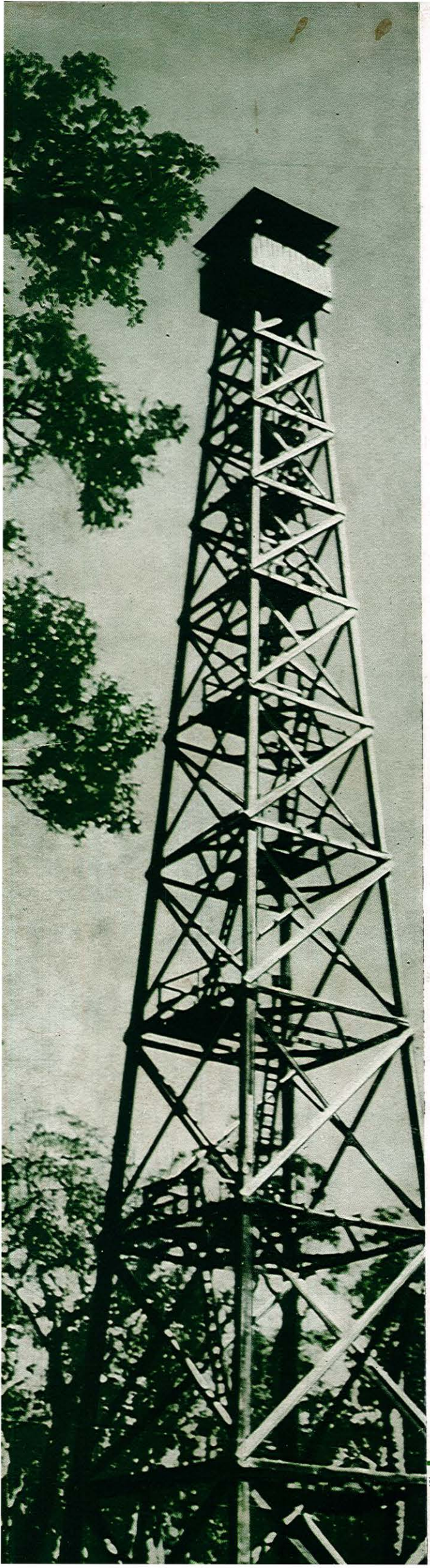

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Report

on the operations of the

FORESTS DEPARTMENT

WESTERN AUSTRALIA

for the

YEAR ENDED 30th JUNE, 1959

by

A. C. HARRIS, B.Sc. (Adel.)
CONSERVATOR OF FORESTS

29177/10/59—760

Cover.—Grevillea fire lookout tower. This tower was erected some 20 miles south-east of Bridgetown in 1940

REPORT

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Conservator of Forests

PRESENTED TO BOTH HOUSES OF PARLIAMENT

No. 22

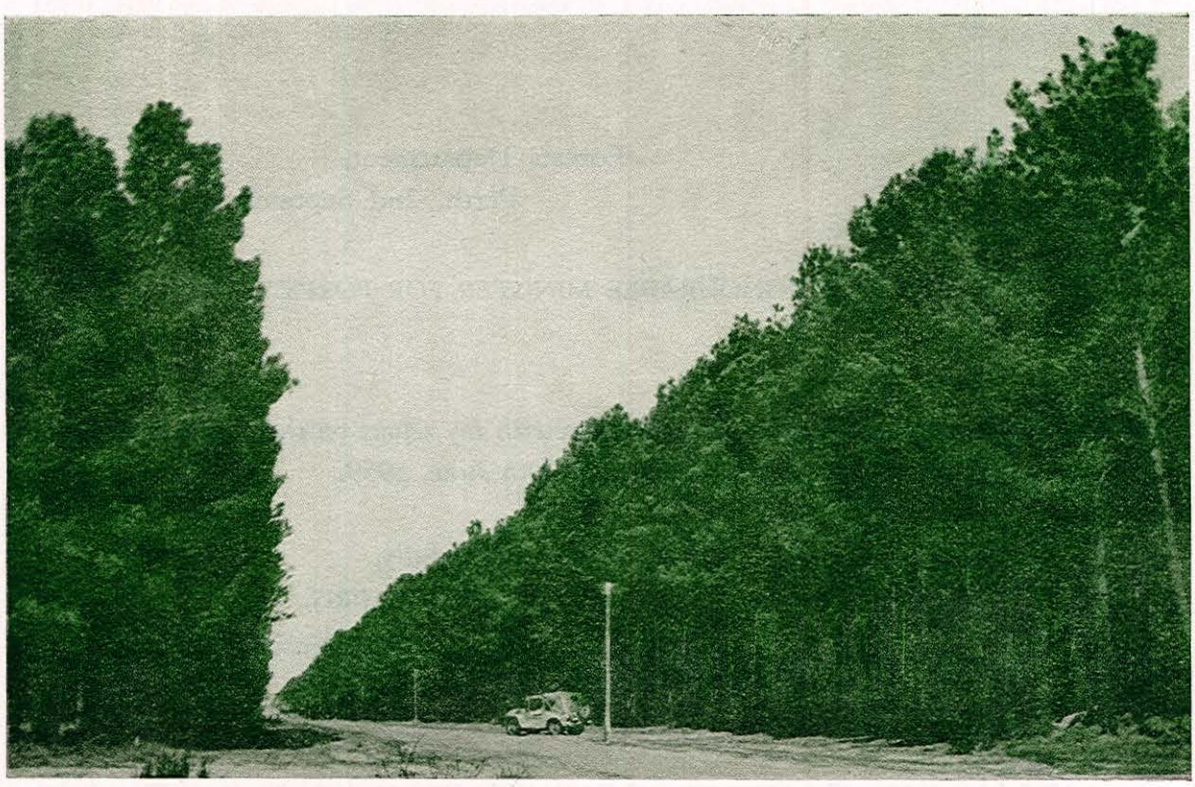
Forests Department,
Perth, 2nd September, 1959

TO THE HONOURABLE 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, 1959.

