1969

ANNUAL REPORT

FORESTS DEPARTMENT WESTERN AUSTRALIA

" *Eucalyptus laeliae* Podger and Chippendale.

This species is the most recently named Eucalypt in Western Australia and is closely related to Powder-bark Wandoo (*Euc. accedens*) W. V. Fitzg. It has a limited occurrence in small pure stands on laterite-free soils in the drainage lines of the Darling Range.

The tree reaches a height of 65 feet and is characterised by a startling white bark which persists to the smallest branches. Its name refers to " Laelia ", one of the vestal virgins, and is obviously related to the virgin whiteness of the bark.

The specimens are growing on the south side of the Pinjarra-Dwellingup road about 9 miles from Pinjarra."

REPORT

on the operations of the

FORESTS DEPARTMENT

WESTERN AUSTRALIA

for the year ended

30th JUNE, 1969

by

W. R. WALLACE, Dip. For. (Canb.)

Conservator of Forests

☆

PRESENTED TO BOTH HOUSES OF PARLIAMENT

57868—(1)

Forests Department,
PERTH,
30th September, 1969

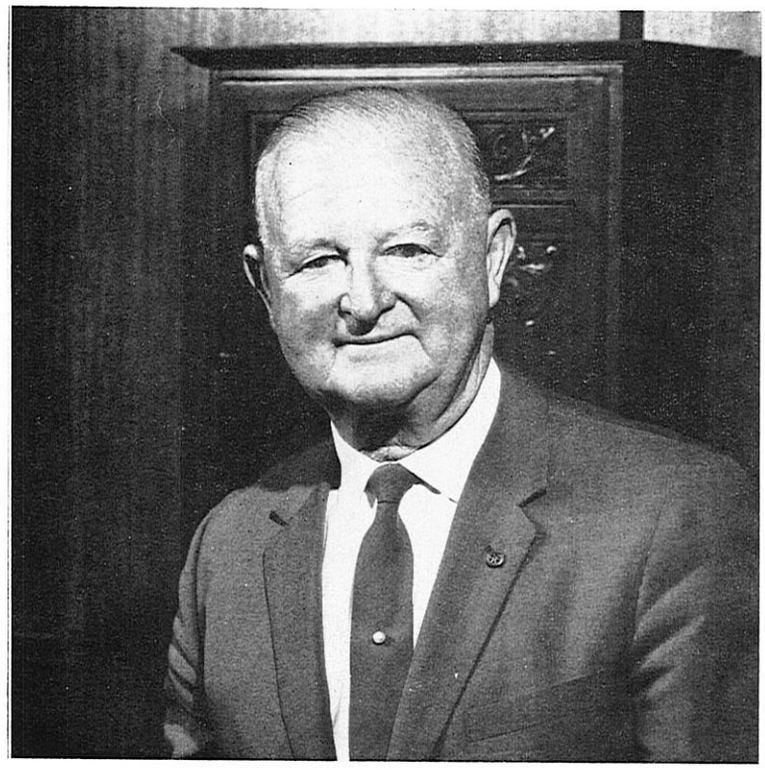
TO THE HONOURABLE THE MINISTER FOR FORESTS

Sir,

I have the honour to transmit herewith my report on the operations of the Department for the year ended 30th June, 1969.

Yours faithfully,
W. R. WALLACE,
Conservator of Forests.

57868—(2)



On 30th June, 1969, after 43½ years of public service, Mr. A. C. Harris retired from the office of Conservator of Forests which he had occupied with distinction for more than 15 years.

As one of the last of the graduates of the School of Forestry at Adelaide University (which provided many of Australia's top forest administrators), Mr. Harris commenced duty in Western Australia on 26th January, 1926, was appointed Assistant Divisional Forest Officer on 1st April, 1927, and promoted to Divisional Forest Officer on 1st July, 1928.

On 8th June, 1946, he resigned from the Forests Department to join the Wood Distillation and Charcoal Iron Industry. His ability and capacity were recognised by his appointment some two years later as General Manager of the Industry at Wundowie.

On 19th October, 1953, he was appointed Conservator of Forests and under his energetic guidance very substantial progress was made in forestry activities. The area of State Forest was increased by almost one million acres and the area of pine plantation was more than trebled from 17,690 acres to some 60,000 acres. However, it is from three major innovations in Australian forestry that his achievements will long be recognised.

Firstly, his introduction in fire protection of a policy of systematic controlled burning under prescribed conditions of all but very young regeneration areas.

Secondly, to achieve the vast amount of annual burning thus required with limited funds and personnel available, the development of a system of aerial ignition to cover large areas in minimal time under favourable weather conditions. Close collaboration between officers of W.A. forest fire research and C.S.I.R.O. over several years led to successful achievement of a " world first " in this field.

Thirdly, an outstanding achievement in tree breeding attracted world attention. An officer was posted in Portugal for two years selecting material from élite trees of *P. pinaster* from the centuries old royal forests of Leiria and despatching it by air transport to W.A. where it was grafted onto locally raised stock for subsequent planting in seed orchards. This is expected to pay real dividends in enhanced quality and yields in stands of the future.

His outstanding service to the profession was recognised in 1967 by the award of the N. W. Jolly Medal by the Institute of Foresters of Australia.

Mr. Harris retires with the full satisfaction of a job well done and with the good wishes of the staff for a long and happy retirement.

CONTENTS

PRINCIPAL OFFICERS

Conservator of Forests	W. R. WALLACE, Dip. For. (Canb.).
Deputy Conservator of Forests	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.).
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.).
Fire Control Superintendent	F. J. CAMPBELL, B.Sc. (For.) Dip. For. (Canb.)
Superintendent	E. R. HOPKINS, B.Sc. (W.A.) Dip. For. (Canb.) Ph.D. (Melb.).
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. lehmannii*
Brown Mallet	*Euc. astringens*
Coral-flowered Gum	*Euc. torquata*
Dundas Mahogany	*Euc. brockwayi*
Dwarf Sugar Gum	*Euc. cladocalyx var. nana*
Gimlet	*Euc. salubris*
Jarrah	*Euc. marginata*
Karri	*Euc. diversicolor*
Lemon-flowered Gum	*Euc. woodwardii*
Long-leaved Box	*Euc. goniocalyx*
Marri	*Euc. calophylla*
Red Mahogany	*Euc. resinifera*
River Gum	*Euc. camaldulensis*
Salmon Gum	*Euc. salmonophloia*
Southern Blue Gum	*Euc. bicostata*
Southern Blue Gum (Tasmanian Blue Gum)	*Euc. globulus*
Sydney Blue Gum	*Euc. saligna*
Swamp Mallet	*Euc. spathulata*
Tallowwood	*Euc. microcorys*
Tingle (Red)	*Euc. jacksonii*
Tingle (Yellow)	*Euc. guilfoylei*
Tuart	*Euc. gomphocephala*
Wandoo	*Euc. wandoo*
W.A. Blackbutt (Yarri)	*Euc. patens*
(New Species)	*Euc. laeliae*
Conifers	
Maritime Pine (Pinaster Pine)	*Pinus pinaster*
Monterey Pine (Radiata Pine)	*Pinus radiata*
Slash Pine	*Pinus elliottii*
Other	
Sandalwood	*Santalum spicatum*
Sheoak	*Casuarina fraseriana*

1. STATISTICAL SUMMARY OF MAJOR OPERATIONS

Timber Production in Cubic Feet

Total Production Sawn Timber	15,300,480	
Exports—Interstate	2,030,709	(13.3 per cent)
Overseas	1,022,088	(6.7 per cent)
Local Consumption	12,247,683	(80.0 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*
1968–69	15,300,480	....	15,300,480	3,052,797	12,247,683	191	3,233*

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

Total Cut

		1968/69	1967/68
Log Volumes (in cubic feet)	Jarrah	32,999,182	38,784,533
	Karri	7,896,260	7,441,638
	Wandoo	1,161,619	1,902,528
	Pine	2,874,346	2,412,604
	Other	1,130,587	1,005,246
Total		46,061,994	51,546,549

Made up as follows—

From State Forest and Crown Land	40,385,056 cubic feet	(87·7 per cent)
From Private Property	5,676,938 cubic feet	(12·3 per cent)

Value Produced

	1968/69	1967/68
Total Value of Timber (on mill skids)	$23,906,000	$26,651,400
Total Value of Other Forest Products	$6,195,250	$6,666,350

Forest Area

Additions to State Forest	5,601	acres
Excisions from State Forest	626	acres
Land Purchased for Pine Planting	1,448	acres
Total Area of State Forest	4,456,326	acres

Reforestation

Cut-over area treated for regeneration	126,381	acres

Afforestation

Area planted with pines, 1968			5,808 acres
Pinus radiata	1,968 acres		
Pinus pinaster	3,839 acres		
Other species	1 acre		
Total area of pine plantation established			58,536 acres
Pinus radiata	23,638 acres		
Pinus pinaster	34,399 acres		
Other species	499 acres		
Total experiment areas (additional)			980 acres

Management

Survey—		
Theodolite surveys (control points)		68 (No.)
Other surveys		14 miles
Topographical mapping		1,944,114 acres
Assessment—		
Area covered		535,000 acres
Engineering, new works—		
Roads and tracks		289 miles
Telephone lines		6 miles
Houses and buildings		11 (No.)

Protection

Controlled burning		1,013,448 acres
Fire Outbreaks—		
Number		252
Area burnt		32,432 acres

Nurseries (Hamel and Dryandra)

Trees produced for—		
Private buyers		211,037 (No.)
Forests Department		195,236 (No.)

Sandalwood

Quantity exported		614 tons

SOURCE AND USE OF FUNDS

	1968/69	1967/68
Source—		
Revenue—		
Royalty on Timber etc.	3,077,704	3,167,665
Departmental Sales of Logs etc.	1,576,702	1,664,818
	4,654,406	4,832,483
General Loan Fund	400,000	400,000
Federal Aid Road Grant	210,000	190,000
Commonwealth Government Softwood Forestry Agreement	600,000	....
	5,864,406	5,422,483
Use—		
Consolidated Revenue Fund	1,599,907	1,576,776
Reforestation Fund	3,054,678	3,376,024
Commonwealth Government Softwood Forestry Agreement	600,000	....
General Loan Fund	400,000	400,000
	5,654,585	5,352,800

2. REVENUE AND EXPENDITURE

Revenue from all sources was $4,654,406 compared with $4,832,483 the previous year.

In the following, figures in brackets refer to 1967/68. Of the net revenue $2,761,178 ($2,935,327) was transferred to Forests Improvement and Reforestation Fund. Expenditure charged against this fund was $3,054,678 ($3,376,024) and the balance in the fund at the 30th June, 1969 was $456,929 ($470,707) which includes a reserve for Fire Control, $201,000, the balance being working account of $255,929. The return from thinning operations in Departmental pine plantations was $255,305 ($259,980).

3. THE FOREST AREA

State Forests. (Forests Act, 1918-1954)

The total area of State Forest at 30th June, 1969, was 4,456,326 acres which is an increase of 4,975 acres compared with the total area at 30th June, 1968.

During the year, additions totalling 5,601 acres were made to State Forest and 626 acres were excised and reverted to the Lands Department.

	June, 1969 Acres	June, 1968 Acres
Jarrah	3,196,242	3,194,304
Karri	171,441	171,441
Jarrah and Karri (mixed)	656,039	655,980
Jarrah and Wandoo (mixed)	163,785	163,785
Tuart	6,471	6,471
Tingle Tingle	10,697	10,697
Karri and Tingle (mixed)	13,885	13,885
Sandalwood	1,930	1,930
Pine Planting Area	180,756	177,778
Mallet	54,928	54,928
Miscellaneous	152	152
	4,456,326	4,451,351

Timber Reserves (Forests Act, 1918-1954)

The area held under Timber Reserve at 30th June, 1969 was 1,865,876 acres, which is an increase of 1,239 acres on the area at 30th June, 1968.

	June, 1969 Acres	June, 1968 Acres
Jarrah	98,320	97,297
Wandoo and Jarrah	71,682	71,682
Jarrah and Karri	465	78
Pine Planting	5,732	5,903
Mallet	475	475
Sandalwood	23,100	23,100
Mining Timber, Firewood etc.	1,666,102	1,666,102
	1,865,876	1,864,637

Land Alienations, etc.

During the year ended 30th June, 1969, 134 applications for land, and for road provisions and closures, were received covering a total of 89,298 acres.

The Department agreed to the release as follows—

Alienations			Mineral Claims and Leases (Pastoral-Grazing)		
Timber Zone		Outside Timber Zone	Timber Zone		Outside Timber Zone
State Forest	Crown Land		State Forest	Crown Land	
Acres	acres	acres	acres	acres	acres
137	6,878	5,380	98	57	....

No. of alienations approved 33
No. of leases approved 15

The total of freehold land held at 30th June, 1969 in the name of The Conservator of Forests was 47,854 acres. This item was not previously included in Annual Reports.

4. SAWMILLING, TIMBER INSPECTION AND FOREST PRODUCE

Timber Production

The production of 15,300,480 cubic feet of sawn timber was a decrease of 1,872,855 cubic feet on last year's figure, and the lowest for 17 years. Of the total production 1,885,708 cubic feet were from timber from private property which is a decrease of 799,838 cubic feet on last year's figure.

During the year ended December 31, 1968, there were 191 sawmills registered, of which 115 operated on Crown land and 76 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 (1829–1969) is shown in Appendix 5.

Departmental pine plantations yielded 2,810,504 cubic feet of logs compared with 2,393,013 cubic feet last year.

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

	Cubic Feet
Karri	143,665
Jarrah and Other Hardwoods	10,410
Pine	109,881
	263,956

Timber Inspections

The total quantity of sawn timber inspected during the year was 3,350,528 cubic feet, made up as follows—

Railway Sleepers		2,335,747 cub. ft.
Ex Crown Land	1,677,559 cub. ft.	
Ex Private Property	652,963 cub. ft.	
Re-inspected	5,225 cub. ft.	
Other Sawn Timber		1,014,781 cub. ft.

All railway sleepers produced were inspected.

