FOR YEAR ENDING 30TH JUNE, 1965

Forests DEPARTMENT

1965 ANNUAL REPORT

WESTERN AUSTRALIA

Cover . . .

"A fine stand of karri regrowth 90 years old. The tree in the left centre foreground has a breast high girth of 90 inches and the average height of the dominants in the stand approaches 200 feet. The area, near Lefroy Brook some 10 miles north-west of Pemberton was originally cleared in 1867 to grow wheat, but abandoned soon after."

Photograph by courtesy of W.A. Newspapers Ltd.

REPORT

on the operations of the

FORESTS DEPARTMENT

WESTERN AUSTRALIA

for the year ended

30th JUNE, 1965

by

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

Conservator of Forests

☆

PRESENTED TO BOTH HOUSES OF PARLIAMENT

11087—(1)

Forests Department,
PERTH,
30th September, 1965

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, 1965.

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

11087—(2)

Frontispiece

" The Four Aces "

These provide a good example of the type of karri trees to be found in prime virgin karri forest. Their individual measurements from left to right are :—

G.B.H.	Bole Length	Total Height
16 ft. 5 in.	92 ft.	220 ft.
16 ft. 5 in.	134 ft.	225 ft.
16 ft. 5 in.	150 ft.	260 ft.
22 ft. 0 in.	122 ft.	250 ft.

Photograph by courtesy of W.A. Newspapers Ltd.

CONTENTS

PRINCIPAL OFFICERS

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

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

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

FORESTS DEPARTMENT

I. STATISTICAL SUMMARY OF MAJOR OPERATIONS

Timber Production (in cubic feet).

Total Production Sawn Timber	17,052,025	
Exports—Interstate	3,027,996	(17·8 per cent.)
Overseas	1,688,300	(9·9 per cent.)
Local Consumption	12,335,729	(72·3 per cent.)

Recent Trends in Production and Consumption.

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

* From 1963–64, these figures exclude persons employed in associated timber yards in the Metropolitan Area.

		1964–65		1963–64
Total Cut		Jarrah	36,934,837	35,940,018
		Karri	8,854,282	8,736,677
Log Volumes (in cubic feet)	51,246,667	Wandoo	2,509,252	49,651,089 2,562,754
		Pine	2,324,458	1,846,092
		Other	623,838	765,548
Made up as follows:—				
From State Forest and Crown Land	41,430,800	(80·8 per cent.)		(79·4 per cent.)
From Private Property	9,815,867	(19·2 per cent.)		(20·6 per cent.)

Value Produced

Total Value of Timber (on mill skids)	£12,538,350	£11,348,800
Total Value of other Forest Products	£3,253,500	£2,893,800

Source and Use of Funds

	1964–65	1963–64
Source:		
Revenue—		
Royalties on Timber, etc.	1,153,864	1,075,884
Departmental Sales of Logs, etc.	657,003	549,697
	1,810,867	1,625,581
General Loan Fund	150,000	175,000
Federal Aid Road Grant	76,000	76,000
	2,036,867	1,876,581
Use:		
Consolidated Revenue Fund	623,820	545,087
Reforestation Fund	1,060,198	1,128,401
General Loan Fund	150,000	175,000
Treasury Unemployment Relief Funds	....	10,017
	1,834,018	1,858,505

11087—(3)

Forest Area

Additions to State Forest	2,639	acres
Excisions from State Forest	411	,,
Land Purchased for Pine Planting	160	,,
Total Area of State Forest	4,461,266	,,

Reforestation

Cut-over area treated for regeneration	115,334	,,

Afforestation

Area planted with pines, 1964	3,413	,,
Pinus radiata	1,845	acres
Pinus pinaster	1,566	,,
Other species	2	,,
Total area of pine plantation established	41,289	,,
Pinus radiata	16,292	acres
Pinus pinaster	24,595	,,
Other species	402	,,
Total experimental areas (additional)	787	,,

Management

Survey:—		
Theodolite surveys	110	miles
Other surveys	184	,,
Map sheet compilation	3,140	sq. miles
Air Photo Interpretation—		
Complete	150,000	acres
Preliminary	831,000	,,
Assessment—		
Detailed	2,119	,,
Area covered	130,600	,,
Type maps produced, covering	1,220,000	,,
Engineering, new works:—		
Roads and tracks	483	miles
Telephone lines	11	,,
Houses and buildings	3	(No.)

Protection

Controlled burning	885,492	acres
Fire Outbreaks:—		
Number	214	
Area burnt	3,588	acres

Nurseries (Hamel and Dryandra)

Trees produced for—	
Private buyers	136,144
Forests Department	116,019

Sandalwood

Quantity exported	695	tons

2. REVENUE AND EXPENDITURE

Revenue from all sources was £1,810,867 compared with £1,625,581 the previous year. In the following, figures in brackets refer to 1963–64.

Of the net revenue £1,071,043 (£972,899) was transferred to the Forests Improvement and Reforestation Fund. Expenditure charged against this Fund was £1,046,840 (£1,128,401) and the balance in the Fund at 30th June, 1965, was £306,952 (£185,421) which includes reserves for Como Research Building, £60,000 and Fire Control £100,500.

The return from thinning operations in Departmental pine plantations was £87,235 (£73,559).

3. THE FOREST AREA

State Forests (Forests Act, 1918-1954)

The total area of State Forest at 30th June, 1965, was 4,461,266 acres which is an increase of 2,228 acres compared with the total area at 30th June, 1964.

During the year, additions totalling 2,639 acres were made to State Forest and 411 acres were excised and reverted to the Lands Department.

	June, 1964 Acres	June, 1965 Acres
Jarrah	3,190,157	3,190,853
Karri	171,041	171,049
Jarrah and Karri (mixed)	655,266	655,241
Jarrah and Wandoo (mixed)	176,815	176,815
Tuart	5,995	5,995
Tingle Tingle	10,687	10,687
Karri and Tingle (mixed)	13,885	13,885
Sandalwood	1,930	1,930
Pine Planting	176,041	177,774
Mallet	57,069	56,885
Miscellaneous	152	152
	4,459,038	4,461,266

Timber Reserves (Forests Act, 1918-1954)

The area held under Timber Reserve at 30th June, 1965, was 1,857,486 acres, which is an increase of 12,621 acres on the area at 30th June, 1964.

	June, 1964 Acres	June, 1965 Acres
Jarrah	88,644	93,638
Wandoo and Jarrah	53,520	61,320
Jarrah and Karri	78	78
Pine Planting	5,908	5,908
Mallet	648	475
Sandalwood	23,100	23,100
Mining Timber, Firewood, etc.	1,672,967	1,672,967
	1,844,865	1,857,486

Land Alienations, etc.

During the year ended 30th June, 1965, 284 applications for land and road protections and closures were received covering a total of 320,878 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 1,375	acres 22,227	acres 25,095	acres 9,158	acres 356	acres 43,884

No. of alienations approved 87
No. of Leases approved 20

4. SAWMILLING, TIMBER INSPECTION AND FOREST PRODUCE

Timber Production and Distribution

The production of 17,052,025 cubic feet of sawn timber was an increase of 963,856 cubic feet on last year's figure. Of this total production 3,265,739 cubic feet were from timber from private property, which is a reduction of 45,541 cubic feet on last year.

During the year ended 31st December, 1964, 206 sawmills were registered, of which 117 operated on Crown Land and 89 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 (1829–1965) is shown in Appendix 5.

Departmental plantations yielded 2,280,657 cubic feet of pine logs, which was an increase of 28 per cent. on last year's figure.

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

	Cubic Feet
Karri	151,991
Pine	126,946
Jarrah	1,700
Other	471
	281,108

Sawn sleepers produced during the year amounted to 4,260,369 cubic feet of which 1,497,262 cubic feet were from private property. All sleepers produced were inspected and 15,410 cubic feet were re-inspected.

Other sawn timber inspected during the year amounted to 935,644 cubic feet.

Interstate exports rose by some 230,000 cubic feet, but overseas exports fell sharply by 780,000 cubic feet as compared with the previous year. This fall was due to a decrease in sleeper orders of nearly one million cubic feet but other sawn jarrah and karri overseas exports actually rose by some 80,000 cubic feet each.

Local production used within the State rose by 1·5 million cubic feet, due entirely to a higher demand for sleepers.

The value of imports increased by £400,000 due very largely to the doubling in demand of sawn Malaysian timbers.

Distribution	Sleepers	Other Sawn Timber		Total
	All Species	Karri	Jarrah and Other Species	
	cub. ft.	cub. ft.	cub. ft.	cub. ft.
Interstate	466,993	1,147,543	1,413,460	3,027,996
Overseas	766,913	309,037	612,350	1,688,300
Local	3,026,463	1,793,078	7,516,188	12,335,729
Total	4,260,369	3,249,658	9,541,998	17,052,025

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

Year	From Crown Lands		From Private Property		Total Quantity	Estimated Value of Timber Obtained
	Sawn Timber other than Sleepers	Sawn Sleepers	Sawn Timber other than Sleepers	Sawn Sleepers		
	cub. ft.	cub. ft.	cub. ft.	cub. ft.	cub. ft.	£
1963/64	10,433,973	2,342,916	1,861,969	1,449,311	16,088,169	11,348,800
1964/65	11,023,179	2,763,107	1,768,477	1,497,262	17,052,025	12,538,350

TIMBER PRODUCTION

PRODUCTION OF TIMBER FOR YEAR ENDED 30th JUNE, 1965 (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	28,966,991	8,443,644	1,338,094	300,637	31,100	8,034	2,280,657	61,643	41,430,800	13,786,286
Private Property	7,967,846	410,638	1,171,158	179,042	42,250	329	43,801	803	9,815,867	3,265,739
Total	36,934,837	8,854,282	2,509,252	479,679	73,350	8,363	2,324,458	62,446	51,246,667	17,052,025

In addition to the above 43,775 tons of Wandoo logs were treated for Tannin extract.

Firewood Production and Consumption

The firewood consumption for the State was estimated at 703,000 tons of which 33 per cent. was used for industrial and mining fuel. The quantity of sawdust burnt as fuel was 141,362 tons.

The following table accounts for approximately 46 per cent. of the firewood consumed, the balance being obtained from private property for which specific records are not available.

Of the total quantity consumed 41 per cent. was obtained from Crown Land.

	Crown Land Tons	Private Property Tons	Total Tons
Production			
Domestic Firewood—			
Firewood Permits (South-West)	49,687	327	50,014
Mill Waste sold as firewood (estimated 50 per cent. of total)	40,237	16,170	56,407
Domestic use on Goldfields	24,269	....	24,269
Total Domestic Firewood as shown by returns	114,193	16,497	130,690
Industrial Firewood—			
Supplied under License, Nos. 3 to 8 Pumps	16,838	....	16,838
Other Pumps	673	....	673
Factories, etc.	61,514	327	61,841
Mill Waste sold as firewood (estimated 50 per cent. of total)	40,237	16,170	56,407
Mill Waste used as firewood	53,034	1,571	54,605
Total Industrial Firewood as shown by returns	172,296	18,068	190,364
Mining Firewood	2,816	....	2,816
Total Firewood Produced (as shown by returns)	289,305	34,565	323,870

Consumption	Tons	
Domestic (estimated)	456,350	(at 2 tons per dwelling)
Industrial	226,337	(ex Govt. Statistician)
Pumping Stations	17,511	(as per F.D. Returns)
Mining....	2,816	(as per F.D. Returns)
	703,014	

Other Forest Produce

Piles and poles obtained from Crown Lands during the year amounted to 941,217 lineal feet compared with 832,497 lineal feet for the previous year. Of this total 28,037 lineal feet were produced from Departmental operations. Returns from private property show 291,154 lineal feet produced as compared with 159,555 lineal feet for the year 1963/64.

There were approximately 525,285 posts and strainers cut from Crown Lands during the year, of which 19,338 were produced by this Department. Records received show 22,407 posts obtained from private property, but this is only a small percentage of the total production from this source.

The quantity of Mallet Bark obtained from Departmental plantations was 86 tons, and 209 tons were obtained from private property, making a total of 295 tons.

Apart from sawn timber supplied by sawmills, 17,770 tons of mining timber were used. This was all from Crown Lands, 11,629 tons being from the inland forests.

There was an increase from 10,282 to 12,965 in the number of Christmas trees sold last year, the revenue from sales being £2,100.

The following table shows the quantity of minor forest produce obtained during the year. The estimated total value of this forest produce was £3,253,500.

FOREST PRODUCE NOT ELSEWHERE INCLUDED IN PRODUCTION TABLES
1964–1965

Description of Forest Produce	South-West Division and Agricultural Areas			Northern, Central and Eastern Goldfields	Totals
	Supplied by Department	Other Crown Lands	Private Property*		
Mining Timber .... Tons	26	6,115	....	11,629	17,770
Sleepers for Goldfields Woodline .... Cu. ft.	....	....	....	3,063	3,063
Charcoal (includes 41,848 tons ex Wundowie) Tons	....	41,858	....	....	41,858
Piles and Poles .... Lin. ft.	28,037	868,814	291,154	44,366	1,232,371
Fence Posts and Rails .... No.	18,755	148,920	22,407	329,260	519,342
Strainer Posts .... No.	583	5,360	....	....	5,943
Mallet Bark .... Tons	86*	....	209*	....	295*
Wandoo Timber for Tammin Extract .... Tons	....	28,925	14,850	....	43,775
Bean Sticks, etc. .... No.	....	32,200	....	5,340	37,540
Boronia Blossom .... Lbs.	....	202	1,073	....	1,275
Stone .... Cu. yd.	....	94,398	....	....	94,398
Sand .... Cu. yd.	....	1,025	....	....	1,025
Scout Staves .... No.	288	....	....	....	288
Sawdust consumed as Fuel† .... Tons	....	141,362	....	....	141,362

* Complete figures from private property are not available, only information furnished to the Department has been included.

† Apportionment between Crown Land and Private Property unknown.

Sandalwood

An increased demand for sandalwood from overseas seriously affected the stock position at Fremantle and great difficulty was experienced in obtaining sufficient logwood to meet orders. Every effort was made to obtain suitable operators, but the industry is suffering from the labour shortage prevailing throughout the State.

The price paid to sandalwood getters for fair average quality logwood was increased by £2 per ton free on rails country sidings as from the 1st March, 1965.

A total of 812 tons of sandalwood was delivered during the year as compared with 422 tons for the year ended the 30th June, 1964, and this quantity was made up as follows:—

	Tons
Crown Lands—	
Logwood (including roots and butts)	731
Pieces	74
Private Property—	
Logwood (including roots and butts)	7
	812

Exports amounted to 695 tons compared with 531 tons for the previous year.

No orders for logwood were placed by distillers, but 133 tons of roots and butts severed from the Crown Lands logwood at Fremantle were delivered to them for oil distillation purposes.

The quantity of sandalwood oil distilled was 9,729 lbs. and 4,616 lbs. were exported interstate and overseas during the year.

5. TIMBER UTILIZATION

Design and Construction

With the addition during the year of a small breaking down unit the Harvey pine sawmill is now able to produce timber up to 25 feet in length.

A start has been made on the building of a small mill at Margaret River to saw logs from the Keenan pine plantation.