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



A plantation of *Pinus pinaster* at Gnangara, 12 miles north of Perth, established on poor coastal sandplain of little economic value for other purposes.
This plantation supports a considerable number of men in a variety of industries in the Metropolitan Area.

CONTENTS

Annual Report on the Operations of the Department for the Year ended 30th June, 1959

I. STATISTICAL SUMMARY OF MAJOR OPERATIONS

Timber Production (in cubic feet).

Total production in square	17,759,333	Sawn	17,758,023
		Hewn	1,310
Exports—Interstate	2,987,204	(16·8 per cent.)	
Overseas	3,477,817	(19·6 per cent.)	
Local Consumption	11,294,312	(63·6 per cent.)	

Recent Trends in Production and Consumption.

Year	Production			Total Export	Local Consumption	Sawmills	Monthly Average of Men Employed
	Sawn	Hewn	Total				
	cub. ft.	cub. ft.	cub. ft.	cub. ft.	cub. ft.	No.	No.
1925–26	14,522,733	6,277,952	20,800,685	12,001,384	8,799,301	....	....
1937–38	11,720,642	2,573,540	14,294,192	7,545,744	6,748,448	134	3,112
1945–46	8,869,847	14,041	8,883,888	3,373,025	5,510,863	128	2,876
1950–51	12,571,635	1,183	12,572,818	2,342,492	10,230,326	256	4,047
1951–52	14,717,112	....	14,717,112	2,373,553	12,343,559	280	4,708
1952–53	16,973,332	1,761	16,975,093	3,965,188	13,009,905	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

Total Cut.

Log Volumes (in cubic feet)	54,289,669	Jarrah	41,351,588
		Karri	7,584,740
		Wandoo	3,243,168
		Pine	1,290,344
		Other	819,829
Made up as follows :—			
From State Forest and Crown Land	40,533,471	(74·7 per cent.)	
From Private Property	13,756,198	(25·3 per cent.)	

Value Produced.

	£
Total Value Sawn Timber	11,327,500
Total Value of Other Forest Products	2,532,000

Departmental Expenditure and Source of Funds.

	£	£
Gross Revenue :—		
Royalties-Timber, etc.	911,711	
Departmental	313,662	
		1,225,373
General Loan Fund	100,000	
Federal Aid Road Grant	76,000	
		176,000
		1,401,373
Gross Expenditure :—		
Consolidated Revenue Fund	369,500	
Reforestation Fund	762,698	
General Loan Fund	100,000	
		1,232,198

(Details appear under " Revenue and Expenditure " within the Report.)

Forest Area.

Additions to State Forest during the year (includes 148,200 acres of coastal sandplain for pines)	155,053	acres
Land purchased for pine planting	2,046	,,
Total area of State Forest	4,323,902	,,
Area of National Parks (approx.)	320,900	,,

Reforestation.

Cut-over area treated for regeneration	58,490	,,

Afforestation.

Area planted with pines, 1958 (including 54 acres of experimental areas)	1,712	,,
Area cleared for pines	2,532	,,
Area soil surveyed for pines :—		
Reconnaissance surveys	3,190	,,
Detailed surveys	11,250	,,
Total area of pine plantation established	26,193	,,
Total experimental area	851	,,

Management.

Survey :—		
Theodolite surveys	445	miles
Other surveys	428	,,
Map sheet compilation	2,520	sq. miles
Assessment :—		
Detailed assessment	3,520	acres
Reconnaissance cruises	123	miles
Type maps produced covering	1,044,650	acres
Engineering, new works :—		
Roads and tracks	1,025	miles
Telephones	26	,,
Houses	4	
Offices and other buildings	1	
Vehicle fleet increased by	48	vehicles
New lighting plants	2	

Protection.

Fire outbreaks :—		
Number	434	
Area Burnt	22,503	acres
Controlled burning	398,186	,,

Nurseries.

Hamel and Dryandra :—		
Trees produced for—		
Forests Department	61,895	
Private buyers	81,923	
Plantation Nurseries :—		
Pine plantation stock	approx. 2·5	million

Sandalwood.

Quantity exported	428	tons

2. REVENUE AND EXPENDITURE

Revenue

Revenue for the year ended 30th June, 1959, was £1,225,373 as compared with £1,189,045 for the previous year.

The following tabulation shows a comparison of the two years.

	Year ended 30th June, 1958	Year ended 30th June, 1959
	£	£
Timber Royalties, etc.	898,361	911,711
Pine Conversion Sales	118,163	145,307
Hardwood Conversion Sales	104,666	93,295
Other Departmental	36,456	45,799
Recoupable Projects	31,399	29,261
	£1,189,045	£1,225,373

Details appear in Appendix 1A.