TIMBER PRODUCTION

PRODUCTION OF TIMBER FOR YEAR ENDED 30th JUNE, 1969
(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	28,699,162	7,351,160	494,953	139,304	6,180	803,717	2,810,504	80,076	40,385,056	13,414,772
Private Property	4,300,020	545,100	666,666	71,903	....	20,288	63,842	9,119	5,676,938	1,885,708
Total	32,999,182	7,896,260	1,161,619	211,207	6,180	824,005	2,874,346	89,195	46,061,994	15,300,480

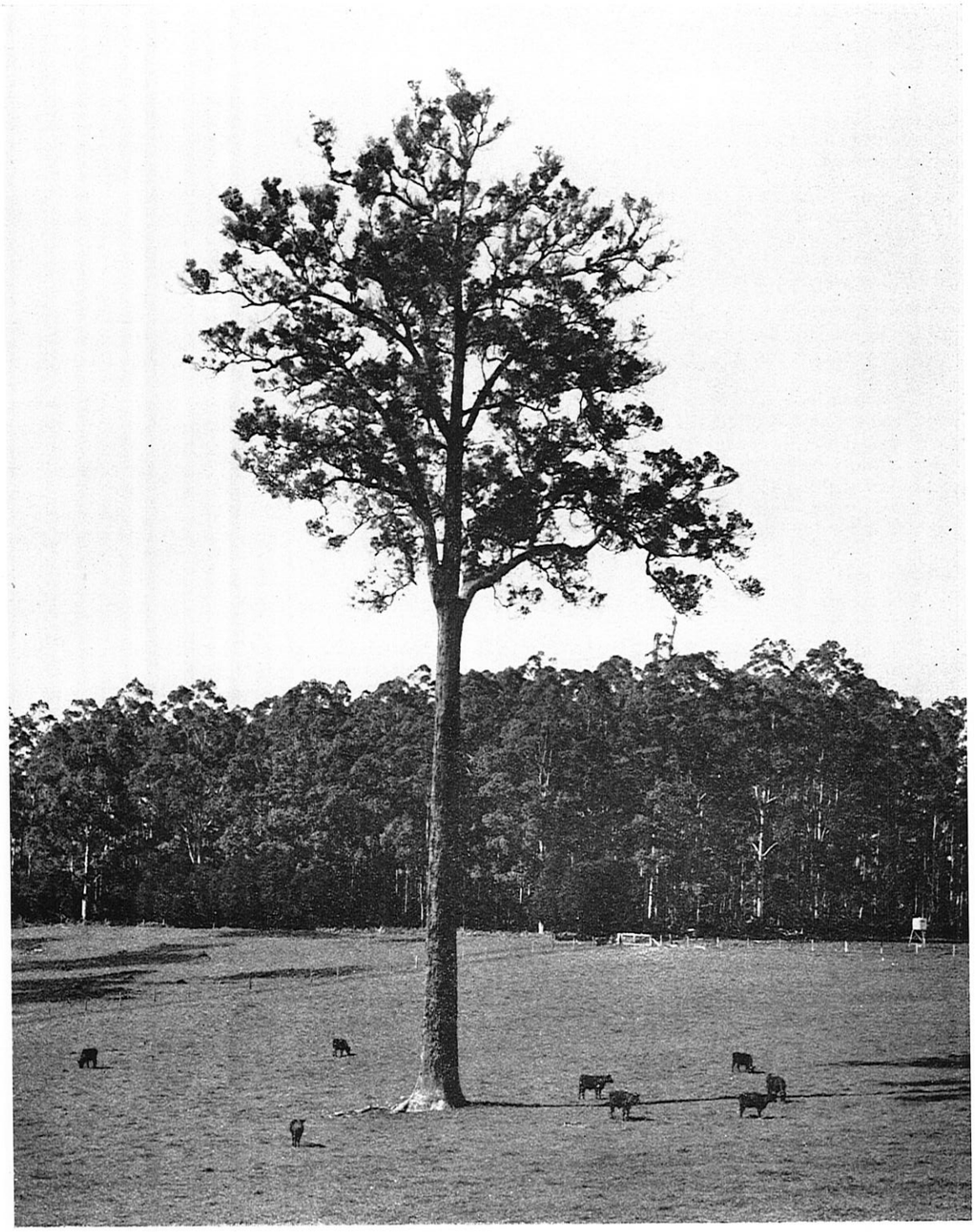
In addition to the above 43,670 tons of Wandoo logs were treated for Tannin Extract.

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	Sawn Sleepers		
	cub. ft.	cub. ft.	cub. ft.	cub. ft.	cub. ft.	$
1967–68	11,862,186	2,625,603	1,437,293	1,248,253	17,173,335	26,651,400
1968–69	11,737,213	1,677,559	1,232,745	652,963	15,300,480	23,906,000

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	588,523	588,779	853,407	2,030,709
Overseas	238,308	185,448	598,332	1,022,088
Local	1,503,691	1,848,894	8,895,098	12,247,683
Total	2,330,522	2,623,121	10,346,837	15,300,480



" Marri (*Euc. calophylla*) is recorded as being a large tree and the above photograph shows the tallest, and one of the largest marri in the State. Growing barely two miles west from Pemberton and a few hundred yards north of the Pimelea Road its measurements (1969) were—

Girth at 4 ft. 3 in. above ground level	20 ft. 10 in. (overbark)
Height to first limb	71 ft.
Total height	201 ft.

The karri regrowth in the background is probably about 45 years old.

Distribution of Timber

The main feature of the demand for timber in 1968-1969 was the sharp reduction of 1,940,000 cubic feet in timber for local use when compared with the 1967-1968 figure. The decrease was largely due to the early completion of railway sleeper orders for iron ore projects which resulted in a fall in demand of 1,300,000 cubic feet. However, although there was a slight increase in the use of karri, the local demand for sawn timber other than sleepers fell by 640,000 cubic feet, despite a record home building programme in the State.

Exports. Both interstate and overseas export markets shown a slight gain when compared with the previous year. In the overseas trade the demand for railway sleepers declined further, but this was offset by increased supplies of jarrah to Kenya and the United Kingdom. In the interstate market, little significant change was noticeable.

Imports. The total value of timber imports fell by some $520,000, the single biggest factor being the sharp drop in imports of reconstituted wood (particle board, etc.) from the Eastern States. The value of sawn hardwoods from Malaysia also fell by $122,000, but there were increases in the value of imports of Douglas Fir of $167,000 (N.Z. $107,000 and U.S.A. $60,000) and plywood and veneer of $306,000, mostly from Malaysia, Ireland, Formosa and Queensland.

Hardwood Chips. On September 26, 1968 the Commonwealth Government announced its intention to control the export of wood chips, logs or billets for paper pulp production. Bunnings Timber Holdings were granted the right to establish an $11,000,000 wood chip in the South West on October 2, 1968

The site selected for the wood chip plant is at Diamond, approximately six miles south of Manjimup. The Department has undertaken a considerable amount of work in the preparation of draft proposals for cutting plans in consultation with Company representatives. These aim at achieving maximum silvicultural benefits from the chipwood operation and, at the same time, take into consideration the economics of the marri logging and the established sawmilling industry.

On June 28, 1969, the Acting Premier signed an agreement with the—W.A. Chip and Pulp Co. Ltd. and Bunnings Timber Holdings Ltd. to establish the industry with Bunbury as the export harbour.

Sandalwood

The steady demand for sandalwood continues and 614 tons were exported compared with 620 tons for the previous year.

It is of interest that this year's shipments included 35 tons of shavings and 71 tons of roots and butts from which excessive dirt and shelly and brittle pieces had been removed by tumbling.

Sandalwood received at Fremantle during the year totalled 628 tons compared with 775 tons for the year ended 30th June, 1968, and this quantity was made up as follows—

	Tons
Crown Land	
Logwood (including roots and butts)	530
Pieces	98
Private Property	Nil
	628

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

A total of 8,335 lb of sandalwood oil from existing stocks was exported interstate and overseas.

The price to pullers for sandalwood logs was increased from $66 to $76 per ton as from 1st November, 1968, exclusive of any approved subsidies.

Mr. A. C. Harris retired from the office of Conservator of Forests on the 30th June, 1969, and, as a result, vacated the position of Chairman of the Sandalwood Export Committee and Western Australian Government representative thereon.

Firewood Production

The following table shows the quantity of firewood produced according to returns received. A large quantity is also obtained from private property for which returns are not received.

	Crown Land (tons)	Private Property (tons)	Total (tons)
Sawmills—			
For Sale	99,757	5,145	104,902
Own Use	35,098	314	35,412
Permits and Licences—			
South-west	68,237	....	68,237
Permits and Licences—			
Goldfields	25,371	....	25,371
Other Permits and Licences—			
Wundowie	73,129	....	73,129
Kalgoorlie—Mines	2,098	....	2,098
Kalgoorlie—Pumps	17,315	....	17,315
	321,005	5,459	326,464

Other Forest Produce

Piles and poles obtained from Crown land during the year amounted to 2,252,874 lineal feet, compared with 1,015,173 lineal feet for the previous year. Of this total, 12,622 lineal feet were produced from departmental operations. Returns received from private property show 261,395 lineal feet produced, as compared with 257,577 lineal feet for the year 1967-1968.

The successful preservative treatment of karri transmission poles by the " boultonising " process has greatly increased the availability of such poles to the State Electricity Commission.

There were approximately 327,285 posts and strainers cut from Crown lands, of which 11,445 were produced by the Department. Records received show 23,853 posts and strainers obtained from private property, but this is only a small percentage of the total production from this source.

No Mallet bark was produced during the year.

Apart from the sawn timber supplied by sawmills, 12,687 tons of mining timber were used. This was nearly all from Crown lands, 7,837 tons being from inland forests.

The number of Christmas trees sold was 10,228, compared with 9,623 the previous year. The revenue from sales was $5,050.

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	....	4,614	236	7,837	12,687
Charcoal	Tons	....	40,020	....	....	40,020
Piles, Poles and Bridge Timbers	Lin. ft.	12,622	2,239,030	261,395	1,222	2,514,269
Fence Posts and Rails	No.	10,991	139,820	23,853	165,925	340,589
Strainer Posts	No.	454	10,095	....	....	10,549
Wandoo Timber for Tannin Extract	Tons	....	26,666	17,004	....	43,670
Beansticks, etc.	No.	....	5,600	....	3,780	9,380
Boronia Blossom	Lb.	....	6,372	199	....	6,571
Gravel and Stone	Cu. yds.	....	141,014	....	....	141,014
Sand	Cu. yds.	....	8,418	....	....	8,418
Scout Staves	No.	300	....	....	....	300
Sawdust consumed as Fuel	Tons	....	133,000	....	....	133,000

5. FOREST MANAGEMENT

Working Plans

Hardwoods. Data collection for the hardwood inventory has been pursued with vigour. Over 1,200 plots on 2,300 acres were measured in Manjimup, Shannon and Collie Divisions, enabling volume statements to be prepared covering 535,000 acres. Fifty-six plots were measured to relate actual volumes present to assessor's estimates in both karri and jarrah types. The administrative territorial unit introduced in 1966 as a framework for hardwood management data continues to function well.

A long range cutting plan for marri chipwood in the Manjimup region was prepared, which considers both logging and silvicultural requirements.

Softwoods. Over 3,000 angle count plots were measured in the pine inventory programme for plantations throughout the forest region. Over 5,500 acres of plantation were stratified from air photos to provide the basis for an economical sampling scheme. A check on the volume obtained by the angle count sampling procedure was made by comparing it with the volume obtained from a measurement of every tree on one 27-acre compartment. The difference was less than 3 per cent and indicates that the angle count sampling method is satisfactory for our pine inventory work.

A simple growth model was produced for *P. pinaster* and *P. radiata* which enabled the volume of pine chipwood, which will become available each year for the next twenty years, to be predicted.

Air Photos. Air photos taken in January, 1969, covering 900,000 acres of the northern jarrah forest, were searched for evidence of Phytophthora root rot. This is a reinterpretation of areas taken in 1965, and when mapped will provide a figure for the area infected by Phytophthora at January, 1969, as well as a measure of the rate of spread in that four year period.

Projects. An initial investigation into the stem analysis of both eucalypts and pines, showed that this method of collecting growth and yield data is promising but costly in pines and karri regrowth, and has technical difficulties in jarrah, marri and wandoo.

Two pine utilization projects were commenced, viz:—the processing of data for weight scaling chipwood logs, and the preparation of a simplified method of recording volumes of peeler logs.

Research. Management research has been under the direction of the working plans section for the past twelve months and has been concerned with pine and eucalypt volume tables, data processing and stand simulation.

To deal with this research, computer programmes have been developed which give considerable savings in time when compared with the system previously in use.

The system has been applied to pine volume equation work, marri and pine log volume tables. Sectional volume tables have been developed for the following localities and species—

1. Myalup-McLarty, *P. pinaster* (Leiria)
2. Myalup-McLarty, *P. pinaster* (Landes)
3. Nannup, *P. radiata*
4. Pinjar, *P. pinaster* (Leiria)

Sample tree data for other areas are being processed.

The pine volume table work required the development of a computer programme capable of reckoning sample tree volume to any specified top diameter from sectional measurements along the tree bole. Information from about 2,000 sample trees was collected and processed by this programme.

A programme was also developed to give total volume under-bark of hardwood species from standard sectional measurements along the tree bole. This programme was applied to some 200 marri sample trees from the southern region. The results were then tabulated by a second computer programme and will shortly be printed as the first marri volume table produced by the Forests Department.

The response of pine stands to combinations of management decisions was the object of a further computer programme. From a full list of possible alternative systems, the programme produces and ordered list of a specified number of the best management systems. These may be optimised by either total volume yield, or net financial return, and will assist decision-making over a wide range of management problems.

Mapping and Surveys

The programme of modern medium scale mapping was further advanced by the publishing of map sheets " Collie 80 " and " Muja 80 ", printed in six colours. An innovation was the definition of private property by a green overlay which is of assistance to field officers and is a valuable addition to co-ordination and tower plans. The preparation for the printing of maps " Dwellingup 80 " and " Harvey 80 " is in the final stages and drawing is proceeding of " Busselton 80 " and " Kirup 80 ".

The total area of 1,759,000 acres was mapped for the 20 chains to an inch topographical series. The number of maps completed was 52.

The remapping of plantation groups Wellington, Brunswick and Tallanalla was completed and contoured with a vertical interval of 20 feet while Strachan Group and Dombakup Section A were mapped without contours. Work is proceeding for the remapping of Myalup-McLarty Group and plantations in Wanneroo and Mundaring Divisions.

Major survey projects were completed to obtain horizontal and vertical control for the mapping of map sheet " Kirup 80 " and Wanneroo plantations. Horizontal control was obtained for 68 photo-identified points while 148 stations were barometrically heighted; 14 miles of compass traverses were surveyed to define lease boundaries and reference trees.

General drafting items totalled 18,864, which included 178 new hardwood and pine progress plans. Maps and material were prepared for the completion of 136 special projects.