It has now been proved that the conical sheet steel mill waste burner set up at Ludlow can satisfactorily burn green pine sawdust without the addition of slab waste. Similarly, green tuart sawdust can also be burnt by itself and there is no reason to doubt that jarrah sawdust could also be dealt with. Therefore there are no longer any technical difficulties in the way of burning all waste at sawmills in a manner which prevents the setting up of a fire hazard and the industry is being encouraged to replace fire heaps with conical burners. A Perth firm is now manufacturing them here, thereby saving the industry the very considerable freight charges on burners from the Eastern States.

Grading Rules

Five meetings of the Western Australian Joint Timber Committee were held during the year. The grading rules for flooring, lining, siding and mouldings were published during the year as A.S. 024, 034, 035, and 038 respectively. The revision of A.S. 036, Joinery Stock, is about to be printed.

Miscellaneous Tests

The test on cooling tower fill was continued but did not show any change in the rating of the various timbers. In order to test the relative effectiveness of various preservative treatments against soft rot, C.S.I.R.O. has now sent out a second series of tower fill samples for testing in towers in which the first series showed the hazard to be very high. One set of the second series is now exposed in a cooling tower in Perth.

The summary of the results of the fifth annual examination of the marine borer test specimens throughout Australia confirmed that teredo attack at Port Hedland was very much more severe than at any other test site in Australia, and has convinced C.S.I.R.O. that more extensive testing is necessary around the Northern coastline.

After twelve months' exposure Clear Finish Test Number 5 has shown that the paint industry has not so far discovered a clear finish for timber which can be considered satisfactory for exterior exposure.

Column tests on round and split mine props carried out at Collie with a simple hydraulic press showed that, size for size, round props are equal in strength, perhaps even slightly superior, to split props. Since round props carry more sapwood of low durability than do split props the questions of rate of decay of sapwood in the mines and an effective and economic preservative treatment for the sapwood are being investigated.

Powder bark wandoo has finally been established by C.S.I.R.O. through fungus and termite exposure tests as a species equal in durability to ordinary wandoo.

Safety in Industry

Four meetings of the Timber Industries Safety Committee of the National Safety Council were held during the year.

Five safety training courses for foremen employed in the timber industry were conducted by officers of the National Safety Council.

Four meetings of the Forests Department Safety Committee were held. Six field officers, five from Fire Control Branch and one from Utilization Branch, whose normal duties bring them into contact with the field employees in the Divisions were appointed as Safety Officers and were given a four-day safety training course by officers of the Safety Section of the Department of Labour. It is hoped that the day-to-day observation, advice and instruction that these officers will carry to employees will materially reduce the number and severity of accidents.

6. FOREST MANAGEMENT

Working Plans

The current increment plot establishment programme was completed this year with the demarcation of a further 13 plots in the karri zone. This brings the number of plots established to almost 150, and the major emphasis is now concentrated on their regular remeasurement and the processing of the resultant data. These figures will provide an exact and continuing picture of the growth rates of local hardwoods under varying natural conditions and silvicultural regimes.

The laborious calculations involved in extracting these growth figures lend themselves very readily to processing by automatic data processing computers, and preliminary investigations have been made into the design of punch cards for recording this data.

Automatic data processing methods have also been used in the preparation of a much-improved Karri Volume Table, which incorporates an extended range of height and girth classes. The Jarrah and Karri Volume Tables were combined into a single booklet for the sake of convenience.

The Pine Site Quality mapping programme was continued, with a total of 1,600 acres assessed and mapped in plantations between Mundaring and Nannup. The increase in the rate of planting which took place in the mid-1950's is now beginning to strain the resources of Working Plans staff to the utmost. This year a major training programme was instituted in an effort to spread the work load, and a total of 18 Working Plans and Divisional officers were instructed in the techniques of site quality assessment. At the same time, investigations were commenced into ways and means of simplifying the present methods of site quality assessment by the use of aerial photos and modern mensurational techniques.

The assessment programme was continued, both as regards the standard sampling of aerial photograph interpretation types as well as producing volume estimates for special projects, such as the availability of mining timber supplies for Collie. Two thousand acres of actual assessment was carried out, covering a total area in excess of 130,000 acres.

Work continued on the collection of data for the 1965 revision of the General Working Plan. Basic inventory data for the whole forest area has now been collated, and overall area and volume figures have been summarised as the basis for revision of the 1960 Preliminary Forest Inventory.

Surveys and Mapping Production

Survey activities have concentrated upon obtaining horizontal and vertical control for the Wild B.8 stereo plotter, although the major survey network was also extended by 110 miles during the year. The acquisition of the Wild B.8 has reduced the need for extensive linear traverses and has also, for the first time, provided facilities for contour mapping in steep plantation areas. Sixty miles of accurate levelling were run in the Blackwood Valley for this purpose, and 40 horizontal fixations with barometric heights were made to provide mapping control for the Nannup, Julimar and Mundaring map sheets, whilst a further six miles of accurate levelling were run at Gnangara to assist in research studies of pine growth potential on coastal sands.

Charting of all the above work along with 184 miles of chain and compass traverses is well in hand.

Emphasis has been placed on improving the reliability of the 1 mile to 1 inch map series and also on using colour to improve the legibility of this series, which now shows areas of karri and wandoo.

During the year, a new Manjimup 80 was printed in four colours and a revised edition of the Shannon map sheet was produced in the same form. In progress, are revision of the Kirup, Perup and Walpole map sheets, and production of a new Chudalup map sheet. The Harvey map sheet was re-issued in its present form and the Vasse and Karridale map sheets were prepared as temporary lithographs.

Photogrammetry

Almost 1,460 photographs were received from the Lands and Surveys Departments and the Wild B.8 stereo plotter has permitted greater use of 1/40,000 scale photographs for topographical mapping. Larger scale photographs are still required for detailed vegetation mapping in the hardwood forest.

Type mapping covered nearly 1,220,000 acres, and 62 standard base maps were produced. Using up to date air photographs new plans were prepared or existing plans revised for 15 plantations.

Sketch mapping of inland areas covered just over 1,000,000 acres, bringing the total area of sketch mapping to 2,127,600 acres and of more detailed type mapping to 12,457,500 acres, including some inland and eastern wandoo areas.

Forest Engineering

Engineering projects during the year included the construction (483 miles) and maintenance (5,469 miles) of forest roads, tracks and firelines.

Plant and Equipment

All items of vehicle and mobile plant were maintained at the same standard of reliability as the previous year, but with a reduction in total costs.

Major items of equipment fabricated within the work-shops include an experimental truck-mounted fire fighting unit for Nannup plantations, one truck-mounted fire-line blade for fire duties, and one front-mounted blade for wheel tractor operation on fire lines. Other construction included steel tanks for fire pumpers, hose reels, chemical boom sprays for tractors, seedling nursery and research implements, and a new design of portable metal safety screens for use in the workshops as eye protection from welding flash.

An improved design of heavy duty fire pumper has been assembled and tested, being composed of a locally manufactured pump and an Australian made engine. Six units have been prepared for use in various centres.

The average number of workshop tradesmen has been maintained on an equal basis to the previous year, and the number of apprentice mechanics has been increased to fifteen.

Departmental Buildings

Construction was commenced on the new Research and administration buildings at Como.

A further three houses were built and two purchased, bringing the total number of Departmental houses to 469.

The shifting of houses from the outlying settlements of Tallanalla to Harvey and Heartlea to Manjimup was commenced. Changing times and social attitudes to living in small isolated communities established 20 to 30 years ago has made it necessary to shift these houses to larger towns, if a satisfactory work force is to be retained. This concentration of work force is also made possible by the better road systems and, faster transport now available for covering large forest areas from central locations.

Communications

Radio.—The installation of further V.H.F. radio equipment in the Busselton, Manjimup, Pemberton and Shannon River divisions was completed as planned.

The Busselton division is the first to use V.H.F. radio for direct reporting of fire sightings. Costs of installation and maintenance of telephone lines have been rising and it is hoped that this experiment will reduce reporting costs.

Plans have been made and equipment obtained to expand the radio system to cover the area north of Yanchep as far as Moore River. In addition a repeater station will be installed on Mt. Dickson look-out tower, 15 miles south of Nannup, to reinforce signals in that area, and another repeater station placed on Mt. Frankland to give coverage to the Walpole district.

Modifications and improvements were made to repeater stations for purposes of standardisation and interchangeability, both important factors in maintenance.

Telephone.—The bush telephone system continues to operate satisfactorily. Most of the old telephones have been withdrawn and replaced by more efficient modern instruments, and modern switchboards have been installed at all centres to raise the efficiency of telephone circuits. Eleven miles of new telephone line were erected.

7. REFORESTATION

The programme of stand improvement by trade and salvage cutting, thinning and the removal of culls, continues in the northern jarrah forests. An effective and economic means of thinning jarrah pole stands has been developed and is reported in some detail later in this Report under Silvicultural Research.

Silvicultural systems in relation to trade cutting and subsequent regeneration are being investigated in the karri forest regions. Model stands are being prepared to assess the effects of different systems on management, protection and utilisation.

During the year 58,834 acres of virgin State Forest were cut over under the West Australian selection system of treemarking. This consisted of 42,486 acres of jarrah, 5,853 acres of karri, 10,350 acres of wandoo and 145 acres of other species. In addition, 56,500 acres of State Forest cut over in the past were again logged.

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

	Acres
Jarrah	2,302,245
Karri	112,635

8. AFFORESTATION

Establishment

A record area of 3,413 acres of pine plantation was established during the year. Clear felling of 280 acres brings the net area of plantations as at 30th June, 1965, to 42,076 acres, including experimental areas of 787 acres.

The total area of pine plantation established by the Department to 30th June, 1965, is as follows:—

Plantation	*P. radiata*	*P. pinaster*	Other Species	Total
Wanneroo	39	13,486	47	13,572
Metropolitan	10	2,460	12	2,482
Mundaring	2,074	1,171	156	3,401
Gleneagle	114	836	24	974
Harvey	1,694	3,460	53	5,207
Collie	2,669	12	2	2,683
Ludlow-Willcock	344	2,528	28	2,900
Keenan	803	402	17	1,222
Grimwade	3,929	178	17	4,124
Nannup	3,896	....	3	3,899
Pemberton	585	62	43	690
Manjimup	135	....	....	135
Total Established Plantations	16,292	24,595	402	41,289
Experimental Areas	153	567	67	787
Grand Total	16,445	25,162	469	42,076

11087—(4)

The 1964 planting was distributed over the following plantations:—

	Pinus Radiata	*Pinus pinaster*	Other Species	Total All Species
Metropolitan—				1,168
Gnangara	....	573	....	
Pinjar	32	367	....	
Neaves	....	179	....	
Somerville	....	17	....	
Mundaring—	9	90	....	99
Gleneagle	17	32	....	49
Harvey—				618
Harvey Hills	292	....	....	
Myalup	10	118	....	
McLarty	51	147	....	
Collie	364	....	....	364
Grimwade	392	....	....	392
Nannup	387	....	....	387
Ludlow	....	43	....	43
Manjimup	135	....	....	135
Pemberton	156	....	2	158
	1,845	1,566	2	3,413

In addition, 25 acres were planted at Esperance and a number of experimental plots were established.

Roundwood Production

The total production of roundwood from Departmental pine plantations was 2,280,657 cubic feet, the highest yet recorded and 28 per cent. above last year's figure.

The following figures show the steady rise in production in recent years:—

Year ended 30th June	Cubic feet
1950	397,347
1955	947,793
1960	1,336,825
1961	1,395,701
1962	1,435,085
1963	1,461,008
1964	1,781,588
1965	2,280,657

Removals, mainly from thinnings, were made up as follows:—

Category	Cubic feet
Sawlogs	1,921,671
Chipboard logs	203,450
Peeler logs	126,946
Poles (for pearl culture)	14,719
Fence posts	8,971
"Woodwool" logs	4,900
	2,280,657

The new chipboard industry established last year in the Metropolitan area obtained large quantities of small size thinnings of *P. pinaster* from Metropolitan plantation. There was an increased demand in all other categories, particularly for sawlogs and peelers.

Log volumes obtained from the various plantations were as follows:—

	Cubic feet	Cubic feet
Metropolitan		750,791
Somerville	408,464	
Gnangara	245,475	
Collier	96,852	
Mundaring		435,978
Gleneagle		8,874
Harvey		209,307
Myalup	99,050	
Harvey Weir	97,707	
Hamel	12,550	
Collie		1,500
Grimwade		232,858
Nannup		2,550
Busselton		597,857
Keenan	300,903	
Ludlow	296,954	
Pimelia		38,608
Miscellaneous Forest Produce Licences		2,334
		2,280,657

Sawn Production

The total sawn output from all sources amounted to 800,399 cubic feet. Production by species was as follows:—

P. pinaster	419,543 cub. ft.
P. radiata	380,856 cub. ft.
	800,399 cub. ft.

There was a marked increase in demand for both case and board material during the year, and the Education Department obtained a greater quantity of dry sawn and dressed pine for use in its manual training centres.

Mallet Plantations

The total area of mallet plantations remains at 19,111 acres.

Eighty-six tons of chipped mallet bark were produced and 23 tons of mining timber, all from thinnings, supplied from these plantations.

Inland Arboreta

A further six arboreta were established in the agricultural areas during the winter of 1964, bringing the total to 56. Four of these plots were located in the Boxwood Hills district some 20 miles south from Jerramungup.

It is estimated that there are now 9,000 trees of many different species growing in a wide range of soils and climatic conditions, ranging from Yuna in the north to Boxwood Hills and Esperance in the south, and Rottnest Island in the west to Kalgoorlie in the east.

Planting: The standard procedures of establishment were again carried out. Where the ground was hard a ripper was run in two directions and the trees planted at the intersections of the ripped lines. Early plantings took place during a dry period and one to two gallons of water were given to each young tree planted. Survivals were comparable with those planted under wet conditions.

Survival: Severe frosts took a heavy toll of the young plants on two sites and the lack of follow-up cultivation seriously affected another plot. As a result, the overall survival figure of 74 per cent. was much lower than usual.

Maintenance: The mobile maintenance unit consisting of a 7-ton truck carrying a tractor and 6-disc Rotensor plough and towing a caravan, again operated through the inland areas. Plots in heavier soil types were completely ploughed, while those on light soils were only cultivated close to the tree lines leaving an unploughed strip to minimise wind erosion. Hand cultivation was carried out around the younger trees and other maintenance consisted of removing tree guards, pruning the lower limbs of large trees and a general tidying up of the 40 arboreta visited. This work was carried out during September, 1964.

The co-operation of the Department of Agriculture, Shire Authorities and individual farmers in this work was of considerable assistance and is greatly appreciated.

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

Tree Nurseries

The number of trees supplied by the Hamel and Dryandra nurseries to private buyers on farms and in country towns, increased by 41,712 to a total of 136,114. In addition, 123,160 pine seedlings from plantation nurseries were sold to the public.

River Gum, with 22,967 plants distributed, retained its popularity, followed by Sugar Gum (10,543), Dwarf Sugar Gum (6,871), Tuart (6,446) and Coral-flowered Gum (6,011).