Expenditure

The total expenditure charged against Consolidated Revenue Fund amounted to £369,500, expended as follows :—

	£
General Administration of the Forests Act and Regulations	154,055
Refund of Royalty to Settlers	15,024
Direct Conversion of Pine	91,667
Direct Conversion of Hardwood	78,109
Recoupable Projects	23,409
Forests Improvement—Collie Area, special fund	7,236
	£369,500

Details appear in Appendix 1A.

APPORTIONMENT OF NET REVENUE OF DEPARTMENT

	£	£	£
Gross Revenue for year 1958–59		....	1,225,373
Less Revenue from Recoupable Projects		....	29,261
			1,196,112
Consolidated Revenue Fund		369,500	
Expenditure and Direct Charges by Treasury		3,876	
		373,376	
Less Expenditure on :—			
Recoupable Projects	23,409		
Timber Industry Regulation Act Salaries and Incidentals	3,608		
Forests Improvements, Collie area	7,237		
		34,254	
			339,122
Net Revenue		....	856,990
Nine-tenths of Net Revenue Credited to Reforestation Fund		....	£771,291

FOREST IMPROVEMENT AND REFORESTATION FUND

	£	£
Balance, 1st July, 1958		209,739
Nine-tenths, Net Revenue		771,291
Cash Book Credits		17,370
Federal Aid Road Grant		76,000
		1,074,400

Less Expenditure :—		
General Account	762,698	
Federal Aid Roads	76,000	
		838,698
Balance as at 30th June, 1959		*£235,702

(Details appear in Appendix 1B.)

* This balance is made up as follows :—

	£
Outstanding orders for plant and equipment	25,220
Housing (including purchases not completed)	1,770
Forest and Plantation Stabilisation Reserve	208,712
	£235,702

LOAN FUND EXPENDITURE

	£
Plantations	89,542
Administration	10,458
	100,000

Details appear in Appendix 1C.

GROSS EXPENDITURE

The total expenditure of the Department charged against all funds was as follows :—

	£
Consolidated Revenue Fund	369,500
Reforestation Fund including Federal Aid Road Grants	762,698
General Loan Fund	100,000
	£1,232,198

3. THE FOREST AREA

State Forests

Proposals covering 901,700 acres of timbered crown land have been prepared by the Forests Department and the State Land Utilisation Committee has already recommended to the Government 43,489 acres for dedication as State Forest, 67,590 acres for Timber Reserves under the Forests Act and 75,000 acres for temporary reserves pending further investigations. On the other hand, 423,000 acres considered unsuitable for forestry purposes are available for release.

Following an intensive study covering the remaining three-quarters of a million acres of Crown Land in the far south-west requiring consideration, it has been found that only about one-third was suitable for permanent forestry. This includes a relatively limited area of wandoo, a particularly valuable tree for production of sleepers, poles, honey and tannin extracts, and it can now be stated that the area of this species contained in State Forests is unlikely to be greatly increased.

The total area of State Forest at 30th June, 1959, was 4,323,902 acres which is an increase of 154,812 acres compared with the total area at 30th June, 1958.

During the year, additions totalling 155,053 acres were made to State Forest and 241 acres were excised and reverted to the Lands Department.

The increase was mainly due to 148,200 acres of timber reserves and Crown land north of Perth, being dedicated State Forest for pine planting. These areas are at present carrying no marketable timber and appear of little economic use for other purposes.

Timber Reserves Under the Forests Act

The area held under Timber Reserve at 30th June, 1959, was 1,772,610 acres, which is a decrease of 63,246 acres on the area at 30th June, 1958. An additional 4,161 acres were reserved and 67,407 acres excised. The decrease was mainly due to reserves 108/25 and 126/25 at Gnangara and Lake Pinjar being cancelled as such and dedicated as State Forest for pine planting.

	June, 1958 acres	June, 1959 acres
Jarrah	54,418	57,844
Pine Planting	72,411	5,521
Mallet	648	1,140
Sandalwood	27,105	27,105
Mining Timber, Firewood, etc. (Goldfields)	1,681,274	1,681,000
	1,835,856	1,772,610

Land Acquisitions

During the year, 2,046 acres of land suitable for the growing of *Pinus radiata* were purchased at a cost of £16,016 in furtherance of the policy of acquiring such areas when offered for sale.

In addition, 1,337 acres were purchased for inclusion in State Forest to eliminate fire hazards, consolidate irregular blocks and to preserve valuable regrowth.

Land Released

During the year 202 applications for land were received, covering a total of 245,603 acres. Fifteen applications were received for the provision of or closing of roads.

The Department concurred in the release of land and the issue of pastoral and other leases as follows :—

Alienations			Leases		
Timber Zone		Outside Timber Zone	Timber Zone		Outside Timber Zone
State Forest	Crown Land	Crown Land	State Forest	Crown Land	Crown Land
acres 799	acres 34,828	acres 31,449	acres 486	acres 3,545	acres 91,784

A total of 11,000 acres of Crown land north of Lake Muir were agreed for reservation as a Fauna Reserve.

The above are actual applications for particular areas of land and do not include large areas which have been recommended for release by the State Land Utilisation Committee.

WESTERN AUSTRALIA'S TIMBER POSITION AND REQUIREMENTS

With a population of only 700,000 people, the present home consumption of timber in Western Australia requires approximately 700,000 loads of logs annually or one load per capita (1 load = 50 cub. ft.). In addition, some 300,000 loads of logs are used in producing timber for export overseas and interstate, making a total drain on our forest resources of one million loads annually. From the above we can deduce that when the population reaches one million (about 1970 it is estimated) we shall have no true surplus, and any exports will have to be balanced by imports. The needs of any increases in population thereafter will have to be met by higher priced imported timber.

