	Brunei	895	1,128
	Ghana	1,558	2,413
	Ivory Coast	3,248	10,347
	Malaysia	1,120,929	1,545,463
	New Zealand	522	1,232
	Singapore	16,518	22,505
	Thailand	3,770	28,014
	United Kingdom	51	336
	United States of America	....	18
		1,147,491	1,611,456
	Australian States: cub. ft. $		
	Victoria 142 647		
	Queensland 1,427 4,759		
	Tasmania 18,579 31,282	20,148	36,688
	Total	1,167,639	1,648,144
6	*Shooks and Staves, Undressed—(d)*		
	Malaysia	1,932	1,586
7	*Beadings and Mouldings—(e)*		
	Malaysia	....	1,084
	Netherlands	....	835
	New Zealand	....	9,254
	Norway	....	356
	United Kingdom	....	3,041
	Total	....	14,570
8	*Saw Timber, Dressed or Moulded—(f)*		
	Flooring: (g)		
	New Zealand	984	3,386
	Sweden	4,652	7,134
	Total	5,636	10,520
9	*Other:*		
	New Zealand	1,162	2,626
	Singapore	36	161
		1,198	2,787
	Australian States: (h) cub. ft. $		
	Victoria 543 2,534	543	2,534
	Total	1,741	5,321

	Item and Origin	Quantity	Value
		sq. ft.	$
10	*Plywood and Veneers—*		
	China-Formosa	250,000	6,962
	China (mainland)	67,320	2,350
	Gabon	18,430	1,382
	Germany, Federal Republic of	27	4
	Ireland	30,694	4,015
	Ivory Coast	19,571	300
	Japan	915,719	98,030
	Malaysia	724,665	9,904
	Netherlands	120,405	2,228
	Papua and New Guinea	9,219	261
	South Africa	23,765	431
	United Kingdom	820,018	23,007
	United States of America	168	62
		3,000,001	148,436
	Australian States: (i) sq. ft. $		
	New South Wales 885,150 97,492		
	Victoria 564,503 73,982		
	Queensland 3,550,597 440,452		
	South Australia 13,480 7,827		
	Tasmania 10,375 1,792	5,024,105	621,545
	Total	8,024,106	769,981
11	*Reconstituted Wood, also shown as Particle Board, Chip Board, Silver Board, etc.—*		
	New Zealand	32,000	8,021
	Surinam	15,168	624
		47,168	8,645
	Australian States: sq. ft. $		
	New South Wales 1,635,267 173,064		
	Victoria 9,965,296 884,722		
	South Australia 968,223 165,567	12,568,786	1,223,238
	Total	12,616,194	1,231,883
	Total Timber Imports	....	**4,567,367**
12	*Match Splints* (e)		
	Finland	....	52,575
13	*Rulers any material—(a)*		
	Germany, Federal Repulbic of	....	7
	United Kingdom	....	913
	Total	....	920
14	*Table Mats, Wooden* (e)		
15	*Wood Flour (j) (k)*	N.r.s.	N.r.s.
16	*Manufacturers of Wood (except Furniture), N.E.I.—*		
	Austria	....	13
	Canada	....	4,218
	China-Formosa	....	19,751
	China (mainland)	....	678
	Czechoslovakia	....	930
	Denmark	....	2,410
	France	....	165
	Germany, Federal Republic of	....	1,137
	Hong Kong	....	4,444
	India	....	1,119
	Italy	....	1,505
	Japan	....	42,956
	Kenya	....	2,013
	Korea—Republic of	....	261
	Malaysia	....	884
	Netherlands	....	211
	New Zealand	....	43,352
	Norway	....	671
	Pakistan	....	114
	Philippines	....	5,963
	Portugal	....	114
	Singapore	....	277
	Spain	....	861
	Sweden	....	47,205
	Switzerland	....	308
	Thailand	....	406
	United Kingdom	....	5,745
	United States of America	....	2,914
		....	190,625
	Australian States: $		
	New South Wales 105,983		
	Victoria 183,071		
	Queensland 15,913		
	South Australia 63,307		
	Tasmania 2,992		
	Northern Territory 307	....	371,573
	Total	....	562,198