Forest Engineering

Engineering projects during the year included the construction of 289 miles of roads, tracks and firelines, and regrading of 4,292 miles of existing roads. Telephone line erection amounted to 6½ miles.

Plant and Equipment

A total of 65 employees were occupied during the year in the maintenance of plant and equipment and in fabrication work.

Three apprentices were engaged, two completed their training and one resigned, giving a total of twenty employed. The three apprentices engaged qualified for training terms of four years.

Over twenty-five major items of fabrication were completed including, one front-mounted wheel tractor blade, seven gang truck canopies, three wheel tractor canopies, five portable flame thrower units, two pine planting machines (for the Commonwealth of Australia, Forestry Branch, Darwin) and other small items for field and research use.

Three fire fighting truck units of new design which combine gang and fire operations have been built. The design embodies a 600 gallon capacity flat steel tank with the latest type high pressure pumper built permanently into the chassis of a Bedford 5 ton class four wheel drive truck.

Crew seating accommodation, protection canopy, and stowed working equipment combine to provide for a most flexible unit for all field activities.

Departmental Buildings

The total number of houses owned by the Department at June 30, 1969 was 499. During the year eleven new houses—ten of which were transportables—were erected. Two houses, one at Mount Barker and one at Kojonup, were sold.

New buildings completed included the Dwellingup Research Station, a lecture hall—also at Dwellingup, and a workshop at Harvey.

Five houses and an office, previously situated at Gleneagle, were transferred to other centres (mainly Jarrahdale) and the old Tallanalla recreation hall was transferred to Harvey.

Two huts at Gnangara were demolished, and an engine room at Kirup was sold.

" The new ' heavy duty outfit ' or tanker unit is designed as a dual purpose fire fighting unit and personnel carrier. The unit incorporates a 600 gallon capacity ' flat ' tank, the latest type high pressure pumper, crew seating (under shelter) behind the cab and 4 wheel drive."

Communications

Radio

Six mobiles were added to the radio network during the year and a new fixed station was installed in the Gnangara Office. Re-installations or changes were made at Mount Frankland, Jarrahdale, Narrogin and Wabling Hill.

Licensed equipment in use by the Department is as follows—

V.H.F.—Mobiles	153
V.H.F.—Fixed Stations	18
V.H.F.—Towers	2
V.H.F.—Repeater Stations	18
H.F. A.M. Fixed Stations	13
Hand-held Portables	14
H.F. Single-Side-Band Mobiles	3
H.F. Single-Side-Band Fixed	1
M.F. Radio Beacons	8

On instructions from the Postmaster General's Department, the V.H.F. network is being standardised to 30 Kc/s channelling and 5 Kc/s voice frequency deviation. This change will bring the network up to date with the latest requirements of the P.M.G. Radio Branch.

During the past fire season a small prototype radio telephone network was installed linking Como, Kelmscott and Jarrahdale to the fire lookout towers at Mount Dale and Mount Solus. Detailed reports from operators have yet to be studied, but at this stage the system shows promise.

Radio equipment for aircraft burning will be increased to permit the operation of two aircraft, instead of one, during the forthcoming fire season.

Narrogin Division is being equipped with V.H.F. mobiles and a fixed H.F. and V.H.F. station is being installed at the office. This will complete the Department's change-over from H.F. to V.H.F. mobile communications.

Telephones

The complete re-installation of the Harvey Settlement bush telephone system has been completed with satisfactory results. Similar work on the Grimwade Settlement bush telephone system is almost complete.

Work has commenced on making up apparatus for an " Office Intercom " system at Manjimup to speed up officer to officer calls and relieve the switchboard operator of handling such calls.

" Rubber-tyred logging units have greatly increased in popularity in recent years, particularly in the jarrah forest where logs are smaller than in the karri forest. The photograph shows a Caterpillar 966B loading a jarrah log onto the jinker of a waiting log truck."

6. REFORESTATION

The policy of concentrated jarrah logging in areas affected by die-back disease has enabled a substantial reduction in the areas programmed for salvage log removal. This approach coupled with a high measure of co-operation from the timber industry has restricted all activities which could be expected to transmit the disease to healthy forest. The normal procedures of regeneration of jarrah forest have necessarily been restricted, all efforts being directed to re-establishment of resistant species on die-back sites. Extensive field trials have been established to test under forest conditions, those species which have been proved to be substantially resistant to " Phytophthora " in laboratory pot trials (see under research).

During the year 62,234 acres of virgin State Forest were cut over. The area was made up of jarrah forest 55,996 acres, karri 3,506 acres, wandoo 1,313 acres and other species 1,419 acres. In addition 64,147 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	2,485,567 acres
Karri	131,284 acres

Timber stand improvement operations continued in a small way in the jarrah forest using the now well established " notch-poisoning " technique for removal of trees surplus to crop requirements.

Further regeneration burning was carried out in karri forest to take advantage of the availability of mature seed in karri crowns. Thinning in karri pole stands is deferred pending the development of suitable markets for pressure treated karri poles.

Trees established at Jarrahdale for rehabilitation of areas worked for bauxite are continuing to flourish. Initial trial plantings were made in 1965 and a total area exceeding 150 acres is now established. The commercial potential of these areas cannot be fully evaluated for many years. However, irrespective of commercial prospects, it is desirable to re-establish forest cover for protection of water catchment and preservation of aesthetic values. The area currently worked for bauxite approaches 200 acres per annum and will in time, with the full development of refinery plants at Kwinana and Pinjarra, probably exceed 500 acres in each year. Successful rehabilitation of such areas will require a major programme of tree raising, site preparation and establishment.

7. AFFORESTATION

Pine Plantations

A record 5,808 acres of pines were planted in 1968 and allowing for clear felling of 236 acres, the total planted area including experimental plots, at the 31st December, 1968 was 59,576 acres.

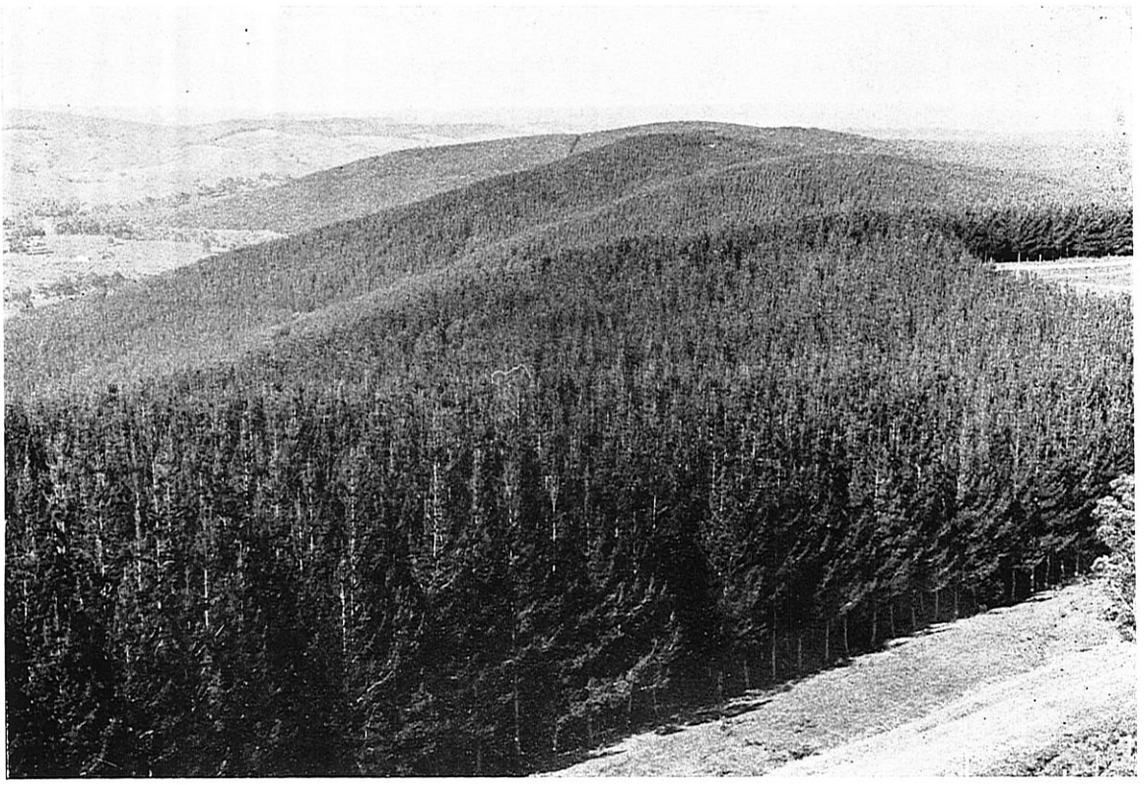
The distribution of these plantations by Divisions was, at December 31, 1968, as follows—

Division	*P. radiata*	*P. pinaster*	Other Species	Total
	acres	acres	acres	acres
Wanneroo	53	21,485	154	21,692
Metropolitan	41	2,173	30	2,244
Mundaring	2,363	1,484	148	3,995
Kelmscott	181	1,505	24	1,710
Dwellingup	....	84	....	84
Harvey	3,341	4,089	31	7,461
Collie	3,514	4	....	3,518
Kirup	5,614	193	....	5,807
Nannup	5,726	31	21	5,778
Busselton	1,392	3,293	54	4,739
Manjimup	524	....	....	524
Pemberton	889	58	37	984
Plantation Totals	23,638	34,399	499	58,536
Experimental Areas	233	678	69	980
Totals	23,971	35,077	568	59,516

The 1968 planting is spread over the following Divisions—

Division	*P. rad.* (acres)	*P. pin.* (acres)	Total (acres)
Wanneroo	....	2,668	2,668
Mundaring	83	203	286
Kelmscott	50	386	436
Dwellingup	....	84	84
Harvey	515	313	828
Collie	239	....	239
Kirup	479	....	479
Nannup	461	....	461
Busselton	31	....	31
Pemberton	106	178	284
	1,964	3,832	5,796
Experimental Areas	4	7	*12
Total	1,968	3,839	5,808

* Includes one acre of " other species ".



" Milward pine plantation near Nannup.
Taken from Milward fire lookout tower the photograph shows the undulating and often steep country on which pines have been established. The pines in the foreground are 10 years of age."

" A Massey-Ferguson 2200 Treever operating in Gnangara plantation (*P. pinaster*).
Operated by one man, the machine handles in a given time a greater volume of logs from first thinnings than the previous system of two and sometimes three crane trucks with their higher man-power requirements."

Roundwood Production

Roundwood production from Departmental plantations, mainly in the form of thinnings, continues to rise. This year removals totalled 2,810,504 cubic feet, an increase of 417,091 cubic feet or 17.4 per cent on last year's figures. The following figures indicate the increase in pine log removals in recent years—

Year ended June 30	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
1969	2,810,504

Removals by category and by species were as follows—

Category	*P. rad.* cub. ft.	*P. pin.* cub. ft.	Total cub. ft.
Sawlogs	1,203,454	526,062	1,729,516
Particle Board Logs	92,988	779,676	872,664
Peeler Logs	109,705	176	109,881
Fence Posts	20,779	58,666	79,445
" Woodwool " Logs	....	15,085	15,085
Poles (Various)	....	3,913	3,913
	1,426,926	1,383,578	2,810,504

Expanded operations of a second particle board plant in the Metropolitan area resulted in an increase of 291,607 cubic feet (50 per cent) in the supply of particle board logs when compared with last year. The market for fence posts, although buoyant early, fell away in the last half of the year, but saw-logs showed a rise of 138,636 cubic feet (9 per cent). There was little change of significance in the remaining items.

Roundwood removals from the various plantations were as follows—

	cub. ft.	cub. ft.
Wanneroo (Gnangara)		377,065
Metropolitan		418,875
Collier	139,773	
Somerville	279,102	
Mundaring		622,276
Kelmscott-Gleneagle		36,073
Harvey		323,421
Harvey Hills	247,279	
Myalup-McLarty	76,142	
Collie		66,860
Kirup (Grimwade)		400,179
Nannup		117,625
Busselton		448,130
Ludlow	201,968	
Keenan	246,162	
		2,810,504

Sawn Production

The total sawn production from all sources was 693,636 cubic feet, an increase of 109,930 cubic feet on last year's figure. The higher production resulted from greater demand for sawn boards and also to a recovery in the case and packaging trade.

Sawn production by species was—

P. radiata .... 482,403 cub. ft.
P. pinaster .... 211,233 cub. ft.

Mallet Plantations

No mallet bark was produced during the year and no extensions were made to the plantation which remains at 19,111 acres.

Inland Arboreta

These arboreta, which range from Yuna in the north to Esperance in the south and Kalgoorlie in the east, are becoming increasingly valuable. Assessment of the performance of the various species on a wide range of sites is carried out in conjunction with the yearly maintenance visits, so adding to our knowledge each year. The coming year promises to present a severe test of the drought resistance of these trees.

Tree Nurseries

In 1968, Hamel and Narrogin Nurseries sold 211,037 trees for planting in country areas. The bulk of the orders came from newly developed farming districts and reflect the need for tree establishment in these areas.

The most popular Eucalypt species sold were, River Gum (41,300), Tuart (12,155), Dwarf Sugar Gum (10,312), Bald Island Marlock (10,242), Blue Gums (8,529) and Coral-flowered Gum (6,220).

Requests for salt tolerant species such as Salt River Gum and Swamp Mallet exceeded 5,000 trees.

The distribution of plants from Hamel and Narrogin 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	54,050	16,546	63,124	133,720	139,182	51,943	191,125	203
Narrogin	70,717	6,600	....	77,317	37	4,074	4,111	102
Total	124,767	23,146	63,124	211,037	139,219	56,017	195,236	....

Total production from all Departmental Nurseries was slightly over 6 million plants. These were mainly pines for the expanded plantation programme.

Seed Supplies

The Seed Store continued to supply seed of Western Australian trees to Australian and overseas buyers. Seed of dry area species such as *Eucalyptus brockwayi*, *E. salubris*, *E. salmonophloia*, *E. torquata* and *E. woodwardii* is in much demand for planting programmes in arid countries. There has also been a big increase in demand for the seed of *E. wandoo*, particularly from Morocco.

Facilities for handling and storing seed were improved with the construction this year of a cold store room at Como.

The enlarged pine planting programme has considerably increased the Department's requirements for pine seed. In the past most pine seed was imported from the Eastern States and Portugal, but our own plantations are now reaching the stage where local collection can be made from selected stands. Some particularly good stands of both *P. radiata* and *P. pinaster* have been selected and are being treated to induce greater seed production by heavy thinning and fertilizing. These will provide an improved source of seed until such time as the seed orchards from the tree breeding programme come into production.