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

Nursery	Number of Plants Sold			Departmental Use		Number of Species
	Potted Stock	Tray Stock	Open Rooted Plants	Pines	Other	
Hamel	58,195	11,350	14,099	92,844	20,934	132
Dryandra	46,900	5,600	....	....	2,241	91

Seed Supplies

Sales of seed to Australian and overseas buyers declined during the year. The total sales amounted to £4,133, compared with £7,436 for last year. Included in this total was an order for Morocco to the value of £1,548.

Kalgoorlie District officers, again collected the bulk of the seed taken into the store during the year.

The value of seed, of all species, held in store, was £12,646, while an additional 1,425 lb. of conifer seed, mainly for Departmental use, was taken into stock.

Germination tests carried out during the year totalled 185.

9. PROTECTION

FIRE PROTECTION

State Forest under Protection

Indigenous Forest	4,200,000 acres
Pine Plantations	42,076 ,,
Mallet Plantations	19,111 ,,

The Fire Season

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

	Jarrah	Karri
Rainfall	Below average for November, February and April. Above average in October, December and March.	All months above average. March was a record.
Temperature	Below average from October to January inclusive. Above average February, March and April.	Generally about average.
	Highest 103° in January.	Highest 103° in January.
	4 days above 100°.	2 days above 100°.
	26 days above 90°.	11 days above 90°.
Relative Humidity	45 days 16–26 per cent.	13 days 16–26 per cent.
	10 days 10–16 per cent.	3 days 10–16 per cent.
	5 days below 10 per cent.	None below 10 per cent.
Fire Hazard	12 days Dangerous.	One day Dangerous.
	16 days Severe Summer.	11 days Severe Summer.
	Season's Mean Hazard 5·1.	Season's Mean Hazard 4·1.
	Mean of Past Fire Seasons 5·4.	Mean of Past Fire Seasons 4·5.

Controlled Burning

Mild conditions early in the season curtailed spring burning in some of the northern divisions, and early heavy rains prevented normal autumn burning in some of the southern areas. Despite this, the total area burnt was 885,492 acres, almost equal to last year's satisfactory figure.

Suspensions of the prohibited burning times were obtained to complete the programme of regeneration burns in the karri forest region.

Prescribed Burning—	Acres
General	781,569
Advance and Top Disposal	103,382
Firebreaks	541
Total	885,492

Detection

Two new fire lookout towers, one at Mowen in the Margaret River district, and the other at Garvin overlooking the Lewana pine plantation in the Nannup division, were manned for the first time.

Some difficulty was experienced in obtaining towermen for some of the higher towers in the karri forest region.

Manning of Towers—	Jarrah	Karri
First Watch	19/10/64	9/11/64
Last Watch	15/4/65	11/4/65

Communications

A third channel of the V.H.F. radio communication was introduced during the year and coverage extended over most of the southern region. Complete coverage should be attained next season. Except for some slight " teething " troubles with some of the repeater stations the network performed very satisfactorily.

A number of " Citizen Band " walkie-talkie radios were purchased to give better communication around fires and within plantations and they gave every satisfaction.

Fires and Fire Damage

The total number of fires attended by Departmental gangs was 214, the lowest on record. This figure is 67 below that of last year and well below the overall average of 350.

The following table sets out the principal causes:—

Escapes from Settlers' burning	51
Escapes from Prescribed burning	43
Hunters and Travellers	42
Children	15
Deliberately lit	9
Other Government Employees	6
Natives	6
Householders	5
Bush workers	5
Lightning	5
Tractors	4
Locomotives	4
Mill surroundings	3
S.E.C. Mains	2
Rubbish Tips	2
Spontaneous Combustion	1
Unknown	11
Total	214

Escapes from settlers' burns again heads the list with 23·8 per cent. as against 22·4 per cent. in the previous year. Fires caused by hunters and travellers increased from 13 per cent. last year to just under 20 per cent. for the year under review.

The total area burnt was 3,588 acres, made up as follows:—

Acres	
35	—Pines (1 year old), destroyed.
160	—Pines, salvageable.
40	—Pines, undamaged.
2,652	—Protected indigenous forest.
701	—Wasteland in indigenous forest.
3,588	

Date of first fire—11/9/1964.
Date of last fire—25/4/1965.

During the year Departmental gangs were largely instrumental in saving eight houses, one school and 100 loads of pine lumber. They also assisted in stopping a fire which could have devastated Chidlow townsite.

Public Relations

Once again, Divisions report ever improving co-operation with bush fire brigades, who with Departmental officers, took an active part in local bush fire organisation.

Bush Fire Wardens, local Fire Control Officers and Fire Control staff, planned and organised a number of co-operative burns, with great benefit to all concerned.

Local bush fire brigades attended some of our schools and under the direction of Departmental officers carried out a number of successful controlled burns in isolated areas of State Forest and timber reserves adjoining alienated land.

On a number of occasions Departmental officers and gangs demonstrated the use of our equipment at Agricultural Shows and similar functions.

PROTECTION FROM INSECTS

Sirex Wasp

Close liaison continued with the Entomology Branch of the Department of Agriculture and the Plant Quarantine Branch, particularly the inspecting staff at Fremantle.

Live Sirex wasps were reported in the holds of two ships visiting Fremantle this year. Prompt action was taken by quarantine officers to deal with the destructive insects.

Careful examinations of private and Departmental plantings of pine have failed to reveal any evidence of the wasp in Western Australia.

10. SILVICULTURE, SOILS AND FIRE RESEARCH

PINE SILVICULTURE

Tree Breeding

(a) *Grafting*

Approximately 4,500 grafts of *Pinus pinaster* and *Pinus radiata* were made during the year. The major activity in this sphere was associated with the introduction of scion material from " plus " trees of *P. pinaster* selected in Portugal.

Batches of scions were imported from Portugal in September, 1964, and within the period March-May, 1965. A total of 3,086 grafts manipulated provided a survival value of approximately 18 per cent. Survival varied greatly with season of grafting and type of graft. The overall situation is shown in the following table:—

Time of Grafting	Type of Graft	Number Attempted	Number Surviving	Survival Per cent.
September, 1964	Bottle	555	3	....
	Tip	974	112	11
March, 1965	Bottle	563	12	2
	Tip	774	283	36
May, 1965	Tip	211	165	....
February*	Tip	72	60	83
May*	Tip	74	57	77

* Budded in the glasshouse from established grafts.

Scions airfreighted from Portugal were subjected to an eight day storage period prior to grafting. All imported material was fumigated in methyl bromide and dipped in Zineb. Grafting and the initiation of the quarantine observation period of 12 months were conducted at the Wanneroo Breeding Centre in an insect proof glasshouse constructed for the purpose.

Low survival percentages associated with these introductions are mainly the result of an almost complete failure of bottle grafts arising from the presence of a bacterial soft rot on the scion wood and bark. With tip grafting, the old wood is removed, eliminating the source of infection present in bottle grafts.

Low survival values for the September importations are partly attributable to the dormant condition of the scions when picked. Without any chilling treatment, growth following grafting was mainly of the long bud " lammas " type with little needle development. In general this growth was associated with a weak graft union.

Of the 83 plus trees introduced by scions from Portugal, 74 have been successfully introduced, providing an average of nine healthy grafts per clone.

A total of 1,000 successful tip grafts from 30 clones of *Pinus radiata* were also made during the year. These were required for seed orchard establishment.

(b) *Propagation Trials*

In spring a trial was run to investigate effects of different storage methods, fumigation treatment, clonal origin and grafting techniques on the survival of scions of *Pinus pinaster*.

The following treatments were compared:—

1. 7 days dry storage + fumigation.
2. 7 days dry storage without fumigation.
3. 7 days moist storage + fumigation.
4. 7 days moist storage without fumigation.
5. Fresh scions + fumigation.
6. Fresh scions without fumigation.
7. Fresh scions + fumigation + 7 days dry storage.

Each treatment included 10 scions of each of 3 clones. Following treatment, 5 scions of each of these clone batches within treatment were tip grafted and 5 were bottle grafted.

The number of deaths resulting per treatment are expressed as a percentage of the total mortality possible in the following table:—

Clone	E5		E41		E29		Total		Total
Type of Graft	Bottle	Tip	Bottle	Tip	Bottle	Tip	Bottle	tip	Both
Treatment 1	0	100	0	20	0	20	0	47	23
2	0	100	0	0	0	0	0	33	17
3	20	100	0	60	100	100	40	87	43
4	0	100	0	40	0	40	0	60	30
5	0	40	0	0	0	0	0	13	7
6	0	0	0	0	0	0	0	0	0
7	20	0	0	0	0	0	7	0	3
Total	6	63	0	17	14	23	7	34	20
Clone Total	34		9		19				

Results were also analysed for the extent of needle damage involved and the subsequent vigour of the scions.

The most striking feature of the results is the greater mortality which is incurred when tip grafting non vigorous material. This confirmed previous experience. It was also possible to deduce from the trial that when importing material from Portugal:—

(i) Storage time should be minimised.
(ii) Dry storage would be more favourable than packing in a moist medium.
(iii) Methyl bromide fumigation offered no great problem to success.
(iv) Clonal variation would result.

This knowledge greatly assisted the importation venture.

(c) *Controlled Pollinations*

Five hundred and thirty-seven controlled crosses were attempted during the year. A take of 85 per cent. was obtained. Results of the programme for *Pinus pinaster* since its inception in 1961 are as follows:—

Year	Cones Pollinated	Number of Takes	Percentage Take	Number Female Parents	Number Male Parents
1961	99	80	81	11	2
1962	280	211	76	12	3
1963	414	340	82	9	4
1964	537	453	85	12	9

One half pound and 2 lb. of seed was obtained from the 1961 and the 1962 pollinations, respectively. Fifteen serials of full sib seed obtained from the 1961 pollinations provided germination percentages ranging from 62 to 100 with a median percentage of 90.

Compared with a standard seed source, however, cone size, the number of viable seeds per cone and seed weight are still below expectation. At present an average of 50 viable seeds per cone is being obtained from controlled crossing. Under optimum conditions this could approach 130 viable seeds per cone with a seed weight of approximately 6·4 grams per 100.

(d) *Seed Orchards*

The first stage of the 30 acre *Pinus pinaster* seed orchard at Lake Joondalup was completed in the winter of 1964. It incorporates 2,500 grafts representing 16 different clones planted out at a spacing of 22 ft. x 22 ft. The clonal number will be increased when grafts of " plus " trees from Portugal are available.

Seven hundred and sixty grafts have been planted out in the *Pinus radiata* seed orchard at Chandlers Farm in Gleneagle Division. A further 250 grafts are available for planting later in the winter.

This second seed orchard has an effective area of approximately 10 acres. Forty clones will be involved, of which 14 are local selections. Provision is made for increased tree numbers during the developmental stages of the orchard to provide an efficient pollen source at an early age.

(e) *Progeny Testing*

Stock has been raised and sites pegged for progeny tests of half sib seed obtained from " plus " trees in Portugal. Two 7 x 7 latin squares were also prepared for progeny testing full sib seed raised as tubed stock.

(f) *Provenance Trials*

A 5 x 5 latin square trial testing five provenances of *Pinus pinaster* was established in the winter of 1964. The trial unit is 128 trees at 8 x 6 foot spacing.

Four of these provenances are also being compared by a pot trial in the glasshouse. Two levels of nutrition and two levels of watering are involved. Two harvests have been made and the trial will be terminated with a final harvest in spring 1965.

(g) *Progress in Portugal*

Senior Forester D. H. Perry has spent the whole year in Portugal occupied with the introduction venture. He is scheduled to return in early November.

Eighty-five " plus " trees have been selected within the famous forests of the Pinhal de Leiria. Half sib seed was collected from all trees and scion material has been forwarded for all but the two trees which were only recently located. Pollen from two trees was forwarded successfully.

At present the photographing and wood sampling of the trees remains to be completed. Work is also proceeding to provide a scion arboretum within Portugal for all clones.

Current results indicate that the planning and financing of the Portuguese venture has been well repaid.

Phenology

Radial Growth.—Details of the growth periodicity of *Pinus pinaster* are now available from dendrometer measurements initiated in 22 year-old stands in November, 1963. Final crop stems for three separate stand densities are measured at fortnightly intervals. Results to date are presented in Figure 1.

With heavy thinning radial growth has continued in every month of the year. Minimal activity occurs from March to July. Soil moisture sampling on the three plots reveals that the decreased growth rate associated with the heavier stockings of 400 and 1,000 stems per acre (Figure 1) predominantly results from their depletion of soil moisture reserves earlier in the summer.

The fact that inherently *Pinus pinaster* possesses the capacity to grow almost continuously under local climatic conditions allows a wide scope for silvicultural control of final crop production.

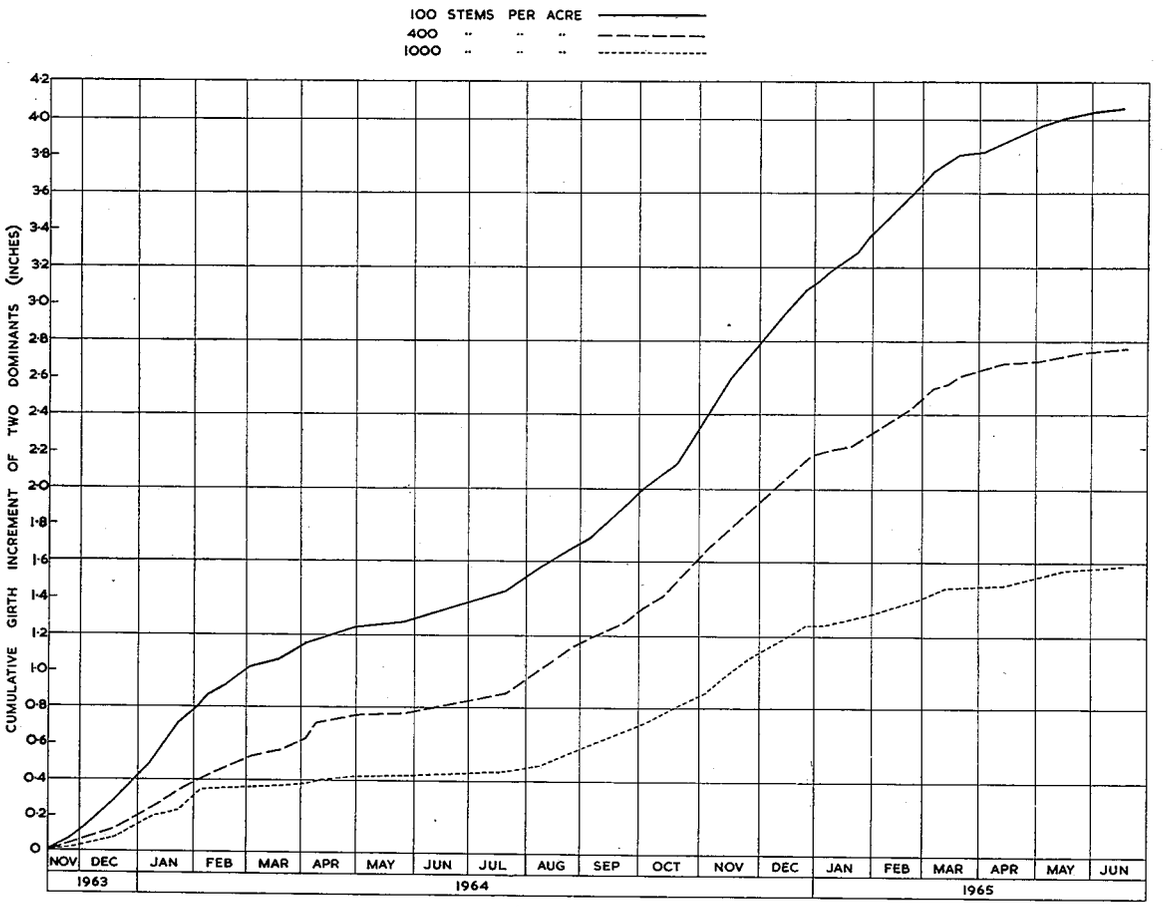


Fig. 1

Shoot Growth.—The heights of six ramets of 15 clones in the Neaves Road Scion Arboretum have been measured at 10 daily intervals over the past 12 months. Considerable variation around a general pattern of seasonal growth was found.