APPENDIX 2B—*continued*

Imports *into Western Australia of Timber, Furniture, Tanning Substances and Essential Oils for the Year ended 30th June, 1968*

	Item and Origin	Quantity	Value
17	*Furniture of any material—(m)*		$
	Austria		84
	China-Formosa		62
	China (mainland)		691
	Czechoslovakia		624
	Denmark		5,477
	Finland		606
	France		1,997
	Germany, Federal Republic of		8,350
	Hong Kong		40,057
	India		1,755
	Ireland		43
	Italy		12,790
	Japan		45,899
	Korea, Republic of		26
	Malaysia		369
	Netherlands		2,468
	New Zealand		21,146
	Norway		11,715
	Pakistan		19
	Philippines		2,305
	Singapore		2,396
	Spain		4,129
	Sweden		1,252
	Switzerland		323
	Thailand		803
	United Kingdom		43,698
	United States of America		22,319
	Yugoslavia		705
			232,108
	Australian States:	$	
	New South Wales	896,570	
	Victoria	889,632	
	Queensland	9,144	
	South Australia	791,882	
	Tasmania	32,701	
			2,619,929
	Total		2,852,037
18	*Clothes pegs, Wooden*—	*N.r.s.*	*N.r.s.*
19	*Tool Handles, Wooden*—		
	Canada		597
	France		12
	Germany, Federal Republic of		8
	Sweden		3
	Switzerland		5
	United Kingdom		126
	United States of America		3,483
			4,234
	Australian States: (*l*)	$	
	New South Wales	59,063	
	Victoria	18,474	
	Queensland	15,944	
	Tasmania	2,720	
			96,201
	Total		100,435
	Total Manufacturers		**3,568,165**

	Item and Origin	Quantity	Value
20	*Tanning Substances, Natural—*		
	Wattle Bark Extracts:	cwt.	$
	South Africa	5,224	36,353
21	*Other Extracts (a)*		
	Norway	197	428
22	*Tanning Substances, Natural and Synthetic Origin—*		
	Germany, Federal Republic of	663	6,312
	United Kingdom	382	13,815
	United States of America	22	316
		1,067	20,443
	Australian States: cwt. $		
	New South Wales 392 4,033		
	Victoria 771 10,755		
	Queensland 5 253		
	South Australia 234 3,392		
		1,402	18,433
	Total	2,469	38,876
	Total Tanning Substances		**75,657**
23	*Essential Oils, Natural, Non-Spirituous—*		
	Brazil	793	810
	China (mainland)	25,105	10,261
	Dominican Republic	210	1,519
	France	1,564	2,086
	Indonesia	1,102	3,078
	Israel	11	464
	Italy	564	2,468
	Japan	1	1
	Malagasy	970	1,123
	Netherlands	124	158
	Seychelles	472	716
	Swaziland	176,224	89,288
	United Kingdom	25	143
	United States of America	2,400	13,810
	Windawrd Is.	210	1,518
	Australian States: lb. $	209,775	127,443
	New South Wales 1,025 962		
	Victoria 5,403 14,983		
	South Australia 112 308		
		6,540	16,253
	Total	216,315	143,696
	Total Value of all Imports on this Return		**8,354,885**

(*a*) Interstate Imports "not recorded separately".
(*b*) Interstate Imports included in item 4.
(*c*) Interstate Imports include "Shooks and Staves" and dressed timber.
(*d*) Interstate Imports included in items 4 and 5.
(*e*) Interstate imports included in item 16
(*f*) Interstate imports included in item 9.
(*g*) Conifer "flooring" only
(*j*) Overseas inports nil
(*k*) Interstate imports included in item 11 *N.r.s.* means "not recorded separately"
Basis of Value—
Overseas—F.O.B. Port of Shipment
Interstate—Landed Cost in Western Australia.
(*h*) Non-conifer only.
(*i*) Includes "blockboard, lamin board, batten board, and similar laminated wood products".
(*l*) Includes "brush and broom handles and the like".
(*m*) Only a small proportion of wooden furniture involved.
(Information supplied by Commonwealth Burea of Census and Statistics).