The position is further complicated by the fact that at present some 25 per cent. of timber produced comes from private property which is not being managed for perpetual yield forestry and therefore when cut out cannot be relied on to contribute to future supplies. The evidence points to steadily declining production from private property and virtual cessation by 1970.

The implications of the foregoing analysis are that there would have to be a *steadily increasing production from State Forests* reaching an extra 250,000 loads by 1970 in order to maintain timber production at only today's level. This would mean an increase of 33⅓ per cent. on the present cut from State Forest.

By the year 2,000 A.D., with an estimated population of 1·8 million, in order to maintain present per capita consumption, W.A. would need 1,800,000 loads of logs annually, *i.e.*, approximately two and a half times current production from State Forest. Even if we allow for a reduction of consumption per capita by 15 per cent. (to Australia's present average consumption) we should still need to provide twice our current output from State Forest.

Figures given in the Annual Report, 1957, of the Commonwealth Forestry and Timber Bureau (the last available), lead to the following conclusions on the approximate timber usage in the various Australian States.

	N.S.W.	Vic.	Qld.	S.A.	W.A.	Tas.
Population at December, 1957 (millions)	3·7	2·7	1·4	0·9	0·7	0·3
Total consumption of timber, including sleepers (millions super ft.)	578	507	300	177	152	77
Consumption per capita (super ft.)	147	185	219	178	209	234

It is pertinent that Queensland, a State comparable in many ways with W.A., and with exactly twice W.A.'s population, used almost exactly twice the W.A. total home consumption. Even allowing for a downward consumption trend (noticeable in the per capita consumption of the more populous States, N.S.W. and Victoria), the future position will not be a happy one.

The States with the lowest per capita usage (N.S.W., Victoria, South Australia) are the heaviest importers.

Imported timber is much dearer, and in many respects less likely to be satisfactory for W.A. conditions than the home produced article, particularly jarrah. Nor can it be assumed that in the long run we can rely on adequate imports. Expert estimates show that U.S.A. expects to increase its own timber usage by at least 75 per cent. by the year 2,000 A.D., and at present more than 50 per cent. of Australia's timber imports come from North America. According to the Australian Timber Supply Review, Vol. 8, No. 2, 1958, Australia's imports from overseas in 1957–58 by States were as follows :—

State	Timber Imports million s. ft.	Approximate State Consumption %
New South Wales	169·4	29
Victoria	61·5	12
South Australia	58·4	33
Queensland	14·6	5
Western Australia	8·0	0·5
Tasmania	0·6	0·8
Total	312·5	

This total importation is approximately one and a half times the total annual timber production of W.A.

It should be realised that timber is the only important primary product of Australia in which large imports are necessary. All others are in excess supply and exported in large quantities, e.g., wool, wheat, meat, fruit, butter, sugar, etc.

In view of Australia's chronic balance-of-payments problem, the desirability of reducing the Australian timber import by increasing home production should need no stressing.

How is W.A. to meet its own requirements in the long term ? Steps which can be taken to this end are as follows :—

1. *Dedication as State Forest in perpetuity* of all suitable timber producing areas, which are still Crown lands. This is an urgent matter. Without real security of tenure, forest management cannot be practiced nor expenditure justified. It is a matter for apprehension that after 40 years since the passing of the Forests Act, 1918, this basic principle has to be continually stressed and fought for, and the erosion of forest areas still goes on.
2. *Maintenance of a steady progamme of pine planting* on suitable soil types. At present the programme is for 2,500 acres per year.
3. *Greater use of karri*, with the co-operation of our builders and architects.
4. *Recognition of the virtues of marri* as a building timber. Very large volumes of this species exist in the forests south of the Blackwood River.

   Departmental policy is to use this timber in its own buildings as much as possible, to set an example. In the Eastern States, timbers which carry far worse gum veins are extensively used, and even preferred for building purposes. A deficiency of timber should force the use of this species within a decade.
5. *Preservation of suitable natural forests on private land*, and the encouragement of private pine planting on the limited areas of suitable soil types available.
6. *Better utilisation of existing timber*, by selling strictly to grade, chemical preservation treatment, finger-jointing for " shorts," etc., and better recovery in the sawmills.
7. *Improved sawmill techniques* to enable small logs and thinnings of jarrah and karri to be used satisfactorily.

Commercial forestry can be practised only in the higher rainfall areas of the State and already considerable areas of the original good forest have been destroyed for settlement. It is estimated that no more than 4·66 million acres of suitable natural forest can now be preserved, and of this, a little more than four million acres is as yet dedicated State Forest. Appendix 6 of the Department's last Annual Report showed that in the Southern half, the State had approximately 72 million acres of land, with an annual rainfall 12 inches or over. Of this, some 34 million acres had been alienated but only 18 million acres developed.

It is contended that whereas forestry is now restricted to a limited area only (possibly 4·66 million acres) agriculture has vast areas at its disposal, and great capacity for expansion without taking over any further forests, which are worthy of retention. In a State so largely dependent on agriculture and so short of industries, the importance of maintaining and increasing the raw material source of the timber industry (which in W.A. ranks next in importance only to wool and wheat) must be apparent.