The general pattern, for " plus " phenotypes selected on the basis of good form, involves a definite peak of shoot elongation in the period July to November. This is illustrated by clone E 33 in Figure 2. A trend for a greater proportion of growth in later summer and in early winter is displayed by clones E 22 and E 34 respectively.

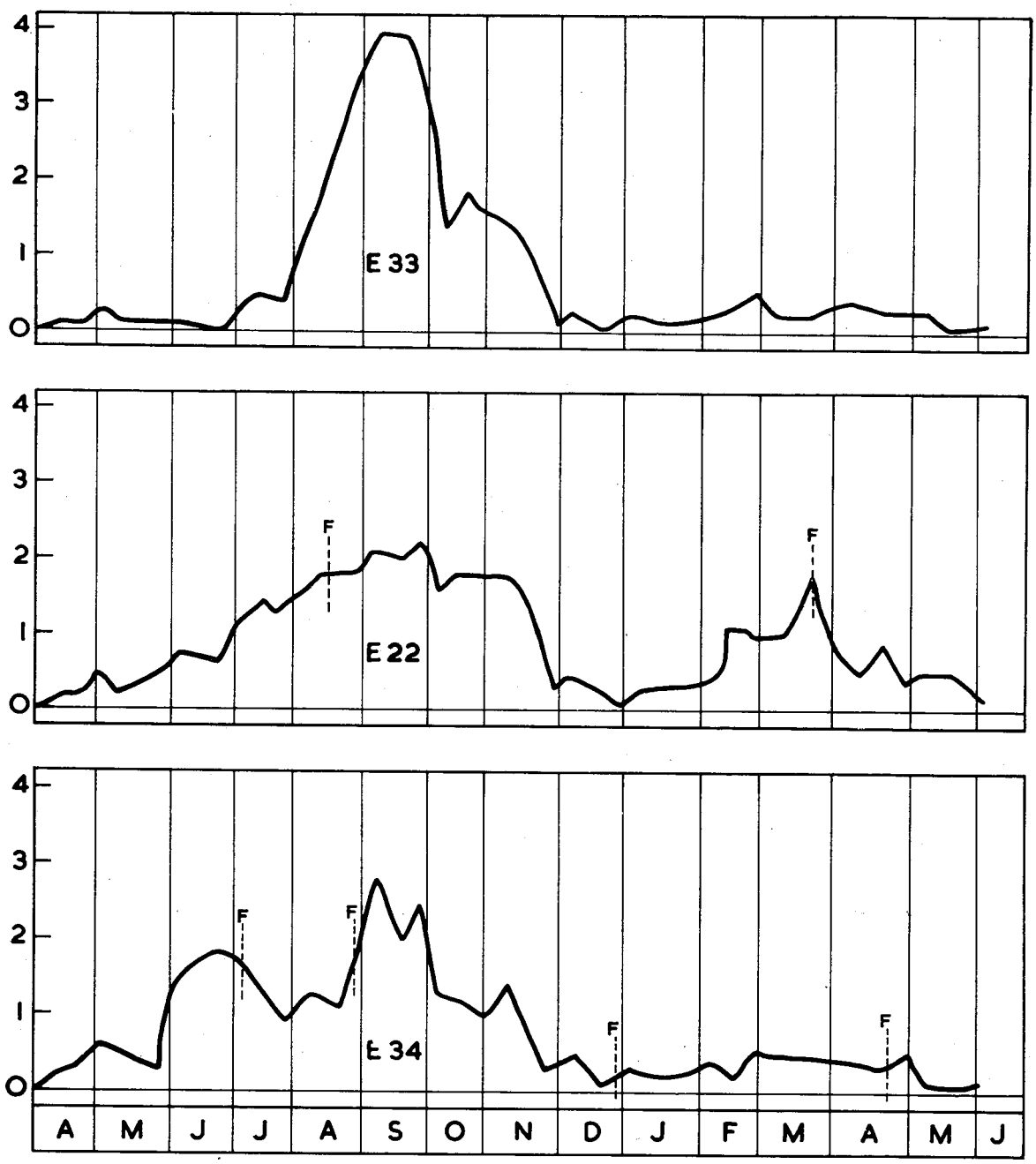


Fig. 2

The frequent flowering of clone E 34 (Figure 2) is worthy of note. This clone has at least 10 times the coning capacity of the average of " plus " phenotypes selected. It is not unusual, however, for clones to flower in autumn as well as spring and usable seed has been obtained from cones formed in autumn 1962 and hand pollinated.

The periodicity of shoot extension is illustrated more clearly in Figure 3. This graph is a plot of monthly height measurements commenced in 1962 on seedlings planted out in 1959.

The consistency with which growth commences in early August and reaches its peak by early September is noticeable.

In Figure 3, a tendency for shoot flush under certain climatic conditions in summer and autumn can be seen. By inducing this flush, with heavy watering under glasshouse conditions, it is now possible to graft this species successfully throughout summer and autumn.

Stand Tending

(a) *Late Thinning Studies*

A detailed progress report of action and findings in the South Lane Poole thinning trial up to 1964 was prepared during the year. An analysis of past measurements has indicated that the current prescription for the first merchantable thinning in *Pinus pinaster* can be altered to remove further stems to advantage.

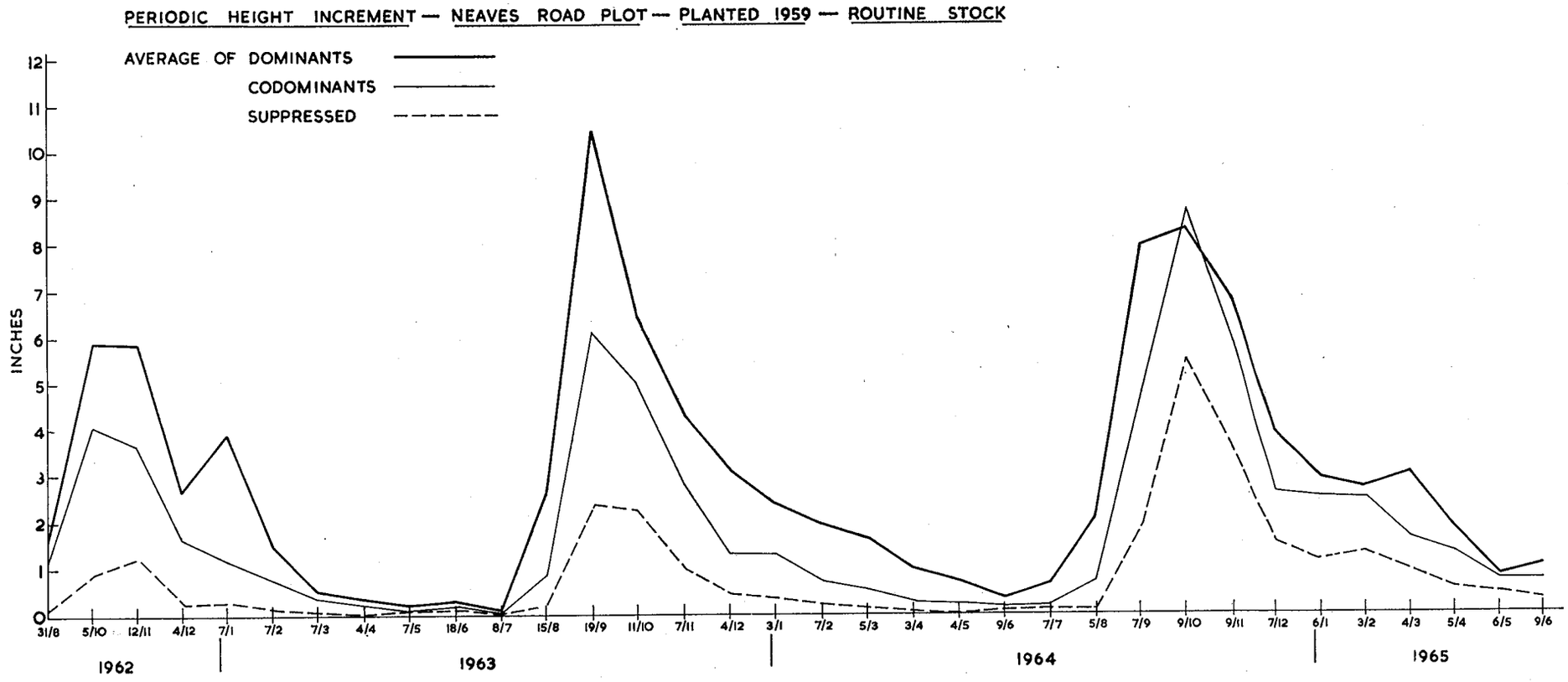

PERIODIC HEIGHT INCREMENT — NEAVES ROAD PLOT — PLANTED 1959 — ROUTINE STOCK
AVERAGE OF DOMINANTS
CODOMINANTS
SUPPRESSED
INCHES
0
1
2
3
4
5
6
7
8
9
10
11
12
31/8
5/10
12/11
4/12
7/1
7/2
7/3
4/4
7/5
18/6
8/7
15/8
19/9
11/10
7/11
4/12
3/1
7/2
5/3
3/4
4/5
9/6
7/7
5/8
7/9
9/10
9/11
7/12
6/1
3/2
4/3
5/4
6/5
9/6
1962
1963
1964
1965

Fig. 3

(b) *Free Growth Studies*

The Free Growth Trial for *Pinus pinaster* was remeasured in February. Thinning treatments were also carried down to 200 stems per acre where necessary. The stands, which cover an area of 70 acres, are now 12 years of age.

A detailed theodolite survey of the plot series has been completed and a base plan accommodating one-foot contour intervals and gradients of tree height is in the process of compilation. Work to place measurement data within a computer programme is proceeding.

(c) *Basal Area Control*

In March, a new trial investigating the increment returns from a range of fixed basal area levels was commenced for *Pinus pinaster*. The design provides for five levels of basal area within each of five site productivity levels. Replication of plots within each site class allows for split plot analysis of two fertilizer levels.

Fifty 0·1 acre plots are involved in the trial.

(d) *Response to Subsequent Fertilizer Applications*

Responses to applications of 4 cwt. of superphosphate per acre in *Pinus pinaster* stands of 17 and 9 years of age were assessed following fertilization and for 5 or 3 year periods prior to treatment were measured for control and treated trees on each area. Average increments for the mean sample trees are shown in the following table:—

Treatment	Planted 1949 Resupered 1958	Planted 1941 Resupered 1958
	sq. ft.	sq. ft.
4 cwt. Superphosphate	·068	·086
Control	·037	·032

The greater increment in the older stand since treatment is associated with the first thinning carried out in 1959. The younger stand is unthinned.

Additional volume increment due to resupering has averaged 98 cubic feet per annum over the 5 year period since treatment in the older stand. This improvement shows substantial financial gains resulting from the relatively inexpensive treatment. The stands were of average to below average quality.

Pathology

The spread of the tip disorder in *Pinus pinaster* has decreased considerably during the past 12 months. The incidence is at the lowest level recorded since the disorder first became prominent in 1963.

The fungus, *Aureo-basidium pullullans*, has consistently been isolated from disordered shoots. It appears that this fungus has only a secondary role and to date, results from inoculation trials with pure cultures have been negative.

A series of field plots testing effects of spray treatments of insecticides and fungicides, boron application and a bird repellent were initiated at Pinjar in October. The trial aims to provide further information on relationships between environmental conditions and the incidence and spread of the disorder.

JARRAH SILVICULTURE

Thinning of Pole Stands

The programme of stand improvement in the northern jarrah forest includes the thinning of pole stands resulting from past trade cutting operations. Because jarrah coppices strongly from stumps or ring-barked stems, growth response from past thinnings has been slow. In recent years the introduction and use of hormone poisons has reached the stage where the development of this coppice growth can be effectively prevented at an economic cost. Over 2,000 acres of pole stands were thinned during the year.

Hormone and Contact Poisons.—Trials of five hormone and two contact poisons—cacodylic acid and ammonium sulphamate—were instituted to find those best suited for use in thinning jarrah.

Hormone poisons proved far superior to contact poisons in terms of both cost and efficiency. Of the hormone poisons, 2,4,5-T was superior to 2,4-D and the amine of 2,4,5-T was better than the butyl ester when mixed with water and applied to a basal frill. However, 2,4,5-T butyl ester mixed with dieseline proved as efficient as the amine in water and was considerably cheaper.

When injected into the stem both 2,4,5-T butyl ester in dieseline and a new hormone poison, 4-amino-3,5,6-trichloropicolinic acid, were found to be equally efficient, but the latter proved to be slightly cheaper per unit dose.

Technique of Application.—Broadly, three different methods of application of poison were tested in the trials:—

(a) Felling competing stems at ground level and poisoning the stumps with 2,4,5-T butyl ester in water.

(b) Poisoning standing stems by applying hormone to a basal frill.

(c) Poisoning standing stems by injecting the derivative of picolinic acid into notches cut into the tree at waist level.

The first technique was costly, the " kill " variable and the results not up to expectations. Furthermore, the rapid and heavy accumulation of debris led to serious problems in subsequent controlled burning operations.

The second method using 2,4,5-T butyl ester in dieseline, gave a better " kill " and, per unit area, cost only one quarter that of the first method. It also had the added advantage that the slow accumulation of debris from the standing dead and dying stems solved the problem of controlled burning.

The third technique, currently in use, involves the cutting of notches with a modified hatchet at 2 in. to 6 in. intervals around the bole of the tree and injecting into these notches a measured quantity of poison from a graduated sheep drencher. (See accompanying photograph.) This method has all the advantages of the second technique and because one operator does the notching and injecting simultaneously, the unit cost has been reduced a further 50 per cent.

Thinning of jarrah pole stands.
The photograph illustrates the current technique employed in poisoning unwanted jarrah stems.