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	1091	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	502,152	....	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	10,017
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	67,350	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	32,965						
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	6,986	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	80,882
			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
			1967 (e)	4,898,421	(g) $7,467,696	$1,335,872	$262,808	$269,044
			1968 (c)	2,986,211	(g) $4,947,595	$3,016,850	N.r.s.	$280,806
			Total	464,895,337	$192,734,507	$11,553,785	$10,925,283	$6,724,487

(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
	£	£	£
1848	464	....	....
1849	....	....	....
1850	189	....	....
1851	3,216	....	....
1852	2,479	....	....
1853	790	....	....
1854	831	....	....
1855	1,464	....	....
1856	1,124	....	....
1857	744	....	....
1858	1,528	....	....
1859	690	....	....
1860	2,005	....	....
1861	1,459	....	....
1862	1,920	....	....
1863	1,568	....	....
1864	894	....	....
1865	548	....	....
1866	1,442	....	....
1867	1,727	....	....
1868	1,451	....	....
1869	1,408	....	....
1870	1,518	....	....
1871	736	....	....
1872	1,660	....	....
1873	1,008	....	....
1874	1,774	....	....
1875	2,707	....	....
1876	3,098	....	....
1877	2,036	....	....
1878	2,947	....	....
1879	2,340	....	....
1880	3,061	....	....
1881	3,639	....	....
1882	3,692	....	....
1883	6,667	....	....
1884	2,930	....	....
1885	11,479	....	....
1886	17,888	....	....
1887	8,136	....	....
1888	4,461	....	....
1889	7,686	....	....
1890	14,979	....	....
1891	18,406	....	....
1892	26,713	....	....
1893	14,493	....	....
1894	17,964	....	....
1895	47,128	....	....
1896	5,381	....	....
1897	164,552	....	....
1898	55,566	....	....
1899	45,689	....	....
1900	56,266	1,416	1,105
1901	80,134	1,740	1,546
1902	97,810	3,418	1,751
1903	102,383	3,556	1,348
1904	157,856	1,322	2,122
1905	98,494	582	1,592
1906	95,229	1,412	1,915
1907	122,016	2,767	1,549
1908	93,205	2,392	4,584
1909	90,502	4,129	4,033
1910	171,280	3,531	3,686
1911	152,133	2,912	4,938
1912	167,244	3,089	4,598
1913	202,640	2,651	5,392
1914	78,736	629	2,823
1914–15	107,763	2,082	4,988
1915–16	76,849	3,313	4,788
1916–17	75,681	2,848	3,848
1917–18	58,305	2,020	4,358
1918–19	62,824	1,181	4,168
1919–20	100,083	3,748	10,043
1920–21	171,654	*4,899	6,106
1921–22	92,448	5,865	6,577
1922–23	109,428	6,991	4,033
1923–24	133,983	2,790	3,301
1924–25	161,893	2,670	4,429
1925–26	144,989	5,826	4,449
1926–27	162,193	8,971	4,254
1927–28	183,196	9,648	6,955
1928–29	241,601	6,894	4,413
1929–30	197,532	10,825	3,980
1930–31	76,533	4,145	3,160
1931–32	164,496	4,705	3,505
1932–33	197,916	4,903	3,421
1933–34	183,944	4,310	3,888
1934–35	211,056	4,076	5,040
1935–36	228,451	5,401	3,921
1936–37	257,164	5,267	4,810
1937–38	270,126	4,777	6,560
1938–39	254,315	3,974	7,014
1939–40	259,399	6,802	23,027
1940–41	249,111	3,798	32,399
1941–42	283,611	15,846	33,828
1942–43	163,480	6,250	47,718
1943–44	149,928	7,883	68,871
1944–45	148,838	9,264	75,449
1945–46	†219,466	19,573	56,295
1946–47	386,465	12,395	78,091
1947–48	345,508	8,019	96,769
1948–49	470,755	8,662	42,926
1949–50	521,815	24,923	51,197
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
1966–67	6,458,909	68,928	191,796
1967–68	8,135,532	75,657	143,696
Total	$72,108,695	$1,410,054	$4,743,922

* 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
				1967 (c)	40,941,527	9,967,907	50,909,434
				1968 (c)	43,485,765	8,060,784	51,546,549
				Total	....	....	2,830,703,068

* 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.