8. FIRE PROTECTION

State Forests Under Protection

Indigenous Forest	4,456,326 acres
Pine Plantations	59,516 acres
Mallet Plantations	19,111 acres

The Fire Season

Prior to December there was considerably less than the average number of days with suitable weather for control burning.

Severe fire conditions were experienced late in December and early January. Then followed a relatively mild but extremely dry January and February which aggravated further severe fire conditions in late February and March.

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

	Jarrah	Karri
Rainfall	Slightly above average. There were 150 wet days as against 226 for the previous year.	Generally below average with 184 wet days.
Temperature	Generally above average with a hot peak in early January. Highest Maximum 106·5° F. 6 days above 100° F. 17 days above 90° F. Mean Maximum 75·9° F.	Generally about average with a hot peak in early January. Highest Maximum 107° F. which is also the hottest day on record. 4 days over 100° F. 12 days over 90° F. Mean Maximum 71·9° F.
Relative Humidity	Five days with RH below 10 per cent Five days with RH between 11 per cent and 15 per cent Nineteen days RH between 16 per cent and 25 per cent	One day with RH below 10 per cent Five days with RH between 11 per cent and 15 per cent Fourteen days with RH between 16 per cent and 25 per cent
Fire Hazard	13 days Dangerous. 24 days Severe Summer. Mean Hazard 6·1 Mean of all Seasons 5·4	4 days Dangerous. 7 days Severe Summer. Mean Hazard 4·7 Mean of all Seasons 4·4

Controlled Burning

Although the spring weather was poorer than usual for control burning, the autumn was unusually favourable. This resulted in hand burning programmes being completed. The use of aircraft allowed maximum advantage to be taken of those suitable days which occurred in spring.

Protection of plantations by control burning buffer strips during winter was continued. As research information becomes available it should be possible to use this form of fuel reduction more extensively within plantations instead of relying upon clean unplanted firebreaks. This will result in more efficient land use.

Prescribed Burning	Acres
Indigenous forest—hand burning	492,115
,, ,, —aircraft burning	484,292
	976,407
Advance and Top Disposal burning	34,497
	1,010,904
Plantations—hand burning	2,544

Detection

Coverage was extended over new plantation areas with the establishment of one additional primary tower in each of three divisions; namely, Wanneroo, Harvey and Nannup. Two additional secondary towers were built for Collie plantations.

A 200 foot tall steel tower was built to replace Beard Tree Lookout which served the Shannon River, Pemberton and Manjimup Divisions. The tree had become unsafe due to development of rot in the upper bole.

In Collie Division, early morning ground patrols were used extensively to check for " billy " fires left burning by campers and marron fishermen within plantations surrounding Wellington Dam. These patrols were mounted on thirty-one days during January, February and March and located 65 such fires of which 28 were left burning against logs or stumps and could have caused serious fires. Only on three of the patrols were billy fires not found, and up to eight were discovered on any one day.

An aircraft was used to provide additional detection during major fires in the Southern Divisions.

Many lookout towers have been equipped with instruments from which weather information is provided for the assessment of Fire Danger throughout the spring, summer and autumn.

Manning of Towers	Jarrah	Karri
First Watch	13/10/1968	29/10/1968
Last Watch	22/4/1969	8/4/1969

Communications

High Frequency radio provided an important inter-divisional service for weather forecasting and fire reporting. It provides an essential supplement to the P.M.G. service.

Very High Frequency radio has proven an excellent intra-divisional means of communication and has brought about major improvements in fire control organisation.

Fires and Fire Damage

Departmental gangs attended 252 fires during the season, compared with a ten-year average of 350. Of these, 159 burned on forest land, and 14 exceeded 200 acres. One extended over 17,370 acres. The total area of forest land burnt was 32,432 acres.

Pines	17 acres
Natural Forest	32,415 acres

The major fire occurred on March 7 in karri forest south-east of Pemberton as a result of stump blasting on private land. The area was carrying heavy fuels which has become unusually dry after nearly three months of drought. On the first two days a combination of high temperature, moderate winds and difficult topography prevented control. On the third day a spot fire thrown ahead of the main fire developed rapidly under the influence of a strong wind. Control lines established on the second day and night were held, but there had not been time to complete these lines and attack all the spot fires thrown ahead. No major development occurred after the third day.

Other major fires occurred in the far south in an area where there has not yet been time or opportunity to introduce rotational control burning. One of these occurred under extreme conditions in early January, but the most extensive losses were in March. The difficulty of controlling these late summer fires reflected the effect of abnormal drought on heavy forest fuels. The staff and employees involved in suppressing these fires performed commendably under dangerous and trying conditions.

It is of interest to note that of the 159 fires which burnt 32,415 acres of forest land, eight were in the areas where rotational control burning has not yet been implemented and these accounted for 29,486 acres. This indicates the necessity for fuel reduction and the benefit being derived from rotational control burning now applied to 90 per cent of the State Forest area.

The following table lists fire causes for the season—

Escapes from settlers burning	57
Deliberately lit	44
Escapes from prescribed burning	40
Children	17
Travellers	12
Bush workers	12
Mill surroundings	10
Hunters and fishermen	9
Householders	5
Other government employees	4
W.A.G.R. locomotives	3
Mine surroundings	3
S.E.C. mains	2
Rubbish dumps	2
Mill locomotive	1
Aircraft crash	1
Burning vehicle	1
Blasting	1
Unknown	21
	*252

*Note—65 " billy " fires mentioned elsewhere in this report have not been included in the above table.

It is of interest that no lightning fires were recorded during the past season. Of the fires deliberately lit, 13 were in the Gleneagle Division where it is believed one person may have been responsible, although no-one was apprehended. Ten fires were lit in metropolitan plantations, eight at Collie and four at Manjimup. There were one or two in most other Divisions.

Departmental gangs were sent out on a number of occasions to protect public and private dwellings and property from fire damage. The most notable of these was the protection of the Manjedal Brook Scout Camp where, together with local brigades, they suppressed a fire threatening the establishment and scouts encamped there.

The very small area of plantation burnt from the 38 fires started within or adjacent to them is a direct result of the hazard reduction burning carried out in metropolitan plantations where most fires occur and the highly effective fire attack organisation. A supply of chemical fire retardant—diammonium phosphate—is now held at the major plantation centres. It will be carried by tankers and used in the initial attack to restrict fire spread until sufficient forces arrive to complete suppression.

Remodelling of the tanker fleet has been initiated to take advantage of modern equipment developments. The new units will have superior fire fighting characteristics and be designed for the dual purpose of carrying personnel. A considerable reduction in the number of prime movers at present needed for these two functions will result in major cost savings.

Training

Special emphasis has been given to gang training in the various aspects of fire control. A competition has been instigated between four divisions and has proven a marked success. It will be extended through all divisions next year. The Carinyah gang from Kelmscott Division were the winners for the past year and demonstrated outstanding fire fighting technique and morale.

Public Relations

Displays of fire control equipment and methods were provided at several Agricultural shows.

As far as possible all meetings of bush fire control organisations were attended and there appears to be steadily improving relations with Shires. Co-operative burns were undertaken with settlers in most divisions.

The Department has established or assisted the establishment of four airstrips in the south-west forest areas. Several groups with sawmilling or contracting interests have co-operated with Shires and the Forests Department in this operation. The strips, essential to the aircraft burning operations, are already providing an important service to private interests and must be of increasing value to the Shires and nearby towns.

9. RESEARCH

The completion of the buildings and equipping of the new research stations at Dwellingup and Manjimup, achieved during the year, greatly improved the facilities available to staff engaged on research. These were further enhanced by the construction of a seed treatment centre, glasshouse and shade house adjacent to the main centre at Como. Research officers and silviculturists are now centred at Como, Wanneroo, Dwellingup, Collie and Manjimup, and summaries of their investigations follow.

PINE SILVICULTURE

Pinus pinaster Plantations

Tree Breeding

Grafting. Both *Pinus pinaster* and *Pinus radiata* grafts were carried out in the current year, the numbers being 1,028 and 268 respectively. The survival was good, averaging 88 per cent. Five hundred scions were sent to the Victorian Forestry Commission.

Progeny Testing. Progeny trials covered 21 acres at Gnangara and 11 acres at Yanchep, bringing the progressive total to 132 acres. The total number of tubed plants raised was 20,616 and in addition 19,000 plants of *P. pinaster, P. elliottii* and *P. taeda* were also raised in open beds.

Controlled Pollination. Out of the 502 female flowers isolated and pollinated this year 269 survived. The harvest from the 1967 pollination will be 219 cones. The 1966 pollination harvested this year yielded 13 kg of " full-sib " seed. In addition, 33 kg of " half-sib " seed were also harvested.

Seed Orchards. The Neaves and Joondalup orchards are now fully planted and work consisted chiefly of routine maintenance. The Mullaloo seed orchard was cultivated and fenced, and the first 920 grafts were planted out.

Site Studies—Coastal Plain

A pot trial incorporating the main soil types of the coastal plain clarified the function of the limiting site factors in the region. Yellow sand, with moderate levels of colloidal iron, proved more drought prone than grey sands, a fact which has also been observed in the field. In grey sands, split application of fertilizer resulted in better growth and better retention of nutrients. Dark humusoid sands gave best results in terms of both survival and growth of pine seedlings.

Site Studies—Northern Jarrah Forest

Classification of sites within this region has proved much more difficult than on the coastal plain, presumably due to the greater range and complexity of environmental factors. Nevertheless many good indicator species have been recognised and were utilized in large scale site surveys in the Mt. Cook region. To supplement this work, a set of establishment trials comparing *Pinus pinaster* with *P. radiata* and *P. elliottii* under a large number of fertilizer treatments and located over a wide range of sites has been established at Mt. Cook. On wetter sites mounding has also been incorporated.

Fertilizer Trials

Earlier established trials are beginning to yield results. The phosphate needs of the deep yellow sands which constitute the bulk of future planting areas have been shown to be intermediate between those of brown sands and grey sands. The omission of zinc appears to be less serious, particularly as compared with the shallow brown sands. On the deep grey sands, where superphosphate is leached too rapidly, calcined and rock phosphate fail to release phosphate sufficiently rapidly for the need of young pines. A mixture of superphosphate and calcined phosphate is under trial.

Hydrology and Thinning Trials

Basal area thinning studies have been integrated with hydrological studies aimed at determining the stand density at which reasonable balance exists between precipitation and moisture loss under pine stands. Neutron probe studies of soil moisture depletion have been delayed by technical difficulties.

Nursery Studies—Gnangara

A comparison of several soil sterilants has shown that whilst methyl bromide and Di-trapex give better control of weeds than formaldehyde, there is a greater likelihood of mycorrhizal upsets with them. This is particularly so with *P. elliottii*. A new weedicide described as selective and capable of both suppressing germination and contact killing, proved inadequate in controlling the autumn crop of cape weed.

Satisfactory amelioration of poor sandy nursery beds has been achieved by balanced application of 2-4 inches of peat and 2–4 cwt /acre of urea. It was not found necessary to correct the acidifying effect of peat. Marked improvement in seedling size resulted.

Pinus Radiata Plantations

Tree Breeding

The establishment of a seed orchard at West Manjimup commenced with the planting out of 500 grafts. In the current year, a further 1,400 grafts have been prepared for the 1970 planting. Clones from the West Manjimup Seed Orchard, together with those from Tallaganda Seed Orchard in the Australian Capital Territory, and from the Chandlers' Seed Orchard at Gleneagle, have been incorporated in a polycross progeny trial at Collie. At Grimwade, sixty acres have been thinned to 50 stems per acre as a first stage in the development of a seed production area. Of this, forty acres will be fertilized to stimulate production. Search is continuing for plus trees for inclusion in the breeding project.

Nursery

A sound tubing technique for pines and other conifers has been developed to facilitate grafting and introduction trials. Trials are in progress to test various forms of crop rotation, green cropping, partial sterilization, fertilizer application and weed control in the open beds.

Tending

A successful method of pre-planting weed control has been developed. It consists of low volume spray application of 2·4·5–T butyl ester, equivalent to 10 gallons /acre of 2½ per cent. aqueous solution with 0.25 per cent. Plus 50. Trials are now under way to test a low-volume post-planting application of 2·4·3–T.

Thinning

Further treatments were carried out in the 1967 Basal Area Thinning Trial to maintain prescribed levels. Planning is in progress for thinning studies on drought susceptible sites in the Nannup district.

Species Trials

A total of 36 acres at Collie, Nannup and Manjimup have been planted with exotic conifers. The purpose of the trials is to test alternative species on sites considered marginal for *Pinus radiata*.

Direct Sowing Trials

Direct sowing trials were established with karri and *Pinus pinaster*. The ultimate aim is the stocking of areas inadequately regenerated by natural seed fall in the case of karri, and the rehabilitation of Phytophthora affected areas within the jarrah forest in the case of *Pinus pinaster*. In order to improve the germination and survival various forms of seed pelleting have been tried. Cellaphos proved a superior sticker in the production of pellets which contained insecticides, fungicides and bird repellants. Sowing in July gave markedly better results than earlier sowings.

Multiple-seed karri pellets proved superior to single-seed pellets. The survival and growth of direct sown karri, was greatly improved by the placement of all-round fertilizer (nutrifert) adjacent to the pellets. The increase in plant per cent. was from 1·4 per cent. for non-pelleted seed to 5 per cent. for pelleted but not fertilized, to 30 per cent. for pelleted and fertilized. Whereas unfertilized seedlings failed to exceed 8 inches in height during the first year, the height of fertilized seedlings ranged up to 45 inches, with an average of 20 inches.

Further trials are being established to compare broadcast sowing with spot sowing, and to establish the optimum composition and size of fertilizer pellets.

JARRAH DIEBACK

Environmental studies in the northern jarrah forest have demonstrated considerable differences in soil moisture and soil temperature between topographic sites, forest types and burnt and unburnt areas. In the higher better drained topographical sites there is a relatively short period, during which both moisture and temperature are adequate for the growth and activity of the fungus *Phytophthora cinnamomi*, the causative agent of jarrah dieback. In some lower lying situations, however, they may be adequate for a considerable period of the year. Rate of spread measurements made over a range of sites during the last twelve months gave an average rate of unassisted or natural uphill spread of 1.25 feet.

These studies will be continued in the northern jarrah forest areas and are also being duplicated in the southern region.

Screening of species for resistance to *P. cinnamomi* is continuing in both glasshouse and field trials. The influence of several environmental factors—e.g. drought, waterlogging, and nutrition, on disease resistance is under investigation. The outstanding species in field trials are *Pinus pinaster* and *Euc. resinifera* on mid and upper slopes, and *Euc. globulus*, *saligna*, *goniocalx* and *microcorys* on lower slopes.