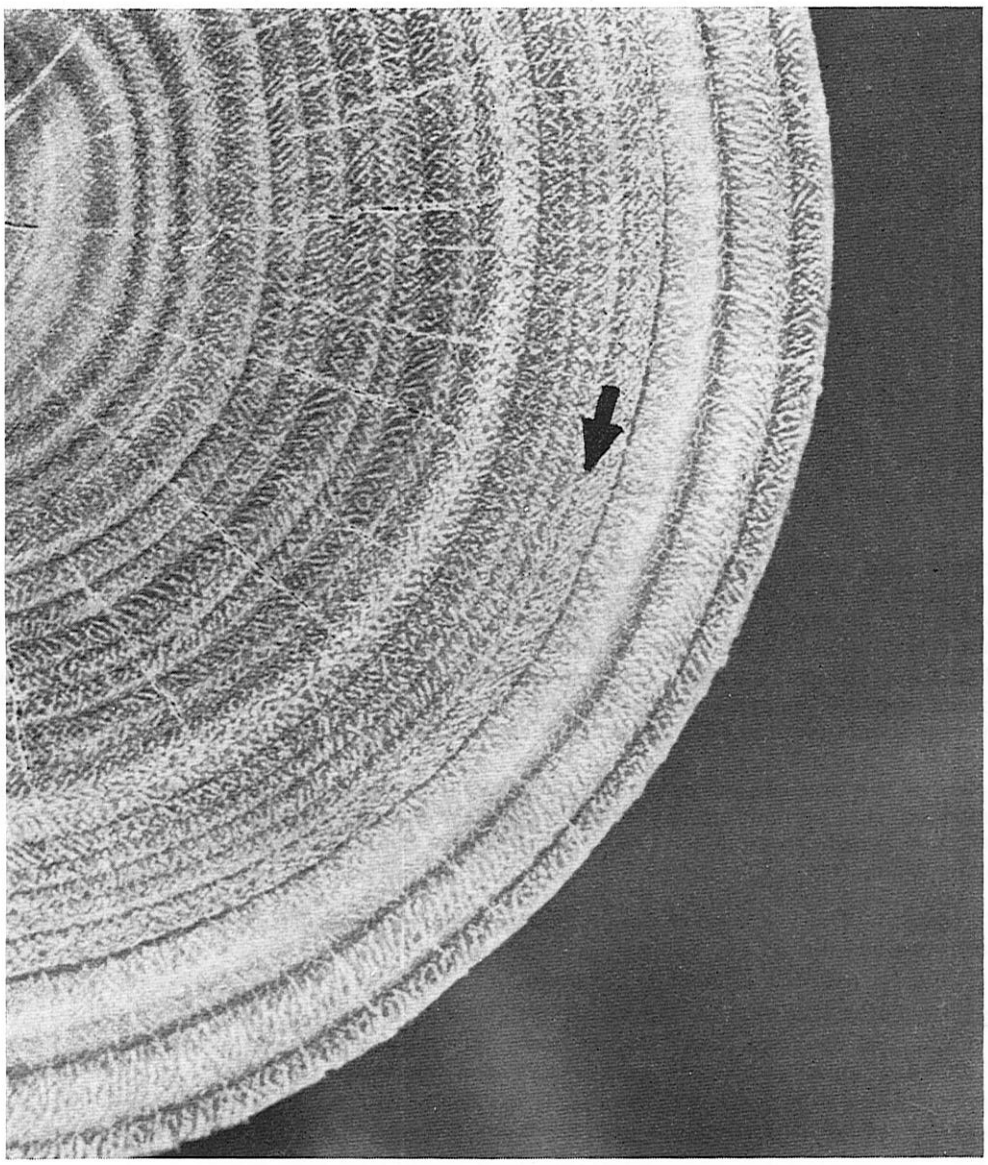
Growth Response.—Insufficient time has lapsed since the first effective thinning trials, to indicate just how much growth response can be expected over a period of time. However, measurements have shown that individual trees have doubled and even trebled their growth rate over the past two to three years. The accompanying photograph (P. 27) shows a section of a pole removed from a successful trial plot 3½ years after competing stems had been removed and the stumps poisoned. The plot was thinned in June, 1961, and the pole removed in December, 1964.

Regeneration Studies

Where regeneration is adequate, investigations have commenced into ways and means of inducing dynamic growth. These include reducing competition from overtopping trees, trenching to sever competing roots, raising the soil nutrient level, spraying foliage with growth regulators, and controlled burning.

In areas where regeneration is inadequate, trials have commenced to study the seed dispersal pattern and the minimum opening size needed with respect to canopy and root competition. These trials aim to ascertain the fate of seed after dissemination, the seedling survival over the first year, the rate of development of the ligno tuber, and the mechanism controlling the release of the dynamic shoot from the bushy advance growth stage.

Other investigations include a study of fire intensity and the timing of a burn and its effect on regeneration and on the composition of the resulting vegetation. Techniques and the economics of artificial regeneration of both jarrah and other species are also being investigated.



The stem section of this jarrah pole shows the growth response following the felling of competing stems and the poisoning of stumps 3½ years earlier. The arrow shows the time of thinning (June, 1961) and the pole was removed in early December, 1964.

Rehabilitation of Deteriorated Sites

Trials with arboreta on sites where jarrah has died out, involve tests with soil preparation, drainage, sowing or planting various species, and types of planting stock.

Studies in Mensuration

Investigations into satisfactory methods of determining bark thickness are well advanced. Tests of methods to determine response to silvicultural treatment are also being continued and involve both direct measurements of underbark girth and basal area increment and stem analyses of prepared stem sections.

KARRI SILVICULTURE

Regeneration Studies

Blossom and Seed Crops.—The presence, in June, 1965, of abundant buds in an advanced stage of development and of isolated trees already flowering, indicates a good blossom and honey yield during the summer of 1965–66.

The generally assumed 4-year floral cycle from bud initiation to seed dissemination varies between three and five years, and the intervals between these cycles may be equally variable. Over the past six years, the number of opercula* and seed that fell per acre was sampled in six widespread localities in the karri forest. The results, recorded in the following table, show the variability of flowering and seed production. The total number of opercula exceeded the total number of seed by eight times and the total loss of 75 per cent. of the immature fruit indicated a very low seed set.

Year	*Opercula per Acre	Seed per Acre
	No.	No.
1959–60	82,000	....
1960–61	957,000	1,000
1961–62	715,000	19,000
1962–63	714,000	59,000
1963–64	23,000	179,000
1964–65	11,000	30,000
Total	2,502,000	288,000

* Bud caps.

Economic seed collection for artificial regeneration will be possible only in years of abundance which may occur at intervals of between 4 and 12 years. However, adequate seed at short intervals in lean years may be available for natural regeneration. Two consecutive years of seed, varying one year either way in most stands are usually followed by intervals of 2 to 4 years without seed.

Seed Source and Dispersal.—Tests this year indicate that dominant and co-dominant trees having a crown spread of one chain can be expected to produce 60,000 seeds per tree, or on a per acre basis, two such trees should provide 120,000 seeds which has been assessed as adequate for natural regeneration.

Sampling at the time of seed dissemination shows that the seed is dispersed indiscriminately with equal numbers of seed per unit area under the crowns and out to a distance equal to half the tree height. Beyond this point half the number of seed per unit area is dispersed to a distance equivalent to the total height of the tree.

Seed Testing. —The statistics of a good average sample of capsules collected during trade cutting operations were as follows:—

Average number of seed per capsule .... 2·18

Ratio of weight of green capsules to weight of clean seed.... .... 186 : 1

The mixture of seed and chaff obtained contained only 22 per cent. of actual seed, i.e. approximately 77,000 per pound and 91 per cent. of this seed was viable.

Assuming the value of 100,000 seed is £8, it has been calculated that for economic operation, one man in one day would need to collect approximately 65 pounds of capsules.

The Primary Trade Cut and Silvicultural System

Following a normal trade cut in 1959, an area of 25·6 acres was divided into four strips each four chains wide and 16 chains long, each strip carrying different levels of karri growing stock. Remeasurement five years later shows that, although the increment rate per cent. was slow because of the large size growing stock involved, the actual sawlog increment was such that the removal of vigorous standards of any size, or of healthy standards up to about four feet in diameter may not be justified in the primary trade cut.

DISTRIBUTION AND INCREMENT (1959–64) OF KARRI GROWING STOCK

Strips (6·4 ac.)	1	2	3	4
Crown area—Per cent. Karri	8	36	30	20
Crown area—Per cent. Marri	7	4	14	23

Girth Class	Crown Description	Vol. per ac.	Inc. ac./yr.	Vol. per ac.	Inc. ac./yr.	Vol. per ac.	Inc. ac./yr.	Vol. per ac.	Inc. ac./yr.
ft.	Classes (A-D)	cub. ft.	cub. ft.	cub. ft.	cub. ft.	cub. ft.	cub. ft.	cub. ft.	cub. ft.
3–9	Unhealthy (C, D)	155	3	235	2	301	5	136	2
3–9	Healthy (A, B)	194	7	442	9	667	20	687	23
9–12	Healthy (A, B)	592	5	913	9	487	5	395	4
Over 12	Vigorous (A, A/B)	....	....	976	9	810	7	140	3
Over 12	Unthrifty (B, C, D)	....	....	1,632	5	367	1	221	0
Total cub. ft./ac./annum			15		34		38		32

Where the partial cover of marri exceeded 20 per cent. (Strip 4) the karri seedlings were rapidly suppressed by undergrowth. If this marri were felled to prevent karri seedling suppression, such fellings should be limited to trees within the regeneration gaps and more than one chain from the boles of retained karri standards, as good marri has a potential future market value. The minimum gap required to ensure that adequate sunlight will reach the karri regeneration is 0·4 acres or two chains square.

Model stands are being established to test the range of conditions affecting management, protection, utilisation and silvicultural practices.

SOILS AND NUTRITION

Pending the construction of the new Research building, the Departmental laboratory remained at Como, but with increased staff several additional projects were commenced during the year.

Pine Studies in Co-operation with C.S.I.R.O.

The following co-operative studies were carried out:—

(a) *Margaret River*

A further series of foliar samples of *P. radiata* were collected and analysed. These results showed that tree volume is correlated with the percentage phosphorus in the needles, percentage gravel in the soil at depths 0–1 in. and 1–6 in. (negative correlations) and the weight of P and N in the litter per unit area.

(b) *Grimwade*

A parallel series of samples were collected from the Grimwade experimental area. The foliar levels of the high Site Quality trees agreed with the values observed in South Australia, (per cent. N > 1·4, per cent. P > 0·14).

(c) *Soil Fertility Experiments*

Experiments have been established at Gleneagle (laterite soils) and Lake Pinjar (coastal plain sands) to study the effects of nitrogen and phosphorus fertilizers. The preliminary results at Gleneagle showed a marked nitrogen-phosphorus interaction, and in these soils nitrogen dressings are necessary before responses to phosphorus can be obtained.

Further factorial trials were established in both *P. pinaster* and *P. radiata* plantations during the year. A 23 factorial trial (nitrogen, phosphorus and thinning) at Gnangara has given very marked responses, but the preliminary results indicate that phosphorus has been the cause of the response. In *P. radiata* plantations 2 x 3 x 2 factorial trials (nitrogen, phosphorus and zinc) were established. The results from these trials showed a marked interaction between nitrogen and zinc, and applications of zinc spray have depressed growth in the presence of nitrogen.

(d) *Foliar Analysis*

The analysis of foliar samples from *P. radiata* and *P. pinaster* continued. In some preliminary work it was shown that the variation in the foliar composition of trees from different Site Quality Classes was not significant.

A set of samples were collected from a series of *P. pinaster* clones planted out at the Neaves Road Scion Orchard, and the following results obtained:—

Clone No.	Per cent.		
	N	P	K
E15	0·63	0·070	0·96
E40	0·54	0·077	0·98
E28	0·72	0·094	1·14
E14	0·59	0·089	0·89

These between clone variations are highly significant, and this efficiency of nutrient is an important feature to be studied in the selection of " plus " trees.

A further series of samples were collected from the resupered free growth plots, and preliminary results indicate that foliar phosphorus levels are still being maintained in these plots.

The Effect of Pine Cropping on Soil Properties

A comparison was made of soil properties under virgin tuart (*E. gomphocephala*) forest and an adjacent 31 year old *P. pinaster* plantation at Ludlow, and it was shown that pine cropping had caused marked changes in some of the soil properties examined, e.g. organic carbon and nitrogen.

Depth	Tuart		*P. pinaster*	
	Organic Carbon	Nitrogen	Organic Carbon	Nitrogen
in.				
0– 3	0·74	0·048	0·52	0·028
3– 6	0·48	0·024	0·40	0·021
6– 9	0·36	0·018	0·31	0·016
9–12	0·30	0·015	0·25	0·013

These decreased values are very significant, particularly those of the nitrogen. This current decline in soil nitrogen plus the loss of nitrogen caused by a final clearing and burn would seriously reduce the soil nitrogen available for a second rotation.

Soil and Plant Analysis

Routine soil phosphorus analyses were again an important function of the laboratory, a total of 197 samples being handled during the year.

In addition a large number of foliar and soil analyses were carried out for Dr. Hopkins, in connection with his experimental work.

FIRE RESEARCH

The activities of the fire research section at Dwellingup were concentrated mainly in the northern jarrah forest although some work was completed in *Pinus pinaster* plantations.

Jarrah Forest

(a) *Fire Behaviour Studies*

Further information on fire behaviour was obtained from a series of experimental fires in both spring and autumn. The data was used to test the reliability of the present fire danger rating and controlled burning guide. It was concluded that, although the tables could be improved, they were sufficiently reliable for field application.

The controlled burning guide was used by most northern jarrah forest divisions last spring and autumn, and further extension work was undertaken on the use of these tables and on burning techniques. The results achieved using these methods over a large area of controlled burning were investigated and compared with results of previous years. There was a marked increase in correlation between weather conditions and the quality of the burns, indicating the value of standardised planning and burning methods.

(b) *Moisture Trends in Litter, Bark and Scrub*

Factors influencing the inflammability of jarrah leaf litter were investigated by recording daily drying trends after rain. Fuel inflammability is related to the amount of the last rain, the number of days since rain, and both temperature and relative humidity during the drying period.

Seasonal trends in bark moisture content of jarrah were recorded for the third consecutive year. There is a seasonal trend in the moisture content of the dead outer bark and this has an important influence on scorch height during autumn controlled burning.

Seasonal trends in the moisture content of scrub foliage were tested for three common species. From the little information available it appears that the foliage of woody species may follow a seasonal trend, but there is little variation in fleshy types. A programme of scrub assessment was undertaken to define the distribution of the major types in the Dwellingup division. This assessment will be used as a basis for an attempt to determine " scrub correction factors " for controlled burning.

(c) *Fire Damage Assessment*

This assessment was completed for the fully browned forest in the Dwellingup fire area, and for an adjoining area of controlled burning. Damage from defoliation and full browning of crowns by wildfire was compared with that from controlled burning. Injury was related to the degree of crown damage and to the size and vigour of the trees. In the defoliated and fully browned areas considerable damage was done to both merchantable and small trees, but in the controlled burnt area, damage was limited to a few small trees of no major significance to the future development of the stand.

(d) *Growth Trials*

A series of dendrometer plots in a jarrah pole stand were treated by different fire intensities in both spring and autumn. Treatments by intense fire indicated that butt damage was related to tree size and bark thickness. Work by the C.S.I.R.O. showed that the degree of butt damage was related to the cambial temperature produced by the fire, and that a temperature of 60°–65° centigrade was lethal. In the short period since the trials the growth rate of the plots subjected to a mild fire has been comparable with that for unburnt controls.

Jarrah saplings averaging 10 feet in height were also subjected to treatment at different fire intensities. Some information has been obtained on an acceptable fire intensity for controlled burning under these young stands.