The part played by our forests in the economy of this State is still not properly appreciated. Other States have passed through the stage where timber supply was deemed " inexhaustible," and today farmers buy fence posts at £25 to £32 per hundred, compared with a price seldom reaching £10 per hundred for jarrah in W.A. Our railways have ample supplies of very durable, cheap sleepers, our public works can draw on very durable piles, poles, stringers and bedlogs, at relatively cheap prices, especially when all cost aspects including replacements are taken into account. The forests are the basis of our valauble and ever expanding honey industry ; they protect our watersheds from erosion

and salinity, and our unique fauna and flora from extinction by the ubiquitous bulldozer. They have not yet developed their full potential, and only await the coming of paper pulp, hard-board, and other industry to show their true value.

A Warning on the Jarrah Forest

Jarrah is not only one of the most valuable hardwoods but there is more timber produced from jarrah than from any single species in Australia—approximately 10 per cent. of Australia's total timber production.

The regeneration of the jarrah forest presents some unique aspects and problems. In the seedling stage it remains dormant for many years, before it is ready to develop from a low bush to a sapling. This dormant period is seldom less than 20 years, while it is developing a ligno-tuber, and a deep underground root system to enable it to meet the harsh conditions of the poor gravelly ironstone (laterite) soils, and the heat and drought of long summers. In the natural forest there is usually a good stocking of this advance growth merely awaiting the opening up of the forest, by logging or natural death of older trees, to come away vigorously and develop saplings. This long dormant period is thus of little effect on regeneration in forest conditions.

If, however, this forest is cleared for agriculture, and the existing seedling growth destroyed by cultivation, it is doubtful whether such land could ever be economically reconverted to jarrah forest, if in the future it was deemed desirable to do so. The very long dormant period of the seedling stage, especially on open sun baked land, would render it an uneconomic proposition.

The karri seedling does not have this dormant period, and cleared fields will quickly revert to karri forest, if seed is available.

Consequently, when an area of jarrah forest is properly cleared, it is lost beyond recall, on any economic basis. There is no road back. Further alienation of jarrah forest should therefore not be lightly undertaken without the fullest consideration of all that such an irretraceable step involves.

Attempts to grow jarrah forests in other countries have failed miserably. It remains an uniquely West Australian Forest.

4. SAWMILLING, HEWING AND TIMBER INSPECTION

The production of 17,759,333 cubic feet of sawn and hewn timber was an increase of 271,018 cubic feet, or 1·5 per cent. on last year's figure. Of the total production, 4,499,783 cubic feet were obtained from private property, an increase of 283,912 cubic feet on last year.

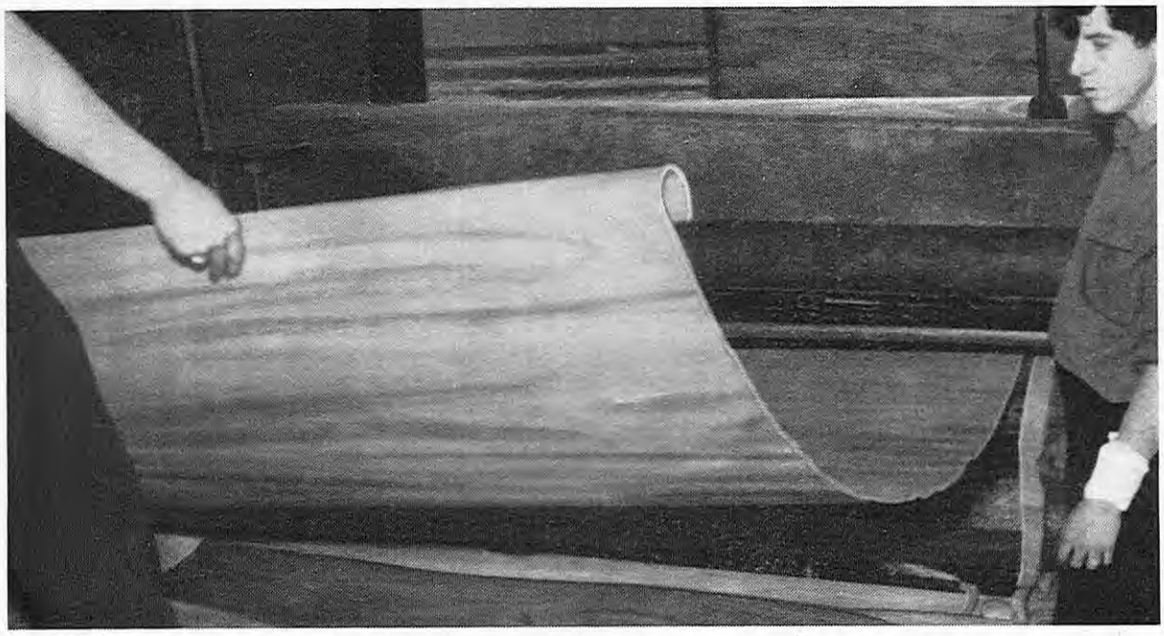
During the year ended 31st December, 1958, 260 mills were registered. Of these, 137 operated on Crown land and 123 on private property.

Details of the intake of mill logs and production of sawn timber are given in the accompanying tables.