Reports have been received from two consultant plant pathologists, Dr. G. A. Zentmyer and Dr. F. J. Newhook. These commented favourably on the work in hand and proposed avenues for further research into this disorder. The Ph.D. Fellowship at the University of W.A. was taken up in January of this year. Departmental Officers lectured to members of the timber industry regarding *P. cinnamomi*, its physiology, methods of control and aspects of reforestation. A draft of proposals to introduce various forms of logging and general forest hygiene was prepared and submitted to representatives of the timber industry.

JARRAH SILVICULTURE

Growth Studies

The investigation of stocking and increment rates of jarrah regrowth pole stands continued during the year. It is based on stem analyses of individual trees from 50 plots. Data obtained from the plots were analysed by means of multiple regression analyses. The optimum basal area stocking was found to be 110–130 square feet per acre, at which level the mean annual increment was three square feet per acre. It decreased slowly to 2.5 square feet per acre for the stocking of 180–190 square feet per acre. The study indicated that basal area per acre is a satisfactory index of stocking providing significant allowance is made for site quality differences. The figures given above are for sites on which jarrah is capable of attaining a co-dominant height of 110–120 feet.

Jarrah Site Quality

Detailed site quality investigation utilizing both environmental and vegetational data is in progress in the high rainfall region (45 inches per year) around Dwellingup. Multiple regression and principal component analyses will be utilized in the analysis of the data. Information already summarised indicates that jarrah regeneration is inadequate on many sites. Of the total number of plots studied, only 35 per cent contain regeneration at stocking above 300 plants per acre, which is considered adequate. Additional information on jarrah site quality will be obtained from the study commenced in the previous year which broadly covers the entire northern jarrah forest.

Nutrition Studies

A comprehensive pot trial using jarrah seedlings has shown that best results are obtained by applying a balanced phosphorus-nitrogen fertilizer. The findings are now being applied experimentally to a 45 year old pole crop.

Control of Undesirable Species

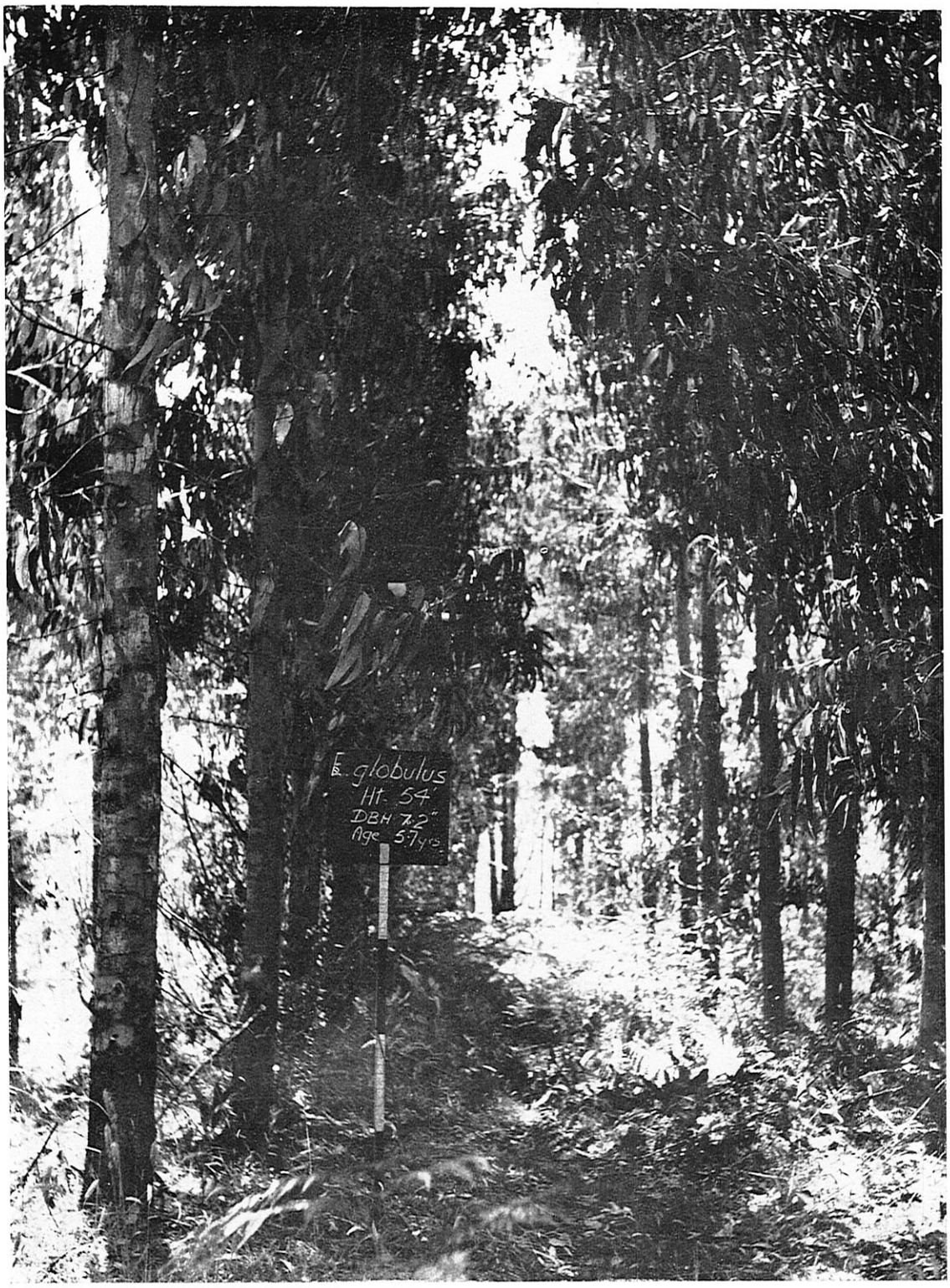
Application of Tordon 50D into holes bored 2½ inches deep into wood has given satisfactory control of marri, which is relatively resistant to hormone poisoning by notching. It is considered that deeper placement overcomes the washing out or occlusion of the poison by the copious gum flow characteristic of this species.

KARRI SILVICULTURE

Karri Floral Cycle

Intensive branch sampling throughout the karri region, from Margaret River to Denmark, has revealed the following—

> 1968–69 was a good general seed year and apparently successful regeneration burns were carried out in most areas.



"Tasmanian Blue Gum (*Euc. globulus*) growing on old pasture—cleared 30 years ago—north of Walpole. The young trees are a little over 5¼ years of age and the co-dominants average 54 feet in height.

The original forest type probably was a mixture of jarrah, karri, yellow tingle and marri. Treatment prior to planting consisted of thorough ploughing only—no fertilizer was added. Competing scrub was slashed twice and a controlled burn run through the area on one occasion."

" In contrast to the previous photograph, this plot of Slash Pine (*P. elliottii*) is growing in peaty acid sand which was once a treeless flat carrying bottlebrush, sword grass and paperbark and which was waterlogged for six months of the year. At age 3 years and 7 months the average height of the pines is 15 feet.

Site preparation consisted of ploughing, then left as fallow for one year, reploughed and ridged to allow drainage of water.

The ridges were planted and 2½ ozs. of copper-zinc-superphosphate applied to each tree."

Only localised flowering was observed in summer-autumn 1969. This was confined to certain areas within the Pemberton, Shannon and Northcliffe areas and no useful seed crop is likely to result.

A good general crop of buds was initiated in summer 1968 in all areas except Margaret River. However, 50–60 per cent of this crop appears to have been lost and a new mediocre crop of buds appeared in most areas this summer.

Indications at present appear to be for a light general seed crop in 1971–72 with enough seed for regeneration only in certain localities.

Statistical analysis of results obtained with the present sampling technique indicated that, in order to obtain reliable estimates in a stand, very large samples had to be taken. Thus due to the time and expense involved, the rifle sampling technique, which was used generally last year, will in future be confined to the sampling of marginal stands only.

Work on improving the present twig sampling technique is progressing.

Karri Seedling Studies

Because of occasional, apparently inexplicable failures in regenerating some areas in the past a comprehensive seedling study has been initiated.

Seedfall has been recorded accurately in certain areas and germination and subsequent development of the seedlings will be examined in some detail throughout the 1969 winter. Temperature and moisture relations will also be investigated next summer. Preliminary trials on the effects of insects, fungi, shade, soil types, vegetation and time of burning are also under way.

Karri Wildlings

A small trial with 900 plants last year yielded the following information.

1. Wildlings show no apparent benefit from careful lifting. Plants that have been pulled up appear to do just as well.
2. Larger plants, two to three feet high, showed as good a survival rate as smaller ones (80–90 per cent), and since their growth rate was far superior these should be favoured.
3. Seedlings up to 2½ feet high can be stumped to 6 in.–9 in. and planted with 80–90 per cent survival.

Silvicultural Trials

The basic treatments prescribed have been almost completed in two 100 acre trials in mixed marri-karri type, located on March and April Roads, Sutton Block, Quininup.

The aim of these trials is to provide practical alternatives in the treatments of mixed stands of marri-karri, assuming that marri as well as karri can be removed in quantity. This should be the situation when marri chipping operations commence. Alternatives include—

1. Favour karri regeneration—leave karri seed trees only.
2. Favour marri regeneration—leave marri seed trees only.
3. Maintain the mixture—leave marri and karri seed trees.
4. Plant to exotic species.

The March Road trial includes all four alternatives, whereas April Road is a trial wholly confined to the testing of a range of exotics, pine and eucalypts, and incorporating various techniques of establishment.

Slash removal burns were successfully applied in spring and autumn of the summer 1968–69.

Karri seedfall from seed trees following the burn was more than adequate—(March Road Average of 300,000 seeds per acre). Germination has been good and is continuing at this stage. There seems no reason to doubt that an adequate stocking of karri will be obtained where sought. Due to lack of seed in crowns, marri seedfall was absent, but indications are that advance growth surviving the burn will adequately restock with this species.

It was noticeable that in heavy slash burns of this type karri seed trees are better able to survive than marri. (Karri 6 per cent of trees lost—Marri 11 per cent of trees lost.)

Planting of exotics is under way.

Of the further two similar trials planned in mixed jarrah and marri stands, the mill felling operations in one (Coronation Road) is complete. The second (in Kinkin Block) should be commenced later this year.

Exotic Species Trials

The establishment of trials with exotic species, designed to cover the full range of sites, is continuing. An amended design has been adopted to facilitate statistical analysis and increase the yield of information. The number of plots now fitting this new design is 27.

SOILS AND NUTRITION

During the year analytical work continued on established lines of research, but there was a slight reduction in the number of analyses carried out due to a staff shortage and the mechanical failure of some laboratory equipment.

Three new lines of work were commenced during the year. They were as follows—

The Effect of Thinning on the Nutrient Status of Pinus pinaster Stands

A fifteen year old stand of *P. pinaster* at Yanchep was thinned in 1967 and the relationship between stand basal area and foliar nutrient levels observed over a two year period.

Statistical analysis of the data showed that the thinning had had very little effect on the foliar nutrient levels, but marked differences were observed between the different sampling years. At present further studies are being carried out to relate the climate of the different years to the various nutrient levels.

The Effect of Age, Soil Type and Topography on the Nutrient Status of Young Pinus pinaster Stands

A study was carried out on the effects of the above factors on the nutrient status of young (1–9 years) *Pinus pinaster* stands. On the poor sites examined all samples showed a marked decline in nutrient level with age, and there appears sufficient evidence to indicate that these sites could profitably use a second application of fertilizer early in the rotation.

The significance of the various factors is shown in the accompanying Table.

P. pinaster

EFFECT OF AGE AND SITE FACTORS ON NUTRIENT STATUS

	Height Growth	Foliar Levels					
		N	P	K	Ca	Mg	Mn
Age	***	***	**	**	*	N.S.	**
Soil Type	*	N.S.	***	N.S.	N.S.	**	***
Topography	*	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.

N.S. No significant difference.
* Difference significant at 0.05 level.
** Difference significant at 0.01 level.
*** Difference significant at 0.00 level.

A Preliminary Study of the Stem Flow Leachates of Pinus pinaster and Thier Effect on Soil Properties

A preliminary micro soil study was carried out to examine the actual effect of the tree on soil properties. Small transects were sampled away from the bole of the tree to areas which were free from any crown cover. The most significant change observed was an increase in soil pH away from the base of the tree, and the lower pH immediately adjacent to the tree appears to be related to the stem flow leachates which are extremely acid with pH values ranging from 3.9 to 4.4.

Soil Biology and Litter Decomposition

Work on the soil fauna was started in October, 1968; the relationships between the taxonomic and trophic structures of the soil communities and the rates of litter decomposition are being investigated in both softwood plantations and the hardwood forests. In the softwood plantations the effects of burning and of tree density are being studied.

Population densities of up to a quarter of a million microarthropods (minute soil insects, spiders and crustaceans) per square metre have been recorded under *Pinus pinaster* at Gnangara. Over 120 species of soil mite (Acarina) and 20 species of springtail (Collembola) have been collected. Most have been provisionally identified to family level and it seems that many species are new to science. At present four new species of enchytraeid worm are being described.

Preliminary surveys of the soil animal populations show that both the number of species and the proportion of predatory animals are lower in the *P. pinaster* monoculture on coastal sands than in the mixed hardwood forest.

FIRE RESEARCH

Techniques for controlled burning from aircraft have now reached operational standard. This has resulted in a change of emphasis for fire research, which is turning towards intensification of fire behaviour studies in the karri region and the pine plantations.

Fire Behaviour Studies

Studies in jarrah and karri forests will be concentrated in dense scrub fuels.

Pilot experiments with tray burning techniques showed species, density and moisture content to be important variables affecting combustion rates for scrub foliage. This has led to a reappraisal of the experimental fire technique, with more intensive prior preparation of the experimental fire sites.

These preparations have been commenced in karri forests, and consist of assessment to describe scrub species, density and height. Later, weights of scrub foliage, both green and dry, will be collected within the descriptive classes shown by the assessment. Diurnal trends for moisture will be followed in both green and dry foliage, as well as the normal litter measurements. The purpose of this work is to provide quantitative estimates of scrub foliage and the fire intensities which ignite green foliage.

For pine plantations the emphasis remains on *P. pinaster* and studies during the winter months will concentrate on depth-quantity relationships for litter, fuel availability and fuel moisture regimes within and on the edge of compartments.

Fuel Accumulation Studies

Three fuel accumulation studies were completed measuring litter weights in northern jarrah forest, southern jarrah forest and karri forest.