A trial has been established to test the effect of fire on the release of dynamic shoots from jarrah lignotubers.

Pinus pinaster Plantations

Fire behaviour studies in these plantations were initiated last spring and continued this winter. The work is designed to provide information on safe limits for controlled burning in pine fuels.

A growth trial was established at Gnangara to study the effect of burning on overbark girth and to determine damaging fire intensities. A number of trees were subjected to fires of different intensities and C.S.I.R.O. carried out cambial temperature measurements. The trees were banded with dendrometers and the growth of burnt and control stems recorded at monthly intervals. It is too early to arrive at any definite conclusions as to the result of these trials.

Miscellaneous Trials

The burning properties of different fuel types were investigated by burning them in metal trays under conditions where weather factors were partially controlled. Pine and jarrah forest fuels have been compared and observations made on the effect of slope, fuel quantity and inflammability.

The burning properties of the litter of the plane tree (*Platanus occidentalis*) and white poplar (*Populus alba*) were examined as a basic investigation into the suitability of these species for plantation fire breaks.

11. LIBRARY

Although the number of publications received by the Library is approximately the same as for the year 1963–64, a general increase is noted in all other phases of work, as indicated by the following statistics.

	1963–64	1964–65
1. Journal Loans	6,680	7,344
2. Accession List Requests	1,335	1,902
3. Loans and Queries	1,699	1,944
4. Publications Received	699	675

Approval was given for the formation of a small travelling Library for use by the Trainee School. The books purchased range in subject from mathematics to botany and the general principles of forestry. These publications have been placed on loan to the Officer-in-Charge of Trainees.

12. EDUCATION AND PUBLICITY

Education

A staff training school for new appointees to the ranks of the general field staff was held at Dwellingup, and training courses in fire operations and workers' safety methods were again conducted in various divisions.

Six trainees successfully completed the two-year trainee course commenced in 1963. A further 13 applicants have begun a probationary period of three months field training prior to acceptance for the next school.

One State and three Commonwealth forestry scholarships were awarded in 1965. The present position is as follows:—

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

* To graduate in 1965. † Superseded scholarship.

Australian Forestry School

Since 1927, the Australian Forestry School has been conducted by the Commonwealth Forestry and Timber Bureau at Canberra, under the supervision of a Board of Higher Forestry Education representing the Commonwealth and State Forest Services and Universities.

From the beginning of 1965, the School has been taken over by the Australian National University in Canberra. A new professor, Dr. Ovington, a distinguished scientist from England, has been appointed to take charge, and additional staff appointments have been made. The staff of the previous school have been taken over by the University.

An advisory board has been appointed by the University, comprising the heads of State forest services, and representatives of other Universities, C.S.I.R.O. and the Director General, Commonwealth Forestry and Timber Bureau. The transition is working out well. Provision for higher degrees in forestry (Honours B.Sc., M.Sc., Ph.D.) is being made. This development marks a further advance in the Australian forestry profession.

Publicity

The following publications, all part of the Foresters' Manual, Bulletin No. 58, were printed during the year:—

Pamphlet No. 5 (revised)	Afforestation with Pines (South-West)
Pamphlet No. 6 (revised)	Reforestation and Silvicultural Operations—Jarrah and Karri
Pamphlet No. 7 (revised)	Fire Control
Pamphlet No. 10 (new section)	Forest Engineering—Sawmills

Bulletin No. 63, Forestry in Western Australia, is being revised and two new bulletins on second growth jarrah and phenological studies in karri are in the course of preparation.

There were many requests for various Departmental publications.

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

13. FOREST ECONOMICS

Since 1949, the proportion of sawlog timber obtained from alienated land in relation to total sawlog removals has declined from 32·6 per cent. to 19·2 per cent. this year, the lowest since the war years.

A similar trend is developing in removals of poles and piles. As supplies from alienated land become more difficult to obtain, increased quantities of poles and piles are being removed from Crown land. The accompanying figure 4 illustrates the trend in supplies of the two categories over the past 16 years.

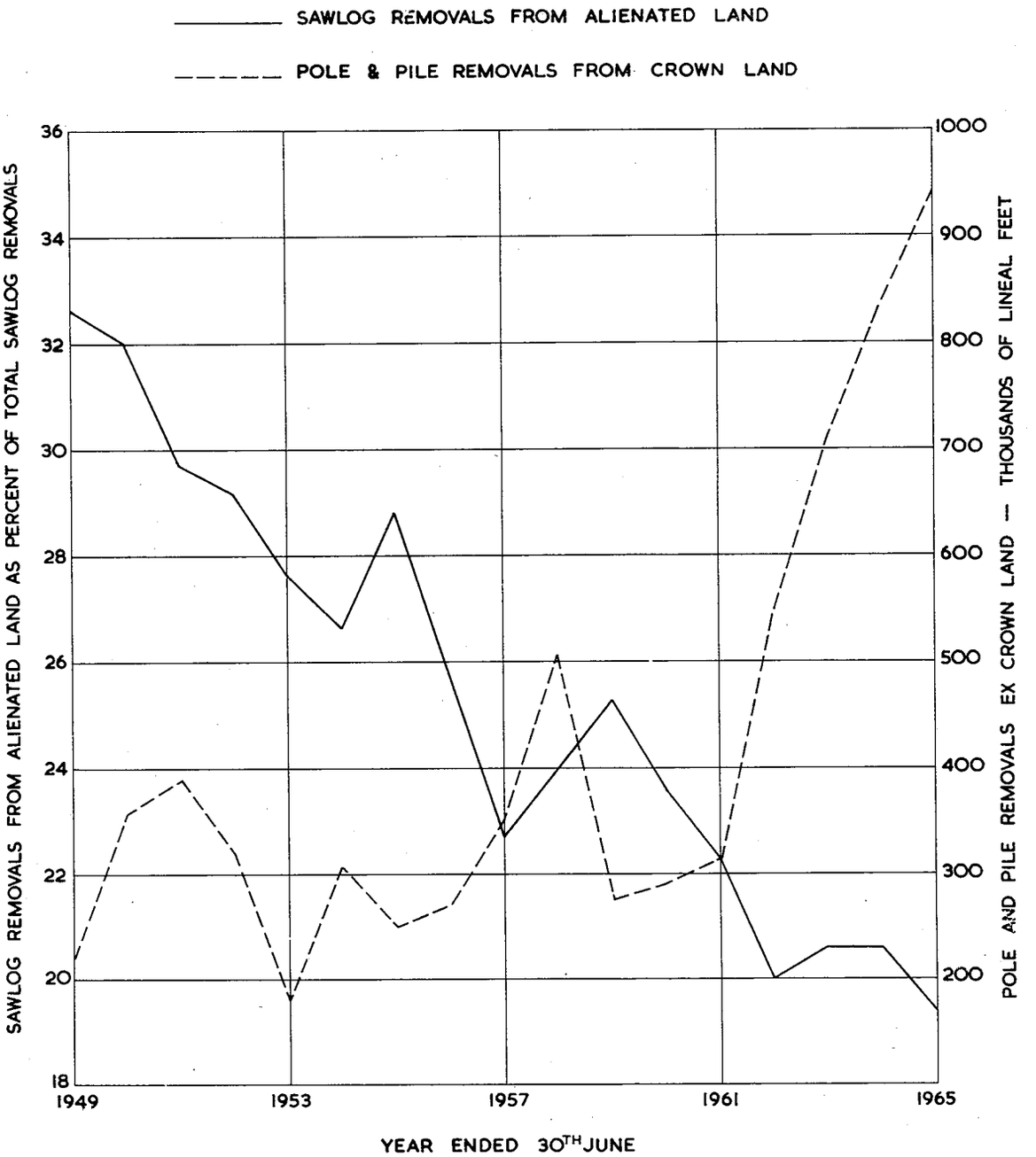


Fig. 4

14. TIMBER INDUSTRY REGULATIONS ACT, 1926-1950

The number of mills registered under the provisions of the Act at 31st December, 1964, totalled 206 (117 Crown Land and 89 Private Property).

The average number of persons employed in timber mills each month throughout the year was 3,615, a slight increase on the previous year.

The District and Workman's Inspectors made 1,482 inspections of timber holdings. There were 893 notifiable accidents, two of which were fatal. The number of accidents per 100 persons employed was 24·5, compared with 25·1 for last year.

The cost to the Forests Department of administering the Timber Industry Regulations Act for the year ending 30th June, 1965, was as follows:—

Salaries	£3,070
Mileage, Travelling Allowances and Sundries	£2,102
	£5,172

15. FOREST OFFENCES

Forest offences reported during the year totalled 62. Legal proceedings were taken in two cases and resulted in one conviction. Fines and costs amounted to £10 and £3 11s. respectively.

Warnings were issued in 20 instances and the remainder dealt with by charging royalty, forfeiture of deposits, collection of damages or confiscation and sale of timber illegally cut. The amount received by the Department in this way totalled £1,169 8s.

16. EMPLOYMENT IN FORESTRY AND THE TIMBER INDUSTRY

The number of wage earners directly employed in Forestry and the Timber Industry was estimated at 5,219, made up as follows:—

Forestry—		
Professional Officers	48	
General Field Staff	186	
Clerical and Drafting	72	
Wages Employees	566	
Contractors and Employees (estimated)	20	
		892
Timber Industry—		
Sawmill employees including bush workers at 31st December*		3,615
Firewood cutters and pole getters, working under permits		284
Goldfields firewood cutters, contractors and woodline employees and carters		20
Sandalwood workers		58
Apiarists, estimated (700 sites registered)		350
Total		5,219

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

17. STAFF MATTERS

Public Service Act

Following a reorganisation of the professional division, the titles of a number of positions were amended and Messrs. G. E. Brockway, D. R. Moore and D. W. R. Stewart became Chiefs of Divisions, Messrs. B. J. Beggs, W. H. Eastman and J. C. Meachem became Superintendents and Messrs. J. B. Campbell, D. E. Grace and D. R. Lejeune became Inspectors. The title of D.F.O. (Grade 1) was amended to Senior D.F.O. and D.F.O. (Grade 2) was amended to D.F.O.

During the year, Messrs. B. J. Beggs, W. H. Eastman and J. C. Meachem were promoted to the rank of Inspector (title later amended to Superintendent), Messrs. J. B. Campbell, D. E. Grace and D. R. Lejeune were promoted to Senior D.F.O. (title later amended to Inspector) and Mr. P. J. McNamara was promoted to Working Plans Officer. Other promotions included Messrs. C. J. Edwards, B. J. Sclater, P. N. Shedley and D. Spriggins to D.F.O., Mr. I. S. Ferguson to Research Officer and Mr. E. R. Hopkins to Silviculturist.

Mr. J. H. Jones retired from the position of Chief Draftsman on the 28th February, 1965, after more than 40 years' service with the Department and he was succeeded by Mr. A. J. H. Burrell.

Four A.D.F.O.'s were appointed, M. J. Clark (graduate from Australian Forestry School), J. J. Havel (returned from New Guinea), K. Kelers (returned from Canada) and J. A. W. Robley (Nyasaland).

The Sub-Accountant, Mr. R. J. Wilkinson, was transferred to the Public Service Commissioner's Office and he was succeeded by Mr. A. C. Thomas who transferred from the Lands Department.

Two A.D.F.O.'s, Messrs. D. Doley and A. A. Macdonald, resigned during the year.

Forests Act

Additions to the staff during the year included the following —

Eight " Forest Trainees " who commenced the course. (Two subsequently resigned.)

Three Clerical Assistants, two Technical Assistants and three Forest Guards appointed to the permanent staff and four Technical Assistants, one Forest Assistant and six Forest Guards who joined the temporary staff.

Two Forest Officers Recruited from the Tanganyika Forest Service.

Promotions included one officer to Forest Guard and one to Assistant Forester and as a result of Amendments to Title and Classification, one officer became Technical Officer Grade II, two officers Technical Officer Grade I and one officer Plant Inspector.

One Cadet, one Forest Guard, three Technical Assistants, one Forest Ranger, one Forest Assistant and one Senior Plant Inspector resigned.

Retirements included Senior Forester O. S. Pears, Assistant Forester J. A. Talbot and Forest Ranger J. Myles.

During the year the Department lost the services of two valued officers who originally joined as apprentices. Senior Forester C. V. Kinsella (apprenticed 8/10/17) passed away on the 26th March, 1965, and Senior Timber Inspector A. R. Kelly (apprenticed 3/2/25) passed away on the 25th May, 1965.

These two officers were amongst the first recruited for training at the old Ludlow Forest School, and made outstanding contributions to the development of forestry in Western Australia from the early days of the Forests Department. They were both men of considerable strength of character who left an indelible impression on colleagues and members of the timber industry alike.

Charles Austin Gardner, M.B.E.

It is a pleasure to record in the last Queen's Birthday honours list, the award of M.B.E. to Charles Austin Gardner, " for services in the advancement of the knowledge of West Australian flora ".

Mr. Gardner joined the Forests Department in 1920 and the following year was a member of the Kimberley Exploration Expedition. In 1924 he transferred to the West Australian Department of Agriculture and five years later was appointed Government Botanist, a position he held until his retirement in 1960.

His contributions to the science of systematic botany have been outstanding. He has described no less than seven new genera and over 130 species. Under his supervision the West Australian Herbarium grew to a total of 64,000 specimens. He has been responsible for several publications and his series "Trees of Western Australia" in the journal of the West Australian Department of Agriculture has reached 104 with the latest descriptions in June this year.

18. AUSTRALIAN FORESTRY COUNCIL

The formation in July, 1964, by the Commonwealth Government of an Australian Forestry Council on similar lines to the Australian Agricultural Council was an event of great national importance, and it is hoped will mean the beginning of a new era in Australian Forestry.

The composition of the Council is as follows:—

Commonwealth: The Minister for National Development.
The Minister for Territories.

State: The Minister for Forests from each State.

This Council is supported by a Standing Committee comprised of the Director General, Commonwealth Forestry and Timber Bureau; The Secretary, Department of Territories; the Chief of the Division of Forest Products, C.S.I.R.O., and the heads of the forest services of each State.

The functions of the Australian Forestry Council are as follows:—

To promote the welfare and development of Australian Forestry.

To arrange mutual exchange of information regarding the production and utilisation of forest products.

To ensure the maintenance and improvement of the quality of forest products and the maintenance of high grade standards.

To formulate and recommend a forestry policy for Australia directed in particular to the development of Australian forests to meet the national requirements for timber and other forest products, both for domestic use and for export.

To promote and co-ordinate research into problems affecting the establishment, development and management of forests and the utilisation of forest products.

To examine methods of obtaining adequate finance for the development of forests.

To consider matters submitted to the Council by the Standing Committee on Forestry.

The Standing Committee's functions are:—

To advise the Council on all matters relating to the functions of the Council.

To perform such functions from time to time as deemed necessary by the Council.

To consider any matter referred to it by the Chairman of the Council at the request of any member of the Council.

A Forest Resources Newsletter will be published periodically by the Council and be available to the interested public.

Other matters under active consideration include:—

(a) the improvement of the native forests;

(b) rural fire control;

(c) encouragement of private pine planting.

The Council has agreed in principle with the objective of achieving virtual self sufficiency in timber by 2000 A.D. At present Australia's imports of timber and timber products are in the vicinity of £90 million per year, and rank second only to oil products as a source of drain on foreign exchange.