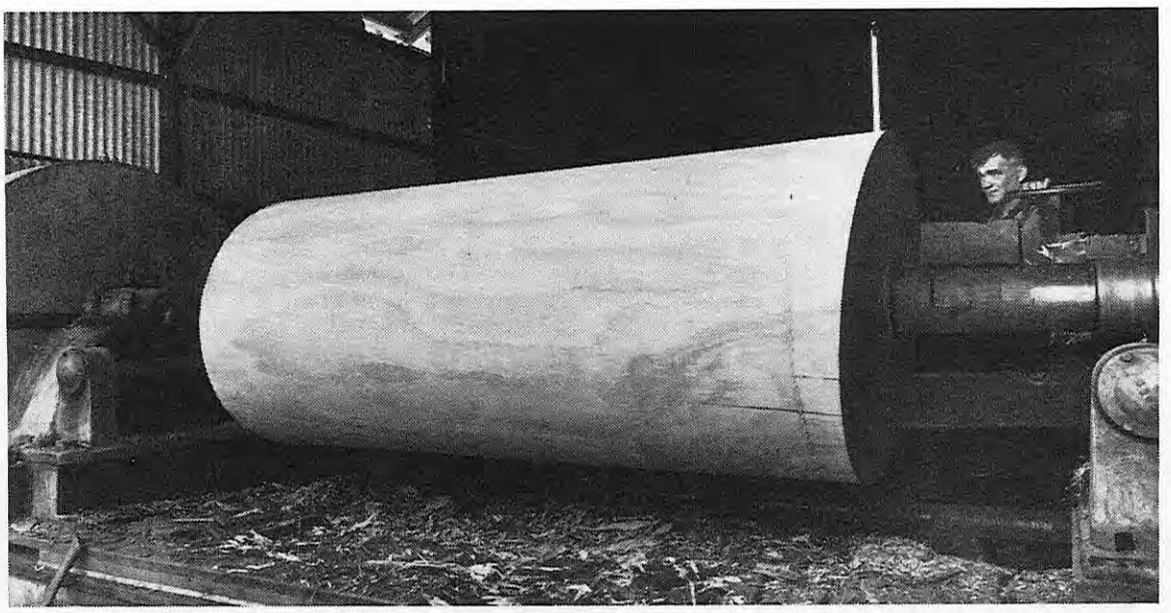
The annual intake of logs (1829–1959) is shown in Appendix 5.

Departmental plantations yielded 1,257,650 cubic feet of pine thinnings, which was an increase of six per cent. on the previous year's total.

A total of 100,400 cubic feet of karri and 51,320 cubic feet of pine were used in local plywood factories.



Karri veneer coming off the lathe. This veneer is used extensively throughout Australia for concrete form work



Peeling a karri log for plywood veneer. Over 100,000 cubic feet of karri was converted into veneer by local manufacturers during the year

There was an increase of over 25 per cent. in the quantity of sawn timber inspected during the year, due mainly to a 30 per cent. increase in the production of sleepers.

Sawn sleepers produced during the year under review amounted to 5,291,598 cubic feet, of which 1,964,983 cubic feet were from private property. Of this quantity, 4,927,736 cubic feet were inspected. Hewn sleepers produced and inspected totalled 1,310 cubic feet, all of which came from private property.

Other sawn timber inspected totalled 613,855 cubic feet, of which 42,947 cubic feet were from private property. Of the 29,123 (736,370 lin. feet) piles and poles produced 496 (13,890 lin. feet) were inspected.

5. TIMBER PRODUCTION AND DISTRIBUTION

The distribution of timber was as follows :—

Distribution	Sleepers (including hewn)		Other Sawn Timber		Total
	Karri	Jarrah and other species	Karri	Jarrah and other species	
	cub. ft.	cub. ft.	cub. ft.	cub. ft.	cub. ft.
Interstate	*Nil*	568,207	916,099	1,502,898	2,987,204
Overseas	*Nil*	2,811,626	258,308	407,883	3,477,817
Local	*Nil*	1,911,765	1,307,590	8,074,957	11,294,312
Total	....	5,291,598	2,481,997	9,985,738	17,759,333

QUANTITY OF SAWN AND HEWN 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	Hewn Sleepers	Sawn Timber other than Sleepers	Sawn Sleepers	Hewn Sleepers		
	cub. ft.	cub. ft.	cub. ft.	cub. ft.	cub. ft.	cub. ft.	cub. ft.	£
1957–58	10,582,413	2,691,900	....	2,840,886	1,372,374	742	17,488,315	10,826,880
1958–59	9,930,557	3,326,615	....	2,535,868	1,964,983	1,310	17,759,333	11,327,513

Loading jarrah logs with a tractor mounted crane in a mixed jarrah-karri forest

TIMBER PRODUCTION

PRODUCTION OF TIMBER FOR YEAR ENDED 30th JUNE, 1959 (EXCLUSIVE OF MINING TIMBER, FIREWOOD, PILES AND POLES)

	Mill Logs					Hewn Timber		Grand Totals	
				Totals		Jarrah			
	Jarrah	Karri	Other	In Log	Recovery of Sawn Timber	In Log	In Square	In Log	In Square
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	cub. ft.	cub. ft.	cub. ft.	cub. ft.	cub. ft.	cub. ft.	cub. ft.	cub. ft.	cub. ft.
Crown Lands	30,265,356	6,942,041	*3,326,074	40,533,471	13,257,172	....	....	40,533,471	13,257,172
Private Property	11,086,232	642,699	†2,027,267	13,756,198	4,500,851	3,997	1,310	13,760,195	4,502,161
Grand Totals	41,351,588	7,584,740	5,353,341	54,289,669	17,758,023	3,997	1,310	54,293,666	17,759,333

Figures in columns (1), (2), (3), (4), (6) and (8) are in the round based on full volume measure.
Figures in clumns (5), (7) and (9) are the volumes of sawn or hewn timber in the square.
* Comprises 1,432,714 cub. ft. Wandoo, 529,103 cub. ft. Yarri, 45,862 cub. ft. Sheoak, 1,262,238 cub. ft. Pine, 16,919 cub. ft. Marri, 37,980 cub. ft. Tuart, 1,149 cub. ft. Red Tingle Tingle, 50 cub. ft. Yellow Tingle Tingle, 59 cub. ft. Bullich.
† Comprises 1,810,454 cub. ft. Wandoo, 175,287 cub. ft. Yarri, 9,715 cub. ft. Sheoak, 28,106 cub. ft. Pine, 929 cub. ft. Marri, 2,776 cub. ft. Tuart.
In addition to the above a total of 33,554 tons of Wandoo logs were treated for Tannin extract.