Litter weights were related to the number of annual leaf falls since the last burn and to canopy cover. Rates of accumulation were higher in the northern than southern jarrah forest, probably due to higher rates of decomposition on the moister, sandier soils of the south. Karri fuel weights were higher than jarrah, due mainly to a thick duff layer.

Statistical analysis of results and calculation of regression equations led to the development of tables of litter accumulation, with suggestions for planning of controlled burning rotations and associated fire control procedures.

Scrub Trials

Two trial areas were burnt last spring to study the effect of mild fire intensities (10 to 30 British Thermal Units (B.T.U.) per second per foot) on the regeneration of Acacia and Bossiaea species. Early observations suggest that these species are unlikely to regenerate at their former density in these trials.

Fire Damage—Growth Studies

Pole Sizes

Karri poles, treated with fire intensities between 20 and 30 B.T.U. per second per foot are entering their third year since burning. To date there has been no significant difference between the girth growth of the burnt and control trees.

Jarrah poles, treated with similar fire intensities, failed to show girth differences with unburnt controls, over a 4 year period. These trees were re-burnt last spring to maintain a 4 year rotation for the treatment.

P. pinaster, burnt under with fires of 11 B.T.U. per second per foot, and measured for a subsequent 2 year period, have shown no effect on girth growth. *P. radiata* showed similar results in the same period although the intensity of the treatment fires was lower.

However, scorching of tree crowns with fires of higher intensity, produced marked decreases in girth growth of both *P. pinaster* and *P. radiata*. These decreases remain for at least 1 to 2 years after scorching where five feet or less of green tip was left on the tree crowns. There were only short term effects where 10 feet or more of green tip was left.

Sapling Sizes

Jarrah saplings up to nine feet high, burnt under with fire intensities of 11 to 13 B.T.U. per second per foot, were badly damaged. Above this height crown damage was negligible. An almost identical result was obtained with marri saplings in the same plots.

Jarrah and marri saplings up to 13 feet high were badly damaged by fires of 20 to 30 B.T.U. per second per foot.

In both trials, 15 months after the fire, ingrowth into the 3 to 4 feet height class either equalled or exceeded the number before the fire.

Wildfire Damage Appraisal

Limited pilot assessments have been carried out in an area of mature karri forest defoliated by a wild fire. No definite conclusions will be reached, however, until the subsequent full scale damage assessment is completed.

Firebreak Species

Two trials are under establishment, to test the suitability of selected tree species as firebreaks in pine plantations.

The first trial, an arboretum on soils suitable for *P. radiata* will be planted this winter with poplar, tamarisk, chestnut and ash species.

The second trial consisting of a poplar belt in jarrah forest, will be planted this winter. This belt is being established with the view of later subjecting it to an intense fire and assessing its firebreak values.

STATISTICAL ANALYSIS AND AUTOMATIC DATA PROCESSING

A set of statistical analyses, programmed for use on the University PDP-6 computer, has been made available to research staff for the analysis of their data. Some of the programmes were developed by the University Computing Centre, others by the Departmental Research staff. The analyses available include analyses of variance coupled with Duncans multiple range test, multiple regression coupled with regression plotting and principle component analysis coupled with co-ordinate plotting. Large volumes of data, both from recently completed experiments and earlier studies have been analysed. An indirect benefit has been the interest in more comprehensive experiments, the manual analysis of which would have proved to be an insurmountable obstacle in the past.

10. UTILIZATION

Engineering

A composite timber and concrete slab for elevated sawmill floors has been designed and test loaded with very satisfactory results. With the timber serving as formwork and also as tension reinforcement a cheap and effective floor has been achieved.

Attention was given to modifications and additions to various Departmental buildings and to transportable dwellings.

Timber Seasoning

Field work for the test on seasoning of jarrah affected by " Dieback " was completed and a preliminary report prepared but certain statistical analyses to confirm final conclusions are still awaited from the C.S.I.R.O. Division of Forest Products.

Four meetings of the Seasoning Productivity Committee were held during the year. Apart from consideration of the work on Dieback the main project has been an assessment of current seasoning practice in the State to find out in what respects it might be falling short of already established good practice and to find out in what fields seasoning problems were considered by the industry to lie.

Round Timber

Mining Timber. A bending test frame has been built to allow the strengths of round and split timbers for mine tunnel roofs to be compared.

Some preliminary hot and cold bath impregnation testing of round mine props with boron-fluoride salts has been carried out. The possibility of using the D.F.P. high solubility boron-chrome-arsenic-fluoride mixture for dip diffusion of green props has been carefully considered but the practical difficulties arising from the methods of procurement and handling of the props from forest to mine seem to render this method impracticable.

Marine Pilings. The marine borer test plots at Kwinana and Port Hedland were inspected during the year after 9 years exposure. Creosotes are giving fairly good results in the round eucalypt specimens but poor results in sawn pine whereas with copper-chrome-arsenic salts the results are directly opposite. A second test with higher preservative loadings and with the ends of the specimens protected to simulate service conditions more closely has been set up at Port Hedland and Carnarvon.

Transmission Poles. A transmission pole bending test simulating service conditions was carried out in the S.E.C. yard at Picton. The results from loading the poles to destruction showed that it was not possible for the ground in which a pole stands to give anywhere near the support needed to allow a pole to be broken by lateral loads applied to its top indicating that it was logical to allow much larger defects in the upper half of a pole than had previously been considered safe.

The difficulty of seasoning karri poles for preservative treatment without serious end splitting and surface checking seems to have been largely overcome by the use of the boultonising process involving boiling of the green poles in creosote under vacuum to remove sap and then applying pressure to force the creosote into the wood. As well as improving quality this process gives a great saving in time and stock outlay and all karri poles now treated at Picton are being boultonised.

Committees

Standards Association. At a meeting of Joinery Manufacturers the desirability of establishing quality control leading to the use of the Australian Standard Mark was discussed with a representative of Standards Association and it was decided that the suitability of the available Australian Standards for W.A. conditions first needed to be established. This aspect is being investigated.

Good progress has been made on a draft revision of the W.A. structural rules to bring them into line with the requirements of the Light Timber Framing Code.

Assistance was given to Standards Association in relation to the many documents arising from the revision of the numerous grading rules for radiata pine and in relation to several grading rules for other products.

National Safety Council, Timber Industry Committee. One meeting of this committee was held during the year. Statistics presented showed that one firm had achieved an outstanding reduction in its accident rate and while there had been some improvement in the other four major firms their rates were still extremely high.

11. LIBRARY

Statistics were variable during the past year. A decrease in new titles led to a reduction in the number of Accession List requests. However, requests for items previously in stock increased considerably as shown in the Loans and Queries Section. Some of the decrease in new titles can be explained by the fact that during the past year a policy of more selective cataloguing was carried out. Only the more important items were catalogued and indexed, some of the lesser items were merely recorded, and others not considered important enough to keep in the library were immediately placed on the Discard List. Steps such as these have become necessary because of the lack of space for expansion of the library within its present confines.

Journal circulation increased by nearly 2,000 over the year, giving a weekly increase of approximately 40 items.

	1968/69	1967/68
Journal Loans	10,521	8,633
Accession List Requests	2,557	3,784
Loans and Queries	4,610	4,054
Publications Received	1,022	1,390

12. EDUCATION AND PUBLICITY

Education

The present position of holders of Forestry Scholarships and Forestry Cadetships is as follows—

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

* To graduate in 1969. † Includes 1 suspended cadetship.

The Forest Field Cadet Course which commenced in 1967 is expected to finish in July, 1969, when 8 lads will successfully complete the course.

After a preliminary period of practical field training 16 lads were accepted for the Forest Field Cadet Course which commenced in February, 1969. For the first time use was made of the Education Department, and for the first nine months of the course, the lads will undergo training in general and forestry subjects at the Mount Lawley Technical College.

Training of personnel in safety methods continued throughout the year.

Publicity

During the year the Conservator, Mr. A. C. Harris attended the Austis Conference at Lismore, N.S.W. in September, 1968; the New Zealand Forestry Development Conference held in Wellington N.Z. in February, 1969; the APPITA Conference at Burnie, Tasmania in March, 1969 and the meeting of the Plywood Association of Australia held in Canberra in June, 1969.

In October, 1968 the Fifth Triennial Conference of the Institute of Foresters of Australia was held in Perth, commencing on the same day as the now famous Meckering earthquake—14th October, 1968.

Bulletin No. 76, " The Potential of the Northern Swan Coastal Plain for *Pinus pinaster*, Ait. Plantations " was published and Bulletin No. 77, " The Estimation of Fire Hazard in Western Australia ", is in the hands of the printer.

13. TIMBER INDUSTRY REGULATIONS ACT, 1926-1968

The number of mills registered under the provisions of the Act as at December, 31, 1968 totalled 191 (115 Crown Land and 76 Private Property).

The average number of persons employed in the timber mills each month throughout the year was 3,233 a slight increase on last year's figure of 3,209.

The District and Workmen's Inspectors made 1,283 inspections of timber holdings.

There were 390 notifiable accidents for the year ending June 30, 1969, four being fatal.

The number of accidents per 100 persons employed was 12 compared with 20 the previous year.

Although the number of fatal accidents showed an increase there was a sharp reduction in the number of other accidents. Over the past two years the number of accidents has decreased by 50 per cent although the work force has remained static.

This reduction is due to the efforts of the Inspectors and the co-operation of the mill management with Safety training impressing on the employees the necessity of becoming accident conscious. Spectacular results were achieved by the one firm which appointed a full time trained Safety Officer some two years ago.

The cost of administering the Timber Industry Regulation Act for the year ending June 30, 1969, was as follows—

Salaries	$7,478
Mileage, Travelling Allowances, Office Rent, Plant, Cost and Sundries	5,998
	$13,476

14. FOREST OFFENCES

Thirty forest offences were reported during the year. Legal proceedings were taken in three cases and all resulted in convictions. Fines and costs amounted to $58 and $13·20 respectively.

Warnings were issued in 10 instances and the remainder were dealt with by charging royalty, forfeiture of deposits, collection of damages or confiscation and sale of timber illegally cut. The amount received by the Department in this way totalled $1,944·69.

15. EMPLOYMENT IN FORESTRY AND THE TIMBER INDUSTRY

The number of wage earners directly employed in Forestry and the Timber Industry was estimated at 4,759, made up as follows—

Forestry—

Professional Officers	51
General Field Staff	253
Clerical and Drafting	65
Wages Employees	660
Contractors and Employees (estimated)	20
	1,049

Timber Industry—

Sawmill employees including bush workers at December 31*	3,233
Firewood Cutters and Pole Getters working under permits	270
Sandalwood workers	57
Apiarists, estimated (301 sites registered)	150
	4,759

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

16. STAFF MATTERS

Public Service Act

Mr. A. C. Harris retired from the office of Conservator of Forests on the 30th June, 1969, and was succeeded by Mr. W. R. Wallace.

Mr. A. J. Milesi retired on 30th September, 1968 after 40 years service with the Department. A graduate of the School of Forestry at Adelaide University, he spent some 17 years in charge of the Narrogin district before being appointed Fire Control Officer. As Superintendent, Fire Control, his influence was seen in the passing, in 1949, of very important amendments to the Bush Fires Act. Later, as a foundation member of the Bush Fires Board (1955), he played an important part in formulating its policy and particularly in setting up its organisation following its constitution. During this period, of course, he was also closely involved with vital changes in policy, organisation and equipment in the Forests Department.

The Public Service Professional Division (Forestry Officers) Salaries Agreement, 1968, was signed on the 12th August, 1968, and published in the *Western Australian Industrial Gazette* of 4th September, 1968. Subsequently a Determination under the Public Service Arbitration Act, 1966, was published in the *Government Gazette* of 1st October, 1968, determining the salaries or salary ranges at appropriate levels to apply from 30th July, 1968, for officers covered by the Agreement. However, it was agreed that, except on increases granted in the case of officers reclassified, the adjusted rates would be paid from 28th June, 1968, to agree with the date fixed for increases granted to professional officers in the Agricultural Department.

Officers reclassified under the Determination were E. R. Hopkins (Superintendent), B. J. White (Senior Silviculturist), R. J. Underwood and D. J. Keene (Divisional Forest Officers), F. J. Bradshaw (Working Plans Officer) and F. Batini (Silviculturist).

The Public Service Professional Division (Drafting Officers) Salaries Agreement, 1968, was signed on the 12th July, 1968, and published in the *Western Australian Industrial Gazette* of 4th September, 1968. Subsequently a Determination under the Public Service Arbitration Act, 1966, was published in the *Government Gazette* of 9th October, 1968, determining the salaries or salary ranges at appropriate levels to apply from 12th July, 1968, for officers covered by the agreement. However, by arrangement with the Civil Service Association, the Public Service Commissioner agreed that the new rates would be determined on and from the 28th June, 1968, but the effective date for the review of any individual office under Section 12 of the Public Service Arbitration Act, would be the operative date shown in the Agreement, viz. 12th July, 1968.

The Chief Draftsman, R. M. Davis, was the only officer reclassified.

Other promotions during the year included Mr. F. J. Campbell to Superintendent, Mr. J. J. Havel to Inspector, Mr. D. E. Cox to Assistant Chief Draftsman and Mr. W. D. Muir to Senior Draftsman.

Appointments included three Assistant Divisional Forest Officers, Messrs. G. W. Heberle, I. D. Scambler and R. J. Sneeuwjagt.

Silviculturist A. L. Clifton and Assistant Divisional Forest Officers G. Airey and C. E. Peaty resigned, as did Draftsman L. D. Smith.

Congratulations are extended to Mr. G. W. Heberle who was awarded the Schlich Medal for 1968 and to N. Malajczuk who gained the Timbind Prize. These awards from the Department of Forestry, Australian National University, are respectively for the most outstanding student of the year and for the student with the best results in subjects dealing with forest utilization.

Forestry cadetships were awarded to G. N. Hambleton and P. T. Bryant, and Drafting cadetships to K. J. Godwin and G. W. Wake.

Divisional Forest Officer J. B. Sclater was seconded to the Commonwealth Government on the 24th February, 1969, and proceeded to Laos for a term of three years to serve as a Senior Resident Forester in connection with the re-establishment of forests in Laos under the Colombo Plan.

Miss C. L. Savage, Machinist-in-Charge, retired on 10/1/1969.

Mr. D. W. Arnold, Management Branch, was promoted to a position in the Department of Fisheries and Fauna, and he was replaced by Mr. W. Shepherd from the Department of Native Welfare. Mr. K. K. Webster was promoted to a position in the Public Works Department.