A programme involving doubling the current pine planting rate in Australia to 75,000 acres per year has been proposed. Recommendations on how this might be achieved have been submitted to the Commonwealth Government.

Council has already held three meetings and the Standing Committee has been very active in preparing information for Council consideration. Liaison by this Committee with the Timber Industry is proceeding.

APPENDIX IA

Statement of Revenue and Expenditure of the Consolidated Revenue Fund for the Year ended 30th June, 1965

1963/64	Revenue	1964/65	1963/64	Expenditure	1964/65
£	*Royalties*	£	£		£
924,698	Logs	975,256	188,983	Salaries	207,068
51,491	Sleepers	59,032	62,276	Incidentals	56,063
1,780	Sawn Timber	2,083	2,426	Timber Industries Regulations Act	2,103
61,437	Piles and Poles	74,539	73,695	Hardwood Conversion	92,127
6,600	Mining Timber	8,730	158,091	Pine Conversion	194,288
11,361	Firewood	11,690	46,138	Recoupable Projects	48,920
6,265	Posts	5,639	13,478	Tree Nurseries	12,415
3,252	Sandalwood	6,041	....	Arboreta	10,836
3,426	Miscellaneous	4,602	....	Excess of Revenue over Expenditure distributed as follows:—	
1,070,310		1,147,612	972,899	9/10 to Reforestation Fund	1,071,043
			107,595	Transferred to Treasury	116,004
	Pine Conversion				
153,933	Pine Logs	189,522			
77,717	Sawn Pine	92,001			
231,650		281,523			
	Hardwood Conversion				
14,297	Sawn Hardwood	27,759			
88,793	Logs	73,375			
7,950	Piles and Poles	6,486			
111,040		107,620			
	Other Sales and Fees				
14,863	Seeds and Trees	19,103			
26,272	Inspection Fees	37,647			
16,812	Rent and Leases	17,083			
104,750	Miscellaneous	143,554			
162,697		217,387			
	Recoupable Projects				
42,588	Specific Roads	45,915			
7,296	Other	10,810			
49,884		56,725			
1,625,581		1,810,867	1,625,581		1,810,867

APPENDIX IB

Forests Improvement and Reforestation Fund Account for Year ended 30th June, 1965

1963/64		1964/65	1963/64		1964/65
£		£	£		£
104,001	Balance as at 1st July,	85,421	1,275,636	Expenditure	1,202,746
972,899	9/10 Revenue	1,071,043	147,235	*Less* Recoups	155,906
20,922	Rents	21,328	1,128,401		1,046,840
76,000	Federal Aid Road Grant	76,000	100,000	Reserve Fire Control	100,500
100,000	Reserve Fire Fighting	100,000	85,421	Balance Working Account	206,452
40,000	Research Building Grant	....			
1,313,822		1,353,792	1,313,822		1,353,792

DETAILS OF EXPENDITURE

1963/64		1964/65
£	*Divisional*	£
490,882	Divisional Wages, Materials, etc.	472,979
	Head Office	
255,063	50. Salaries and Allowances	279,100
19,085	51. Incidentals	16,986
121,944	52. Purchase of Plant and Vehicles	64,551
215,555	53. Plant Operations	199,647
12,051	54. Purchase of Land	15,573
5,967	55. Fire Equipment	4,875
2,182	56. Como Buildings	27,462
8,052	57. Como Headquarters	6,510
36,945	58. Communications	30,124
11,719	59. Research	8,559
2,829	60. Drafting	8,008
3,270	61. Surveys	2,839
6,154	62. Training Staff	3,486
32,337	63. Insurance	31,020
20,415	64. Pay Roll Tax	20,275
31,186	65. Utilization	10,752
784,754		729,767
1,275,636	Total Reforestation Fund	1,202,746

APPENDIX 1C

Statement of Afforestation Expenditure for Year ended 30th June, 1965

1963/64	Expenditure	1964/65	1963/64	Source of Funds	1964/65
£		£	£		£
102,290	Plantation Establishment	119,236	175,000	General Loan Fund	150,000
90,287	Plantation Maintenance	83,559	58,566	Reforestation Fund	58,055
63,376	Houses and Buildings*	31,452	231,650	Sale of Pine Logs and Timber	281,523
8,609	Road Construction and Maintenance	9,002			
12,970	Fire Prevention and Suppression	16,037			
2,663	Research	8,613			
143	Surveys and Plans	737			
12,569	Essential Services and Communications	11,975			
14,218	Administration	14,679			
158,091	Direct Conversion of Pine	194,288			
465,216		489,578	465,216		489,578

* Includes £14,450 for the new Research Station at Como.

APPENDIX 1D

Statement Showing Distribution of Forests Department Expenditure Details

	£
Consolidated Revenue Fund	623,820
Reforestation Fund	1,060,198
General Loan Fund	150,000
	1,834,018

Distribution of Expenditure—

	£
1. Busselton	153,574
2. Mundaring	104,179
3. Dwellingup	156,575
4. Collie	114,446
5. Kirup	127,805
6. Manjimup	164,103
7. Narrogin	25,807
8. Gleneagle	76,842
9. Metropolitan	51,988
10. Harvey	179,533
11. Pemberton	109,096
12. Nannup	125,706
13. Shannon River	79,698
14. Kalgoorlie-Esperance	15,100
15. Wanneroo	96,685
Head Office	252,881
	£1,834,018

APPENDIX 2A

Exports from Western Australia of Timber, Tanning Substances and Essential Oils for Year ended 30th June, 1965

Item No.	Item and Destination	Quantity	Value
	TIMBER	cub. ft.	£
63300	*Softwood Logs—*		
	Indonesia	...	17
63490	*Hardwood Logs—*		
	United Kingdom	59	52
63521–63529	*Sleepers—*		
	United Kingdom	40,345	40,337
	Ceylon	78,125	61,212
	Mauritius	994	798
	New Zealand	219,353	129,927
	Germany, Federal Republic of	1,778	1,063
	Netherlands	751	571
	South Africa	428,260	262,506
	United States of America	84	82
		769,689	496,496
	Australian States: cub. ft. £		
	South Australia 464,725 266,943		
	Northern Territory 2,268 1,225		
		466,993	268,168
	Total	1,236,682	764,664
63540	*Fence Posts—*		
	United Kingdom	1,535	1,358
63550	*Girders, Hewn—*		
	United Kingdom	40	41
63560	*Pole Blocks, Hewn—*		
	Germany, Federal Republic of	3,011	2,370
	Netherlands	66	48
	Total	3,077	2,418
64100	*Softwoods, Sawn, Undressed—*		
	Cocos Island	11	58
	Australian States:		
	Northern Territory	1,381	1,526
	Total	1,392	1,584
	Hardwoods, Sawn, Undressed (other than sleepers)—		
64260	*Jarrah:*		
	United Kingdom	59,603	44,586
	Christmas Island	637	575
	Cocos Island	58	55
	Hong Kong	1,034	596
	Mauritius	5,125	3,791
	New Zealand	56,514	40,146
	Trucial States	2,625	2,977
	Belgium-Luxembourg	498	476
	Germany, Federal Republic of	5,814	4,313
	Greece	176	203
	Iraq	44,998	39,915
	Italy	1,013	835
	Netherlands	10,043	7,637
	South Africa	359,969	282,826
	United States of America	5,795	5,327
		553,902	434,258
	Australian States: cub. ft. £		
	New South Wales 1,503 975		
	Victoria 150,823 111,304		
	South Australia 1,006,879 576,701		
	Northern Territory 3,465 3,238		
		1,162,670	692,218
	Total	1,716,572	1,126,476
		cub. ft.	£
64280	*Karri:*		
	United Kingdom	6,338	6,666
	New Zealand	137,869	106,361
	Belgium-Luxembourg	2,629	2,366
	Germany, Federal Republic of	14,744	11,344
	Netherlands	43,915	33,708
	Mozambique	14,796	10,933
	South Africa	83,774	69,261
	United States of America	2,195	2,262
		306,260	242,901
	Australian States: cub. ft. £		
	New South Wales 9,794 6,797		
	Victoria 7,494 4,518		
	Queensland 333 402		
	South Australia 1,065,343 599,621		
	Northern Territory 64,579 47,061		
		1,147,543	658,399
	Total	1,453,803	901,300

Item No.	Item and Destination	Quantity	Value
		cub. ft.	£
64290	*Other Hardwoods:*		
	United Kingdom	2,677	2,051
	Malaysia	1	2
	Netherlands	1,853	1,482
	Syria	284	480
		4,815	4,015
	Australian States: cub. ft. £		
	Victoria 9,219 8,967		
	South Australia 2,833 1,983		
	Northern Territory 1,537 2,290		
		13,589	13,240
	Total	18,404	17,255
64300	*Shooks and Staves, Undressed or Dressed:*		
	Oversea	...	...
	Australian States: cub. ft. £		
	New South Wales 4,342 5,210		
	Queensland 1,978 2,374		
		6,320	7,584
	Total	6,320	7,584
64410	*Timber, Dressed or Moulded—*		
	Flooring:		
	United Kingdom	29,726	24,889
	Christmas Island	545	769
	Hong Kong	13,085	55,965
	Mauritius	10	24
	Greece	774	963
	United States of America	2,072	3,382
		46,212	85,992
	Australian States: cub. ft. £		
	New South Wales 79,486 77,527		
	Victoria 32,783 34,728		
	South Australia 99,548 94,403		
	Northern Territory 2,196 2,574		
		214,013	209,232
	Total	260,225	295,224
64490	*Other Timber:*		
	Christmas Island	83	107
	Syria	770	1,131
	United States of America	1,845	1,957
		2,698	3,195
	Australian States: cub. ft. £		
	New South Wales 37 33		
	Victoria 22 36		
	South Australia 4,370 3,237		
	Northern Territory 11,060 15,255		
		15,489	18,561
	Total	18,187	21,756
		sq. ft.	£
64600–64794	*Plywood and Veneers—*		
	Canada	1,598	56
	Germany, Federal Republic of	6	1
		1,604	57
	Australian States: sq. ft. £		
	New South Wales 87,792 3,932		
	Victoria 3,117,671 156,195		
	Queensland 31,393 830		
	South Australia 3,274,623 223,551		
	Tasmania 348,068 13,531		
	Northern Territory 83,356 7,802		
		6,942,903	405,841
	Total	6,944,507	405,898
	Total, Timber Exports	...	**3,545,627**
	WOOD MANUFACTURES		
65050	*Casks and Vats (a)—*	No.	£
	United Kingdom	924	4,502
65130–65290	*Manufactures of wood (except furniture) N.E.I.—*		£
	Christmas Island	...	296
	Cocos Island	...	197
	Hong Kong	...	5
	Indonesia	...	892
	Thailand	...	9
	United States of America	...	10
		...	1,409
	Australian States: £		
	New South Wales 2,720		
	Victoria 16,583		
	Queensland 2,454		
	South Australia 2,697		
	Northern Territory 4,729		
		...	29,183
	Total	...	30,592

APPENDIX 2A—*continued*

Exports from Western Australia of Timber, Tanning Substances and Essential Oils for Year ended 30th June, 1965

Item No.	Item and Destination	Quantity	Value
90814–90880	*Furniture of any Material*—		
	United Kingdom		750
	Christmas Island		953
	Hong Kong		10
	Malaysia		11,683
	Mauritius		4,494
	Gilbert and Ellice Islands		1,118
	Bahrein Island		642
	Burma		123
	Philippines		16
	Thailand		914
	United States of America		16
			20,719
	Australian States:	£	
	New South Wales	133,128	
	Victoria	139,877	
	Queensland	84,062	
	South Australia	98,210	
	Tasmania	9,114	
	Northern Territory	3,326	
	Australian Capital Territory	66	
			467,783
	Total		488,502
	Total, Wood Manufactures		**523,596**
16000	*Tanning Substances of Natural Origin*—	cwt.	£
	United Kingdom	455	1,845
	Canada	600	1,987
	New Zealand	2,732	4,261
	Pakistan	1,690	7,728
	Jamaica	90	392
	Trinidad and Tobago	431	1,618
	Austria	1,604	5,169
	Denmark	1,817	6,535
	Germany, Federal Republic of	7,512	16,277
	Indonesia	711	3,182
	Italy	3,140	12,941
	Netherlands	1,511	5,852
	Norway	21	68
	Sweden	700	2,875
	United States of America	68,071	222,183
		91,085	292,913
	Australian States (*b*):	cwt.	£
	New South Wales	2,785	12,041
	Victoria	300	1,363
	Queensland	2,175	12,741
	South Australia	1,355	6,503
	Tasmania	200	595
		6,815	33,243
	Total	97,900	326,156

Item No.	Item and Destination	Quantity	Value
87060–87290	*Essential Oils, Natural, Non-spirituous*—	lb.	£
	United Kingdom	2,149	4,662
	Hong Kong	140	830
	India	2,070	954
	Malayasia	1,711	2,474
	New Zealand	374	203
	France	11,502	1,078
	Germany, Federal Republic of	12,842	2,404
	Mexico	377	11
	Netherlands	497	678
	Switzerland	11,498	1,180
	Thailand	2,173	841
	United States of America	24,136	17,380
		69,469	32,695
	Australian States:	lb.	£
	New South Wales	17,269	14,066
	Victoria	27,268	21,833
	Queensland	935	207
	South Australia	7,882	7,168
	Tasmania	400	50
		53,754	43,324
	Total	123,223	76,019
	Total Value of all Exports on this Return		**4,471,398**

(*a*) Interstate Exports included in Item 65130–65290.
(*b*) Includes Synthetic Tanning Materials and Tanning Oils.
Basis of Value—F.O.B. Port of Shipment.