6. TIMBER UTILIZATION

The Commonwealth Scientific Industrial Research Organization, Division of Forest Products, has carried out a number of tests for the Department.

These are tabulated below :—

Type of Test	Timber	Stage Reached
Strength	Green Marri	Results received and shown on page 14
Shrinkage	Marri, Blackbutt	In progress
Electric moisture meter correction figures	All Western Australian commercial and semi-commercial species	Results received

Mechanical Properties of Marri, Jarrah and Karri

This data was obtained from small clear specimens in a green condition.

	Marri	*Jarrah*	*Karri*
Density	lb./cu. ft. 76	lb./cu. ft. 73	lb./cu. ft. 73
Static Bending	lb./sq. in.	lb./sq. in.	lb./sq. in.
Fibre stress at limit of proportionality	7630	6440	6600
Modulus of rupture	11300	9880	10600
Modulus of elasticity	1,960,000	1,480,000	2,070,000
Compression Parallel to Grain—			
Stress at limit of proportionality	4130	4240	4180
Maximum crushing strength	5880	5190	5250
Modulus of elasticity	2,270,000	1,700,000	2,200,000
Compression Perpendicular to Grain—			
Stress at limit of proportionality—			
Radial	1550	1160	956
Tangential	1360	1290	1260
Hardness—	lb.	lb.	lb.
Radial	1490	1300	1400
Tangential	1480	1270	1320
End grain	1420	1390	1370
Shear—	lb./sq. in.	lb./sq. in.	lb./sq. in.
Radial	1330	1330	1210
Tangential	1330	1320	1460
Cleavage—	lb./inch	lb./inch	lb./inch
Radial	319	360	366
Tangential	399	385	460
Izod Impact (Toughness)—	ft./lb.	ft./lb.	ft./lb.
Radial	14.2	9.2	15.2
Tangential	15.5	10.2	15.4

Clear Finish Exposure Tests

The exposure tests of a number of types of clear finish on commonly used Western Australian weatherboard timbers has been in progress for over a year and all treatments show appreciable breakdown. This supports the world wide conclusion that a durable clear finish has not yet been found.

Sleeper Production by Portable Circular Saws

Sleeper production by portable circular saws and its possible application in Western Australia was investigated. Although this method is reasonably successful in parts of the Eastern States, it has disadvantages which could limit its application in this State.

Power Studies

Power requirements to saw jarrah flitches at varying depths and feed speeds were studied and it is intended to extend this work to karri, wandoo and tuart.

Sawdust Briquettes

Briquettes were made from jarrah sawdust and appear satisfactory. They will be thoroughly tested by the Government Fuel Technologist.

Preservation of Karri

Further consideration has been given to the problem of preservation of karri. However, the need for pressures up to 1,000 lb./sq. in. for satisfactory penetration of heartwood and incision of the material before treatment indicates the need for cost reductions in order to establish the process under present market conditions.

Prevention of Blue Stain with Sodium Pentachlorphenate

A test was set up at Harvey, where relatively good drying conditions prevail, to compare the efficiency of various concentrations of sodium pentachlorphenate, in preventing blue stain in pine. The minimum effective concentration under these favourable conditions was a 1/4 per cent. solution.

Marine Borers Tests

Pressure treated jarrah and karri poles are to be exposed in sea water at Bunbury, Fremantle and Port Hedland to test their resistance to marine borer attack. In addition, the Department is participating in an Australia-wide test of a large number of preservatives for combating marine borer attack. Sets of specimens will be installed at Kwinana and Port Hedland.

Designs for Fire Tower Lookout and Office Extensions

A 60 ft. guyed pole fire tower lookout was designed and is in the course of erection. This is the first tower of its type to be built in Western Australia.

Designs were also prepared for office extensions and timber storage sheds.

Pulp and Paper

The Division of Forest Products, C.S.I.R.O., is continuing work on the problems connected with making pulp and paper from Western Australian timbers.

Mature marri, jarrah and karri, and young jarrah and karri can be mixed in any proportion to make certain types of paper.

If young marri, which is being tested, also proves satisfactory, it will be possible for a pulp mill to utilize all trees in the forest, thus simplifying logging and management.

Committees and Conferences

One meeting of the Western Australian Joint Timber Committee was held. Its purpose is to recommend standards to the Australian Standards Association.

An all-Australian conference at Mt. Gambier discussed the grading of *Pinus radiata* and was attended by the Department's Utilisation Officer.

7. FIREWOOD PRODUCTION AND CONSUMPTION

The firewood consumption for the State was estimated at 774,002 tons, almost half of which was used for industrial and mining fuel. The quantity of sawdust consumed as fuel increased from 90,549 tons to 97,621 tons.