It is with deep regret that I report the sudden death of Drafting Cadet G. Weir.

Forests Act

Dr. J. Springett, a microbiologist, was engaged for a term of three years from 30/9/1968 to work as a Research Officer.

New appointments during the year included the following—

17 Technical Assistants, 3 Forest Assistants, 2 Forest Rangers, 4 Forest Guards, 1 Publicity and Extension Officer, 1 Plant Inspector and 1 Senior Forester.

Promotions included one officer to Forester and one officer to Forest Ranger.

Resignations were received from many officers including Forester F. J. McKay.

Two officers retired, namely Forest Guard G. W. Reynolds and Forest Assistant J. L. Shannon.

It is with deep regret that I have to record the death of Senior Forester C. V. Rutherford.

"The Forests Act Field Staff Agreement, 1968" was signed on the 6th December, 1968, and published in the *Western Australian Industrial Gazette* of 30th December, 1968. Subsequently a Determination made under the Public Service Arbitration Act, 1966, was published in the *Government Gazette* of the 4th February, 1969, determining the salaries or salary ranges at appropriate levels for officers covered by "The Forests Act Field Staff Agreement 1968". The salary ranges were in line with those fixed for the General Division under the Public Service Act and were to apply from the 6th December, 1968. However, it was agreed that, except an increase granted in the case of officers reclassified, the adjusted rates would be paid from 15th March, 1968, to agree with the date fixed for General Division officers under the Public Service Act.

Officers reclassified under the Determination included L. Nicol (Senior Forester, Fire Control), C. E. Hopkins, L. J. Marshall and J. Reynolds (Plant Inspectors), A. Malajczuk, J. McCormick and E. H. J. Randall (Technical Officers, Grade 2), R. J. Edmiston, C. A. Miller, M. N. Rowell (Technical Assistants, Grade 1), M. W. Cook, W. B. Edgecombe and R. R. A. Fremlin (Technical Assistants, Grade 2). The majority of our Female Assistants were reclassified as Clerk-Typists.

17. AUSTRALIAN FORESTRY COUNCIL

One meeting of the Council was held in Canberra in February, 1969.

The Standing Committee met on three occasions, once each in Canberra (September, 1968), Perth* (October, 1968) and Melbourne (April, 1969).

* This was intended to be a meeting of the Council, but at the last moment the Minister for National Development (Mr. Fairbairn) was unable to attend.

APPENDIX 1A

Statement of Revenue and Expenditure of the Consolidated Revenue Fund for the Year ended 30th June, 1969

1967/68	Revenue	1968/69	1967/68	Expenditure	1968/69
$	*Royalties*	$	$		$
2,791,833	Logs	2,715,409	524,683	Salaries	522,556
164,770	Sleepers	115,095	100,043	Incidentals	92,125
7,069	Sawn Timber	5,851	5,880	Timber Industry Regulations Act	5,998
110,828	Piles and Poles	158,074	167,664	Hardwood Conversion	156,393
18,333	Mining Timber	13,177	623,017	Pine Conversion	684,342
25,634	Firewood	24,290	92,083	Recoupable Projects	83,701
12,958	Posts	10,312	47,260	Tree Nurseries	44,771
14,359	Sandalwood	11,224	9,448	Arboreta	5,026
6,731	Miscellaneous	7,208	6,698	Printing and Stationery	4,994
			2,935,327	Excess of Revenue over Expenditure distributed as follows—	
3,152,515		3,060,640			
				9/10 to Reforestation Fund	2,761,178
	Pine Conversion		320,380	Transferred to Treasury	293,322
538,415	Pine Logs	565,100			
344,582	Sawn Pine	374,547			
882,997		939,647			
	Hardwood Conversion				
132,704	Sawn Hardwood	108,350			
122,684	Logs	108,657			
20,094	Piles and Poles	292			
275,482		217,299			
	Other Sales and Trees				
47,975	Seeds and Trees	39,604			
74,647	Inspection Fees	57,725			
47,165	Rent and Leases	53,898			
257,180	Miscellaneous	212,091			
426,967		363,318			
	Recoupable Projects				
71,267	Specific Roads	57,667			
23,255	Other	15,835			
94,522		73,502			
4,832,483		4,654,406	4,832,483		4,654,406

APPENDIX 1B

Forest Improvement and Reforestation Fund Account for the Year ended 30th June, 1969

1967/68	Source of Funds	1968/69	1967/68	Expenditure	1968/69
$		$	$	*Divisional*	$
458,339	Balance as at 1st July	269,707	1,551,061	Wages, Materials etc.	1,786,652
2,932,479	9/10 Revenue	2,694,532		*Head Office*	
2,848	Bauxite Areas Compensation	66,646	717,572	Salaries and Allowances	836,970
62,065	Rents	69,720	58,799	Incidentals	58,396
190,000	Federal Aid Road Grant	210,000	282,781	Plant and Vehicles	196,027
201,000	Reserve Fire Fighting	201,000	502,725	Plant Operations	549,502
....	C/W Government Softwood Forestry		98,205	Purchase of Land	40,304
	Agreement	600,000	50,751	Fire Equipment	67,489
			167,743	Head Office Housing and Building	119,619
			14,305	Como Headquarters	19,877
			20,216	Communications	25,876
			46,259	Research	84,162
			12,622	Drafting	8,910
			1,141	Surveys	3,023
			30,978	Training Staff	31,498
			100,179	Insurances	135,020
			53,564	Payroll Tax	60,906
			17,750	Utilisation	31,675
			2,175,590		2,269,254
			3,726,651	Total	4,055,906
			350,627	*Less* Recoups	401,230
			3,376,024		3,654,676
			201,000	Reserve Fire Control	201,000
			269,707	Balance Working Account	255,929
3,846,731		4,111,605	3,846,731		4,111,605

APPENDIX 1C

Statement of Afforestation Expenditure for the year ended 30th June, 1969

1967/68	Source of Funds	1968/69	1967/68	Expenditure	1968/69
$		$	$		$
400,000	General Loan Fund	400,000	476,224	Plantation Establishment	586,006
354,299	Reforestation Fund	281,900	256,271	Plantation Maintenance	145,475
882,997	Sale of Pine Logs and Timber	939,647	60,456	Houses and Buildings	22,081
			72,343	Road Construction and Maintenance	49,879
			48,911	Fire Prevention and Suppression	42,694
			15,688	Silviculture and Research	27,076
			10,525	Surveys and Plans	6,723
			39,439	Essential Services and Communications	23,033
			34,422	Administration	34,238
			623,017	Direct Conversion of Pine	684,342
1,637,296		1,621,547	1,637,296		1,621,547

APPENDIX 1D

Statement Showing Distribution of Forests Department Expenditure

Details

	$
Consolidated Revenue Funds	1,599,907
Reforestation Fund	3,654,678
General Loan Fund	400,000
	5,654,585
Distribution of Expenditure—	
1. Busselton	420,727
2. Mundaring	310,360
3. Dwellingup	446,000
4. Collie	339,563
5. Kirup	437,432
6. Manjimup	401,713
7. Narrogin	59,016
8. Kelmscott	219,295
9. Metropolitan	118,492
10. Harvey	644,289
11. Pemberton	335,574
12. Nannup	426,759
13. Shannon River	223,127
14. Kalgoorlie-Esperance	19,237
15. Wanneroo	433,519
Head Office	819,482
	5,654,585

APPENDIX 2A

Exports *from Western Australia of Timber, Furniture, Tanning Substances and Essential Oils for the Year ended June 30, 1969 (a)*

	Item and Destination	Quantity	Value
1	*Softwood Logs*—	cub. ft.	$
2	*Hardwood Logs (including poles, posts, piling and other wood in the rough)*—		
	Australian States—		
	Victoria	24,872	25,220
	South Australia	3,380	3,167
		28,252	28,387
3	*Sleepers*—		
	Overseas—		
	Hong Kong	241	411
	Saudi Arabia	83,990	167,193
	Sierra Leone	3,177	5,786
	South Africa	53,063	72,452
	United Kingdom	97,837	215,651
		238,308	461,493
	Australian States—		
	South Australia	588,523	873,963
4	*Hardwoods, Sawn, Undressed*—		
	Jarrah (b)		
	Overseas—		
	Bahrain	1,733	3,801
	Belgium Luxembourg	1,522	3,241
	Germany	988	2,048
	Greece	999	2,276
	Iran	3,500	10,500
	Kenya	134,055	232,825
	Mauritius	2,076	3,280
	Netherlands	2,143	3,817
	New Zealand	44,064	73,856
	South Africa	21,346	37,266
	Tanzania	20,062	35,587
	United Kingdom	326,192	756,441
		558,680	1,164,938
	Australian States—		
	New South Wales	3,514	7,331
	Victoria	89,384	158,851
	Queensland	16	165
	South Australia	569,115	687,953
	Northern Territory	11,660	19,176
		673,689	873,476
5	*Karri (b)*—		
	Overseas—		
	Belgium Luxembourg	1,459	2,791
	Canada	400	866
	Germany	36,315	67,117
	Mozambique	850	1,496
	Netherlands	19,185	38,547
	New Zealand	66,182	107,886
	South Africa	54,691	97,950
	United Kingdom	433	933
	United States of America	5,932	12,225
		185,447	329,811
	Australian States—		
	New South Wales	6,447	9,857
	Victoria	4,256	7,408
	South Australia	487,439	587,366
	Northern Territory	90,637	175,267
		588,779	779,898
6	*Other*—		
	Overseas—		
	Germany	2	4
	Japan	6,157	1,651
	Malaysia	18	33
		6,177	1,688
	Australian States—		
	Victoria	1,816	3,294
	Queensland	208	450
	South Australia	4,941	4,888
		6,965	8,632
7	*Timber, dressed or moulded*—	cub. ft.	$
	Flooring—		
	Overseas—		
	Christmas Island	260	1,344
	Australian States (c)—		
	New South Wales	60,455	131,210
	Victoria	24,722	85,579
	Queensland	94	859
	South Australia	40,905	97,909
	Northern Territory	14,169	64,978
		140,345	380,535
8	*Other*—		
	Overseas—		
	Belgium Luxembourg	700	1,430
	Christmas Island	2,994	6,863
	Greece	568	983
	Netherlands	1,391	2,567
	New Zealand	2,244	5,922
	South Africa	846	2,660
	United Kingdom	24,180	47,166
	United States of America	292	2,235
		33,215	69,826
	Australian States (d)—		
	Victoria	1,939	4,257
	South Australia	771	1,856
	Northern Territory	1,446	3,075
		4,156	9,188
9	*Plywood and Veneers*—	sq. ft.	
	Overseas—		
	Nes Zealand	18,176	690
	Singapore	1,139	229
		19,315	919
	Australian States—		
	Included in Item 11	cub. ft.	$
	Total, Timber Exports	**3,052,796**	**4,994,098**
10	*Casks, Vats, Barrels, etc. empty*—		
	Overseas—		
	United Kingdom	....	9,868
	Australian States—		
	Included in Item 11		
11	*Manufactures of Wood (except furniture), n.e.i.*—		
	Overseas—		
	Christmas Island	....	2,641
	Italy	....	150
	Japan	....	168
	Malaysia	....	31
	Netherlands	....	4,802
	New Zealand	....	11
	Singapore	....	22,403
	South Africa	....	10,488
	United Kingdom	....	2,402
	United States of America	....	26,426
		....	69,522
	Australian States—		
	New South Wales	....	453,281
	Victoria	....	1,167,362
	Queensland	....	9,302
	South Australia	....	444,289
	Tasmania	....	33,923
	Northern Territory	....	86,108
		....	2,194,265

APPENDIX 2A—*continued*

Exports *from Western Australia of Timber, Furniture, Tanning Substances and Essential Oils for the Year ended June* 30, 1969 (*a*)

	Item and Destination	Quantity	Value
12	*Furniture of any Material* (e)—		$
	Overseas—		
	Bahrain		799
	Ceylon		105
	Christmas Island		1,001
	France		10,130
	Indonesia		198
	Iran		27
	Iraq		11,294
	Japan		100
	Kuwait		17,614
	Malaysia		14,207
	Mauritius		2,293
	Singapore		6,459
	Thailand		8,179
	United Kingdom		688
	United States of America		832
			73,926
	Australian States—		
	New South Wales		361,770
	Victoria		452,125
	Queensland		314,825
	South Australia		239,746
	Tasmania		17,723
	Northern Territory		69,157
			1,455,346
13	*Tanning Substances of Natural Origin*—	n.r.s.	n.r.s.
14	*Essential Oils, Natural, Non-spirituous*—		lb.
	Overseas—		
	Cambodia		336
	Ceylon		251
	China-Formosa		56
	France		14,249
	Germany, Federal Republic of		27,553
	Hong Kong		896
	India		805
	Italy		13,991
	Japan		2
	Malaysia		810
	Netherlands		11,825
	Singapore		4,827
	Thailand		900
	United Kingdom		10,678
	United States of America		23,627
			110,806
	Australian States—		
	New South Wales		69,146
	Victoria		44,852
	Queensland		53
	South Australia		9,837
			123,888
	Total Value of all Exports on this Return		**9,054,590**

(*a*) All figures are preliminary and therefore subject to revision.
(*b*) Excludes Shooks and Staves.
(*c*) Non-conifer only.
(*d*) Excludes sawn conifer.
(*e*) Only a small proportion of wooden furniture involved. Includes articles of bedding and similar furnishings (e.g. mattresses, cushions, pillows, etc.)
n.r.s. Not recorded separately.