APPENDIX 2B

Imports into Western Australia of Timber, Tanning Substances and Essential Oils for the Year ended 30th June, 1965

Item No.	Item and Origin	Quantity	Value
63010–63090	*Wicker, Bamboo and Cane and Manufactures thereof, except furniture*—	cub. ft.	£
	United Kingdom	....	12
	Hong Kong	....	5,646
	India	....	79
	Malaysia	....	20,460
	Pakistan	....	2
	Burma	....	410
	China, Republic of (Formosa)	....	559
	China (Mainland)	....	538
	Japan	....	4,995
		....	32,701
	Australian States: cub. ft. £		
	New South Wales 229		
	Victoria 1,381		
	Queensland 161		
		....	1,771
	Total	....	34,472
63390	*Softwood Logs, other than Kauri Pine*—		
	Australia (re-imported)	12	16
63400	*Hardwood Logs*—		
	Ghana	8,737	9,339
	Malaysia	647,134	238,917
	Gabon	4,364	4,951
	Indonesia	7,372	26,334
	Ivory Coast	10,360	10,707
	Thailand	4,074	13,067
	Total	663,741	303,315
64110	*Softwoods, Sawn, Undressed*—		
	Redwood and Western Red Cedar (a):		
	Canada	2,063	1,048
	Sweden	694	876
	United States of America	7,042	6,274
	Total	9,799	8,198
64120	*Douglas Fir (a)*:		
	United States of America	75,141	57,516
64160	*Kauri and Kauri Pine (a)*:		
	Malaysia	483	473
64170	*Radiata Pine (a)*:		
	New Zealand	2,993	1,036
64190	*Other Softwoods*:		
	Sweden	681	650
	United States of America	3,985	4,967
		4,666	5,617
	Australian States: cub. ft. £		
	New South Wales 262 594		
	Queensland 46 107		
		308	701
	Total	4,974	6,318
	Hardwoods, Sawn, Undressed—		
64230	*Beech (b)*:		
	United Kingdom	1	7
64250	*Persimmon (b)*:		
	United States of America	33	248
64290	*Other Hardwoods*:		
	Ghana	2,132	3,277
	Malaysia	822,123	561,011
	Uganda	2,089	2,194
	Philippines	7,789	6,638
	Thailand	29	158
		834,162	573,278
	Australian States: cub. ft. £		
	Victoria 1,542 1,836		
	Queensland 964 1,649		
	Tasmania 19,325 19,311		
		21,831	22,796
	Total	855,993	596,074
64310	*Shooks and Staves, Undressed*—	cub. ft.	£
	Malaysia	1,533	608
	Australian States: cub. ft. £		
	New South Wales 17 21		
		17	21
	Total	1,550	629

Item No.	Item and Origin	Quantity	Value
64361	*Beadings and Mouldings*—		
	Malaysia	....	594
	Sawn Timber, Dressed or Moulded—		
64410	*Flooring (c)*:		
	Sweden	4,625	3,905
64490	*Other*:		
	Germany, Federal Republic of	....	188
	Australian States: cub. ft. £		
	New South Wales 3,280		
	Victoria 30,396		
	Queensland 174		
	South Australia 356		
	Tasmania 118		
		....	34,324
	Total	....	34,512
64690–64792	*Plywood and Veneers*—	sq. ft.	£
	United Kingdom	116,039	2,559
	Papua and New Guinea	6,020	259
	Ghana	132,169	1,241
	India	4,200	189
	Ireland, Republic of	7,118	1,198
	Malaysia	18,270	127
	Gabon	24,718	723
	Germany, Federal Republic of	31,258	307
	Japan	252,907	13,172
	Switzerland	10,782	263
		603,481	20,038
	Australian States: sq. ft. £		
	New South Wales 164,106 9,559		
	Victoria 83,279 8,692		
	Queensland 2,639,382 213,284		
	Tasmania 223,952 7,441		
		3,110,719	238,976
	Total	3,714,200	259,014
	Total, Timber Imports	....	**1,306,327**
64795–64796	*Reconstituted Wood, also known as Particle Board, Chip Board, Sliver Board*, etc.—		
	United Kingdom	10,120	711
	Ireland, Republic of	28,870	1,271
	Sweden	28,000	365
		66,990	2,347
	Australian States: sq. ft. £		
	New South Wales 567,061 63,670		
	Victoria 12,810 498		
	South Australia 866,747 74,136		
		1,446,606	138,304
	Total	1,513,596	140,651
65050	*Casks and Vats, Empty (d)*—	No.	£
	Australia (re-imported)	1	70
65160	*Match Splints (d)*—		
	Finland	....	23,259
65170	*Rules and Rulers, Wooden (d)*—		
	United Kingdom	....	6,599
	Hong Kong	....	948
	Japan	....	118
	Netherlands	....	756
	Total	....	8,421

APPENDIX 2B—*continued*

Imports into Western Australia of Timber, Tanning Substances and Essential Oils for the Year ended 30th June, 1965

Item No.	Item and Origin	Quantity	Value
65190	*Table Mats, Wooden (d)*—		
	Japan	....	42
65210	*Wood Flour (d)*—	cwt.	£
	United States of America	696	4,315
65290	*Manufactures of wood (except Furniture), N.E.I. whether wholly or partly finished*—		
	United Kingdom	....	2,027
	Christmas Island	....	1
	Canada	....	926
	Hong Kong	....	269
	India	....	37
	Kenya	....	31
	Malaysia	....	117
	New Zealand	....	187
	Belgium-Luxembourg	....	23
	Denmark	....	330
	France	....	4
	Germany (East)	....	33
	Germany, Federal Republic of	....	984
	China, Republic of (Formosa)	....	7
	Hungary	....	55
	Italy	....	309
	Japan	....	10,038
	Korea, Republic of	....	20
	Mexico	....	21
	Netherlands	....	72
	Norway	....	58
	Poland	....	27
	Portugal	....	113
	Spain	....	53
	Sweden	....	2,350
	Switzerland	....	45
	Thailand	....	95
	United States of America	....	831
		....	19,063
	Australian States: £		
	New South Wales 20,132		
	Victoria 34,508		
	Queensland 3,645		
	South Australia 6,772		
	Tasmania 62		
	Northern Territory 316		
		....	65,435
	Total	....	84,498
90814–90899	*Furniture of any Material**—		
	United Kingdom	....	24,483
	Hong Kong	....	21,599
	India	....	179
	Ireland, Republic of	....	94
	Kenya	....	3
	Malaysia	....	529
	New Zealand	....	476
	Austria	....	53
	Belgium-Luxembourg	....	40
	China, Republic of (Formosa)	....	401
	China (Mainland)	....	101
	France	....	1
	Germany, Federal Republic of	....	488
	Greece	....	21
	Italy	....	1,412
	Japan	....	5,486
	Korea, Republic of	....	9
	Mexico	....	34
	Netherlands	....	1,252
	Norway	....	1,636
	Portugal	....	547
	Spain	....	371
	Sweden	....	6
	Switzerland	....	8
	United States of America	....	6,503
		....	65,732
	Australian States: £		
	New South Wales 192,057		
	Victoria 205,845		
	Queensland 423		
	South Australia 216,066		
		....	614,391
	Total	....	680,123

Item No.	Item and Origin	Quantity	Value
92508	*Clothes Pegs of any Material*—	gross	£
	Hong Kong	7,750	930
	Sweden	12,400	1,719
		20,150	2,649
	Australian States: gross £		
	New South Wales 1,990 613		
	Victoria 4,854 2,644		
	Tasmania 45,968 15,891		
		52,812	19,148
	Total	72,962	21,797
96450	*Tool Handles, Unattached, of any Material*—	dozen	£
	United Kingdom	927	2,267
	Canada	43	382
	France	1	....
	Sweden	110	206
	United States of America	685	1,978
		1,766	4,833
	Australian States: £		
	New South Wales 10,019		
	Victoria 2,030		
	Queensland 1,093		
	Tasmania 21		
		....	15,663
	Total	....	20,496
16110	*Tanning Substances (Natural)*—	cwt.	£
	Wattle Bark Extracts:		
	South Africa	5,480	19,064
16190	*Extracts, Other:*		
	United Kingdom	60	575
	Norway	897	1,084
	Sweden	639	726
		1,596	2,385
16200	*Other Tanning Substances of Natural Origin*—		
	Australian States: cwt. £		
	New South Wales 51 228		
87010–87290	Total	51	228
	Essential Oils, Natural, Non-spirituous—	lb.	£
	United Kingdom	5	47
	India	397	198
	Malaysia	312	915
	Seychelles	446	255
	Swaziland	108,685	16,688
	Trinidad and Tobago	385	1,305
	Australia (re-imported)	120	648
	China, Republic of (Formosa)	3,149	1,123
	China (Mainland)	3,571	2,099
	France	2,208	1,590
	Indonesia	200	454
	Italy	784	1,581
	Malagasy	5,826	2,136
	Netherlands	643	453
	South Africa	65,261	10,053
	Spain	2	17
	Switzerland	24,216	3,701
	United States of America	2,519	5,037
		218,729	48,300
	Australian States: lb. £		
	New South Wales 46,994 12,255		
	Victoria 4,832 7,000		
	South Australia 5,312 2,186		
		57,138	21,441
	Total	275,867	69,741
	Total Value of all Imports shown on this Return	....	2,381,417

* Metal furniture accounts for some 47 per cent. pf the total value of this Item.
(*a*) Interstate Imports included in item 64190.
(*b*) Interstate Imports included in item 64290.
(*c*) Interstate Imports of flooring included in item 64490.
(*d*) Interstate Imports included in item 65290.

Basis of Value
Oversea—F.O.B. Port of Shipment
Interstate—Landed Cost in Western Australia

APPENDIX 3

Summary of Exports of Forest Produce since 1836

Year	Timber		Year	Timber		Wood Manufactures	Tanning Materials	Essential Oils
	Cub. ft.	Value		Cub. ft.	Value	Value	Value	Value
		£			£	£	£	£
1836 (a)....	10,000	2,500	1901	7,150,600	572,354	....	....	....
1837	....	....	1902	6,256,750	500,533	....	....	....
1838	....	....	1903	7,748,450	619,705	....	859	....
1839	....	....	1904	8,072,300	654,949	....	32,876	....
1840	....	....	1905	8,709,500	689,943	....	154,087	....
			1906	(c) 8,830,700	708,993	....	140,720	....
1841	....	....	1907	(c) 6,409,550	511,923	....	98,773	....
1842	....	....	1908	(c) 9,869,509	813,591	....	79,934	....
1843	....	....	1909	(c) 10,830,450	867,419	....	59,633	....
1844	(b)	163	1910	(c) 12,074,100	972,698	....	93,733	....
1845	....	....						
1846	2,550	255	1911	(c) 12,449,500	986,341	....	83,470	....
1847	12,200	1,120	1912	(c) 11,297,100	903,396	....	49,004	....
1848	3,350	333	1913	(c) 13,619,850	1,089,481	....	47,377	....
1849	....	....	1914 (d)	(c) 6,279,750	502,153	....	18,197	777
1850	10,500	1,048	1915 (e)	(c) 9,968,500	808,392	....	6,127	381
			1916 (e)	5,432,100	441,991	....	10,208	1,102
1851	1,250	268	1917 (e)	3,890,650	310,893	....	18,959	2,060
1852	7,050	806	1918 (e)	3,436,250	274,141	....	16,886	3,995
1853	52,200	5,220	1919 (e)	4,135,750	332,584	11,535	18,875	3,987
1854	58,500	7,023	1920 (e)	5,065,300	465,731	21,935	22,121	3,704
1855	76,900	12,076						
1856	70,500	9,671	1921 (e)	9,816,250	1,137,819	24,916	23,073	10,107
1857	69,200	9,449	1922 (e)	8,309,750	1,041,047	22,248	13,328	6,878
1858	29,250	2,340	1923 (e)	7,911,310	997,454	12,377	21,161	20,075
1859	67,250	6,051	1924 (e)	11,126,861	1,367,517	11,505	29,606	39,877
1860	54,800	4,932	1925 (e)	11,844,303	1,477,997	13,298	40,136	42,057
			1926 (e)	12,001,384	1,522,958	10,072	15,056	47,819
1861	27,750	2,497	1927 (e)	12,580,262	1,651,149	8,727	15,818	26,544
1862	68,800	7,151	1928 (e)	10,384,784	1,265,383	7,783	27,662	39,131
1863	32,900	2,963	1929 (e)	7,635,237	960,435	6,603	35,850	63,307
1864	58,300	5,508	1930 (e)	6,579,743	807,425	4,687	40,628	77,510
1865	183,950	15,693						
1866	85,650	6,849	1931 (e)	4,127,856	507,382	26,615	35,333	56,170
1867	56,750	4,541	1932 (e)	3,062,673	361,700	85,488	42,016	59,301
1868	8,000	638	1933 (e)	2,235,540	262,617	80,332	33,352	26,331
1869	179,900	14,273	1934 (e)	4,060,830	487,248	76,107	20,904	26,720
1870	157,200	17,551	1935 (e)	5,326,117	636,466	65,494	15,284	35,363
			1936 (e)	5,598,180	697,522	50,665	12,237	27,526
1871	218,500	15,304	1937 (e)	5,673,903	699,684	52,338	14,491	38,185
1872	37,000	2,590	1938 (e)	7,545,744	932,420	47,934	13,865	35,128
1873	68,150	4,771	1939 (e)	5,704,250	722,310	43,518	17,842	25,550
1874	345,600	24,192	1940 (e)	5,049,585	634,859	62,796	19,485	47,736
1875	342,350	23,965						
1876	219,050	23,743	1941 (e)	6,091,187	790,876	74,935	13,686	59,867
1877	336,150	26,979	1942 (e)	5,244,634	700,474	64,454	6,896	74,904
1878	580,900	63,902	1943 (e)	3,516,566	605,327	32,426	1,598	70,523
1879	627,250	69,742	1944 (e)	3,645,354	613,994	25,324	1,294	72,704
1880	662,550	66,252	1945 (e)	2,851,475	570,028	27,307	2,795	103,055
			1946 (e)	3,373,025	722,061	(f) 2,618	4,872	128,050
1881	792,750	79,277	1947 (e)	3,458,628	865,255	(f) 13,118	12,056	151,768
1882	936,500	93,650	1948 (e)	3,584,405	1,099,073	(f) 6,572	9,556	116,465
1883	997,000	79,760	1949 (e)	3,198,212	993,152	(f) 6,639	5,112	75,395
1884	861,700	68,936	1950 (e)	2,857,946	974,493	(f) 13,525	8,243	78,550
1885	848,150	67,850						
1886	626,150	50,902	1951 (e)	2,342,492	(g) 918,485	(f) 25,101	16,581	125,833
1887	354,800	28,384	1952 (e)	2,373,553	(g) 1,032,909	(f) 47,689	19,120	119,109
1888	525,570	42,060	1953 (e)	3,965,188	(g) 2,074,421	(f) 120,095	34,136	70,852
1889	788,500	63,080	1954 (e)	3,858,956	(g) 2,248,320	(f) 59,360	80,248	55,273
1890	1,172,200	82,052	1955 (e)	3,477,249	(g) 1,935,019	(f) 79,893	37,338	80,822
			1956 (e)	4,568,034	(g) 2,818,716	(f) 119,459	554,760	90,928
1891	1,273,950	89,179	1957 (e)	4,684,017	(g) 3,256,719	(f) 78,934	588,544	58,993
1892	1,082,650	78,419	1958 (e)	5,572,681	(g) 3,875,705	(f) 39,762	337,655	101,814
1893	512,950	33,888	1959 (e)	6,461,535	(g) 4,373,218	(f) 41,612	259,046	52,843
1894	1,063,700	74,804	1960 (e)	6,133,240	(g) 4,160,354	(f) 20,549	366,606	63,905
1895	1,255,250	88,146						
1896	1,545,600	116,420	1961 (e)	5,533,847	(g) 3,838,387	(f) 25,305	201,957	95,475
1897	2,393,300	192,451	1962 (e)	5,660,937	(g) 3,993,663	(f) 194,380	281,364	81,506
1898	4,086,150	326,195	1963 (e)	5,484,259	(g) 3,966,697	(f) 255,190	254,726	70,402
1899	6,913,550	553,198	1964 (e)	5,266,329	(g) 3,686,732	(f) 272,187	322,916	88,666
1900	5,725,400	458,461	1965 (e)	4,716,296	(g) 3,545,627	(f) 523,596	326,156	76,019
			Total	454,579,457	87,978,969	2,917,811	5,186,317	2,929,910

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

APPENDIX 4

Summary of Imports of Timber, 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
				Total	26,311,082	597,253	2,137,784

* 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
				Total	....	....	2,675,916,477

* 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.

By Authority: ALEX. B. DAVIES, Government Printer