APPENDIX 2B

Imports *into Western Australia of Timber, Furniture, Tanning Substances and Essential Oils for the Year ended June 30, 1969 (a)*

	Item and Origin	Quantity	Value
1	*Hardwood Logs (Including poles, posts, piling and other wood in the rough) (b)*	cub. ft.	$
	Overseas—		
	Ghana	2,076	2,106
	Indonesia	25,363	13,014
	Malaysia	772,010	619,384
	Thailand	1,648	15,344
	United Kingdom	....	43
	Origin—Unknown	2	370
		801,099	650,261
2	*Softwoods, sawn, undressed (excluding shooks and staves)*—		
	Redwood and Western Cedar (c)		
	Overseas—		
	United States of America	5,744	10,191
3	*Douglas Fir (c)*—		
	Overseas—		
	New Zealand	121,010	165,386
	United States of America	100,225	178,312
		221,235	343,698
4	*Other (c)*		
	Overseas—		
	Germany, Federal Republic of	3	349
	New Zealand	1,274	2,079
	United States of America	3,236	7,780
		4,513	10,208
	Australian States (*d*)—		
	South Australia	2,913	7,091
	Tasmania	2,554	3,341
		5,467	10,432
5	*Hardwoods, sawn, undressed (excluding shooks and staves)*—		
	Overseas—		
	Brunei	4,477	6,222
	Germany, Federal Republic of	3	109
	Ghana	540	697
	Indonesia	510	514
	Malaysia	1,070,496	1,422,680
	New Zealand	6,698	11,191
	Singapore	14,050	19,043
	Thailand	2,063	13,475
	United Kingdom	45	365
	United States of America	1,457	3,514
		1,100,339	1,477,810
	Australian States—		
	Queensland	30	179
	South Australia	265	632
	Tasmania	2,288	4,927
		2,583	5,738
6	*Shooks and Staves, Undressed (e)*—		
	Overseas—		
	Malaysia	2,233	1,842
	New Zealand	613	1,037
		2,846	2,879
7	*Beadings and Mouldings (f)*—		
	Overseas—		
	Japan	....	125
	Malaysia	....	4,605
	Netherlands	....	963
	New Zealand	....	16,340
	Norway	....	3,367
	United Kingdom	....	7,092
		....	32,492
8	*Sawn Timber, Dressed or Moulded (g)— Flooring (h)*		
	Overseas—		
	Sweden	5,465	8,731
9	*Other*—		
	Overseas—		
	Germany, Republic of	1	165
	Malaysia	6,090	19,556
	New Zealand	8,482	16,622
	Singapore	264	1,200
	United Kingdom	2	18
		14,839	37,561
	Australian States (*i*)—		
	Victoria	355	2,534
10	*Plywood and Veneers*—	sq. ft.	
	Overseas—		
	China—Formosa	383,000	20,806
	Congo—Brazzaville	34,094	310
	France	81,363	1,967
	Gabon	54,821	2,811
	Germany, Federal Republic of	109	55
	Hong Kong	16,450	1,600
	Ireland	784,528	21,454
	Japan	890,687	98,884
	Malaysia	5,366,400	63,509
	Netherlands	400,295	14,747
	New Zealand	112,554	17,459
	Sweden	20,839	1,941
	United Kingdom	970,645	32,601
	United States of America	12,936	2,849
		9,128,721	280,992
	Australian States (*j*)—		
	New South Wales	868,837	73,139
	Victoria	985,372	79,819
	Queensland	4,194,480	635,903
	South Australia	9,925	3,284
	Tasmania	5,032	1,681
		6,063,646	793,826
11	*Reconstituted Wood, also known as Particle Board, Chipboard, Sliverboard, etc.*—		
	Overseas—		
	Surinam	2,496	148
	Australian States—		
	Victoria	948,252	206,417
	Queensland	2,028	395
	South Australia	957,078	172,715
		1,907,358	379,527
	Total, Timber Imports	cub. ft. 2,164,485	4,047,028
12	*Match Splints (f)*—		
	Overseas—		
	Finland	....	65,700
13	*Rulers, any material (b)*—		
	Overseas—		
	China (mainland)	....	1,005
	Germany, Federal Republic of	....	596
	Hong Kong	....	101
	Italy	....	39
	Japan	....	296
	Netherlands	....	246
	Poland	....	28
	United Kingdom	....	17,950
	United States of America	....	73
		....	20,334
14	*Table Mats, Wooden*	n.r.s.	n.r.s.
15	*Wood Floor (k)*—		

APPENDIX 2B—*continued*

Imports *into Western Australia of Timber, Furniture, Tanning Substances and Essential Oils for the Year ended June* 30, 1969 (*a*)

	Item and Origin	Quantity	Value
16	*Manufactures of Wood (except furniture) n.e.i.*—		$
	Overseas—		
	Austria		24
	Belgium—Luxembourg		91
	Canada		692
	China—Formosa		27,883
	China (mainland)		140
	Czechoslovakia		625
	Denmark		7,874
	France		382
	Germany, Federal Republic of		2,327
	Greece		27
	Hong Kong		5,452
	India		5,818
	Indonesia		25
	Italy		2,245
	Japan		28,338
	Kenya		2,053
	Malaysia		3,309
	Netherlands		83
	New Zealand		79,889
	Norway		111
	Philippines		21,662
	Portugal		297
	Singapore		2,709
	South Africa		38
	Spain		1,221
	Sweden		41,674
	Switzerland		349
	Thailand		1,092
	United Kingdom		11,317
	United States of America		1,978
	Yugoslavia		100
	Origin Unknown		578
			249,311
	Australian States—		
	New South Wales		107,952
	Victoria		224,775
	Queensland		16,758
	South Australia		205,286
	Tasmania		277
	Northern Territory		5,804
			560,852
17	*Furniture of any Material (l)*—		
	Overseas—		
	Canada		6,034
	China—Formosa		777
	China—Mainland		2,821
	Denmark		1,755
	France		3,196
	Germany, Federal Republic of		6,802
	Hong Kong		50,989
	India		5,721
	Ireland		89
	Italy		25,250
	Japan		64,602
	Kenya		13
	Malaysia		1,658
	Netherlands		1,827
	New Zealand		74,700
	Norway		8,276
	Pakistan		189
	Philippines		5,608
	Singapore		7,833
	South Africa		1,161
	Spain		13,176
	Sweden		1,804
	United Kingdom		83,832
	United States of America		27,046
	Yugoslavia		575
			395,734
	Australian States—		
	New South Wales		1,108,677
	Victoria		1,232,399
	Queensland		2,995
	South Australia		909,621
	Tasmania		50,584
			3,304,276

	Item and Origin	Quantity	Value
18	*Clothes Pegs, Wooden*	n.r.s.	$ n.r.s.
19	*Tool Handles, Wooden*—		
	Overseas—		
	France		2
	Germany, Federal Republic of		25
	Switzerland		3
	United Kingdom		98
	United States of America		2,689
			2,817
	Australian States (*m*)—		
	New South Wales		51,967
	Victoria		11,548
	Queensland		15,803
	Tasmania		2,719
			82,037
20	*Tanning Substances, Natural Wattle Bark Extracts* (*b*)—		
	Overseas—	cwt	
	Brazil	700	5,489
	Kenya	39	358
	South Africa	6,583	51,950
		7,322	57,797
21	*Other* (*b*)—		
	Overseas—		
	Norway	1,476	3,075
22	*Tanning Substances, Natural and Synthetic Origin*—		
	Overseas—		
	Germany, Federal Republic of	1,792	15,709
	United Kingdom	677	24,838
		2,469	40,547
	Australian States—		
	New South Wales	281	2,297
	Victoria	620	8,399
	Queensland	1	55
	South Australia	53	810
		955	11,561
23	*Essential Oils*, etc.—	lb.	
	Overseas—		
	Brazil	16,800	22,104
	China, Mainland	53,521	25,385
	Dominican Republic	224	1,566
	France	234	1,505
	Germany, Federal Republic of	1,323	1,286
	India	9	3
	Italy	1,120	4,555
	Malagasy	7,099	8,920
	Malaysia	112	491
	Netherlands	225	330
	Seychells	476	1,120
	South Africa	56,601	30,688
	Spain	400	904
	Swaziland	181,923	80,787
	United Kingdom	6	19
	United States of America	2,418	12,484
		322,491	192,147
	Australian States—		
	New South Wales	732	181
	Victoria	6,758	13,981
		7,490	14,162
	Total Value of all Imports on this Return		**9,047,328**

(*a*) All figures are preliminary and therefore subject to revision.
(*b*) Interstate Imports " not recorded separately ".
(*c*) Interstate Imports included in Item 4.
(*d*) Interstate Imports include coniferous " shooks and staves " and dressed timber.
(*e*) Interstate Imports included in Items 4 and 5.
(*f*) Interstate Imports included in Item 16.
(*g*) Interstate Imports included in Item 9.
(*h*) Conifer only, non-conifer included in Item 9.
(*i*) Non-conifer only.
(*j*) Interstate Imports included Blockboard, batten board, lamin-board, and similar laminated wood products.
(*k*) Overseas Imports, nil: Interstate Imports included in Item 11.
(*l*) Only a small proportion of wood involved. Includes bedding and similar furnishings (e.g. mattresses, cushions, pillows, etc.)
(*m*) Includes " brush and broom " handles and the like.

APPENDIX 3

Summary of Exports of Forest Produce since 1836

Year	Timber		Year	Timber		Wood Manufactures	Tanning Materials	Essential Oils
	Cub. ft.	Value		Cub ft.	Value	Value	Value	Value
		£			£	£	£	£
1836(*a*)	10,000	2,500	1901	7,150,600	572,354	....	....	....
1837	....	....	1902	6,256,750	500,533	....	....	....
1838	....	....	1903	7,748,450	619,705	....	859	....
1839	....	....	1904	8,072,300	654,949	....	32,876	....
1840	....	....	1905	8,709,500	689,943	....	154,087	....
			1906	(*c*) 8,830,700	708,993	....	140,720	....
1841	....	....	1907	(*c*) 6,409,550	511,923	....	98,773	....
1842	....	....	1908	(*c*) 9,869,509	813,591	....	79,934	....
1843	....	....	1909	(*c*) 10,830,450	867,419	....	59,633	....
1844	(*b*)	163	1910	(*c*) 12,074,100	972,698	....	93,733	....
1845	....	....						
1846	2,550	255	1911	(*c*) 12,449,500	986,341	....	83,470	....
1847	12,200	1,120	1912	(*c*) 11,297,100	903,396	....	49,004	....
1848	3,350	333	1913	(*c*) 13,619,850	1,089,481	....	47,377	....
1849	....	....	1914 (*d*)	(*c*) 6,279,750	502,152	....	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
			1969 (*e*)	3,052,796	(*g*) 4,984,098	3,802,927	N.r.s.	267,565
			Total	467,948,133	197,718,605	15,356,712	10,925,283	6,992,052

(*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.
N.r.s. Not recorded separately.

APPENDIX 4

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

Year	Timber, Woodware, etc.	Tanning Materials	Essential Oils	Year	Timber, Woodware, etc.	Tanning Materials	Essential Oils
	£	£	£		£	£	£
1848	464	....	....	1900	56,266	1,416	1,105
1849	....	....	....	1901	80,134	1,740	1,546
1850	189	....	....	1902	97,810	3,418	1,751
1851	3,216	....	....	1903	102,383	3,556	1,348
1852	2,479	....	....	1904	157,856	1,322	2,122
1853	790	....	....	1905	98,494	582	1,592
1854	831	....	....	1906	95,229	1,412	1,915
1855	1,464	....	....	1907	122,016	2,767	1,549
1856	1,124	....	....	1908	93,205	2,392	4,584
1857	744	....	....	1909	90,502	4,129	4,033
1858	1,528	....	....	1910	171,280	3,531	3,686
1859	690	....	....	1911	152,133	2,912	4,938
1860	2,005	....	....	1912	167,244	3,089	4,598
1861	1,459	....	....	1913	202,640	2,651	5,392
1862	1,920	....	....	1914	78,736	629	2,823
1863	1,568	....	....	1914–15	107,763	2,082	4,988
1864	894	....	....	1915–16	76,849	3,313	4,788
1865	548	....	....	1916–17	75,681	2,848	3,848
1866	1,442	....	....	1917–18	58,305	2,020	4,358
1867	1,727	....	....	1918–19	62,824	1,181	4,168
1868	1,451	....	....	1919–20	100,083	3,748	10,043
1869	1,408	....	....	1920–21	171,654	*4,899	6,106
1870	1,518	....	....	1921–22	92,448	5,865	6,577
1871	736	....	....	1922–23	109,428	6,991	4,033
1872	1,660	....	....	1923–24	133,983	2,790	3,301
1873	1,008	....	....	1924–25	161,893	2,670	4,429
1874	1,774	....	....	1925–26	144,989	5,826	4,449
1875	2,707	....	....	1926–27	162,193	8,971	4,254
1876	3,098	....	....	1927–28	183,196	9,648	6,955
1877	2,036	....	....	1928–29	241,601	6,894	4,413
1878	2,947	....	....	1929–30	197,532	10,825	3,980
1879	2,340	....	....	1930–31	76,533	4,145	3,160
1880	3,061	....	....	1931–32	164,496	4,705	3,505
1881	3,639	....	....	1932–33	197,916	4,903	3,421
1882	3,692	....	....	1933–34	183,944	4,310	3,888
1883	6,667	....	....	1934–35	211,056	4,076	5,040
1884	2,930	....	....	1935–36	228,451	5,401	3,921
1885	11,479	....	....	1936–37	257,164	5,267	4,810
1886	17,888	....	....	1937–38	270,126	4,777	6,560
1887	8,136	....	....	1938–39	254,315	3,974	7,014
1888	4,461	....	....	1939–40	259,399	6,802	23,027
1889	7,686	....	....	1940–41	249,111	3,798	32,399
1890	14,979	....	....	1941–42	283,611	15,846	33,828
1891	18,406	....	....	1942–43	163,480	6,250	47,718
1892	26,713	....	....	1943–44	149,928	7,883	68,871
1893	14,493	....	....	1944–45	148,838	9,264	75,449
1894	17,964	....	....	1945–46	†219,466	19,573	56,295
1895	47,128	....	....	1946–47	386,465	12,395	78,091
1896	5,381	....	....	1947–48	345,508	8,019	96,769
1897	164,552	....	....	1948–49	470,755	8,662	42,926
1898	55,566	....	....	1949–50	521,815	24,923	51,197
1899	45,689	....	....	1950–51	640,059	21,147	161,358
				1951–52	1,037,499	18,494	167,697
				1952–53	509,667	21,493	69,804
				1953–54	923,367	45,202	58,019
				1954–55	816,052	27,395	76,464
				1955–56	839,581	27,315	131,758
				1956–57	830,700	35,403	99,863
				1957–58	873,520	28,310	101,680
				1958–59	815,300	9,365	62,983
				1959–60	895,845	14,608	74,199
				1960–61	1,203,641	12,621	60,942
				1961–62	1,236,106	13,853	130,876
				1962–63	1,978,937	9,868	63,739
				1963–64	1,903,772	19,412	37,494
				1964–65	2,289,999	21,677	69,741
					$	$	$
				1965–66	4,856,090	60,963	132,862
				1966–67	6,458,909	68,928	191,796
				1967–68	8,135,532	75,657	143,696
				1968–69	8,731,114	109,905	206,309
				Total	80,839,809	1,519,959	4,950,231

* 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
				1969 (c)	40,385,056	5,676,938	46,061,994
				Total	....	....	2,876,765,062

* 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.

ALEX. B. DAVIES, Government Printer, Perth, Western Australia