The following table accounts for roughly 55 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 48 per cent. was obtained from Crown land.

Production

	Crown Land Tons	Private Property Tons	Total Tons
Domestic Firewood—			
Firewood Permits (South-West)	52,335	737	53,072
Mill Waste sold as firewood (estimated 50 per cent. of total)	33,024	24,819	57,843
Domestic use on Goldfields	28,317	....	28,317
Total Domestic Firewood as shown by returns received	113,676	25,556	139,232
Industrial Firewood—			
Supplied under License, Nos. 3 to 8 Pumps	25,702	....	25,702
Other Pumps	592	....	592
Factories, etc.	65,098	738	65,836
Mill Waste sold as Firewood (estimated 50 per cent. of total)	33,024	24,819	57,843
Mill Waste used as Firewood	91,544	3,340	94,884
	215,960	28,897	244,857
Mining Firewood	40,748	....	40,748
Total Firewood Produced (as shown by returns)	370,384	54,453	424,837

Consumption

	Tons	
Domestic (estimated)	394,428	(at 2 tons per dwelling)
Industrial	312,532	(ex Govt. Statistician)
Pumping Stations	26,294	(as per F.D. Returns)
Mining	40,748	(as per F.D. Returns)
Total	774,002	

8. SANDALWOOD

Overseas marketing for sandalwood improved during the year and it was possible to dispose of stocks held at Fremantle. Measures have been taken to step up production to meet the increased demand.

The quantity of sandalwood delivered during the year (including deliveries from orders placed during the previous year) was 252 tons, compared with 799 tons to 30th June, 1958, and was made up as follows :—

	Tons
Crown Lands—	
Logwood (including roots and butts)	250
Pieces	2
Private Property	*Nil*
Total	252

The total quantity of sandalwood exported was 428 tons, as compared with 421 tons for the previous year, and included a trial shipment of 5 tons to France.

No orders for logwood were placed by the oil distillers, but 58 tons of roots and butts severed from the logwood at Fremantle were delivered to them for oil distillation purposes.

Four thousand one hundred and thirty-four pounds of sandalwood oil were produced by local manufacturers during the year and this was exported Interstate and Overseas.

9. FOREST PRODUCE

Piles and poles obtained from Crown Lands during the year amounted to 276,654 lin. feet, a big decrease on last year's figure of 509,495 lin. feet. Departmental cutting supplied 15,127 lin. feet of this quantity. The records received from private property operations show a quantity of 459,716 lin. feet, although their records are not complete.

Approximately 232,500 posts and strainers were recorded for the year of which 14,900 were produced by this Department. These figures only represent a portion of the actual quantity produced as private owners do not supply returns to the Department.

A total of 1,037 tons of mallet bark was produced, of which this Department supplied 229 tons, the balance being mainly from private property.

Over 41,000 tons of mining timber was used apart from timber supplied by sawmills. Practically all of this came from Crown lands, 14,000 tons being obtained from the inland forests.

There was a continued increase in demand for Christmas trees and the revenue received from this source was approximately £1,000.

The following table shows numerous other items of interest produced from the forest areas of the State.

The estimated total value of this forest produce was approximately £2,500,000.

Honey Industry

It is estimated that of the quantity of honey produced, approximately 75 per cent. comes from apiary sites situated on State Forests.

The honey production was over 7,300,000 lb., 75 per cent. of which was exported, bringing £250,000 into the State.

FOREST PRODUCE NOT ELSEWHERE INCLUDED IN PRODUCTION TABLES
OBTAINED DURING YEAR ENDED 30th JUNE, 1959

Description of Forest Produce	South-West Division and Agricultural Areas			Northern, Central and Eastern Goldfields	Totals
	Supplied by Department	Other Crown Lands	Private Property*	Crown Lands	
Mining Timber .... Tons	57	24,284	2,832	14,053	41,226 tons
Sleepers for Goldfields Wood Line .... Cub. ft.	....	....	....	9,695	9,695 cub. ft.
Charcoal (includes 22,836 tons ex Wundowie) Tons	....	23,025	....	....	23,025 tons
Piles and Poles .... Lin. ft.	15,127	261,527	459,716	....	736,370 lin. ft.
Fence Posts and Rails .... No.	14,662	90,898	19,436	104,865	229,861 No.
Strainer Posts .... No.	223	2,295	....	....	2,518 No.
Mallet Bark .... Tons	229	77	731	....	1,037 tons
Wandoo Timber for Tannin Extract .... Tons	....	1,487	32,067	....	33,554 tons
Bean, etc., Sticks .... No.	....	10,500	....	2,550	13,050 No.
Boronia Blossom .... Lbs.	....	1,548	293	....	1,841 lbs.
Stone .... Cub. yds.	....	2,440	....	....	2,440 cub. yds.
Sand .... Cub. yds.	....	74	....	....	74 cub. yds.
Loam .... Cub. yds.	....	8	....	....	8 cub. yds.
Scout Staves .... No.	576	....	....	....	576 No.
Sawdust consumed as fuel, etc.† .... Tons	....	97,621	....	....	97,621 tons

* Complete figures for Private Property are not available, only information furnished to the Department has been included.
† The apportionment between Crown Land and Private Property unknown.

10. FOREST MANAGEMENT

Surveys and Map Production

During the year 445 miles of major surveys for mapping control were completed, representing an increase of 58 per cent. on last year's work. Low order surveys totalled 428 miles, or almost three times the amount completed in the previous year.

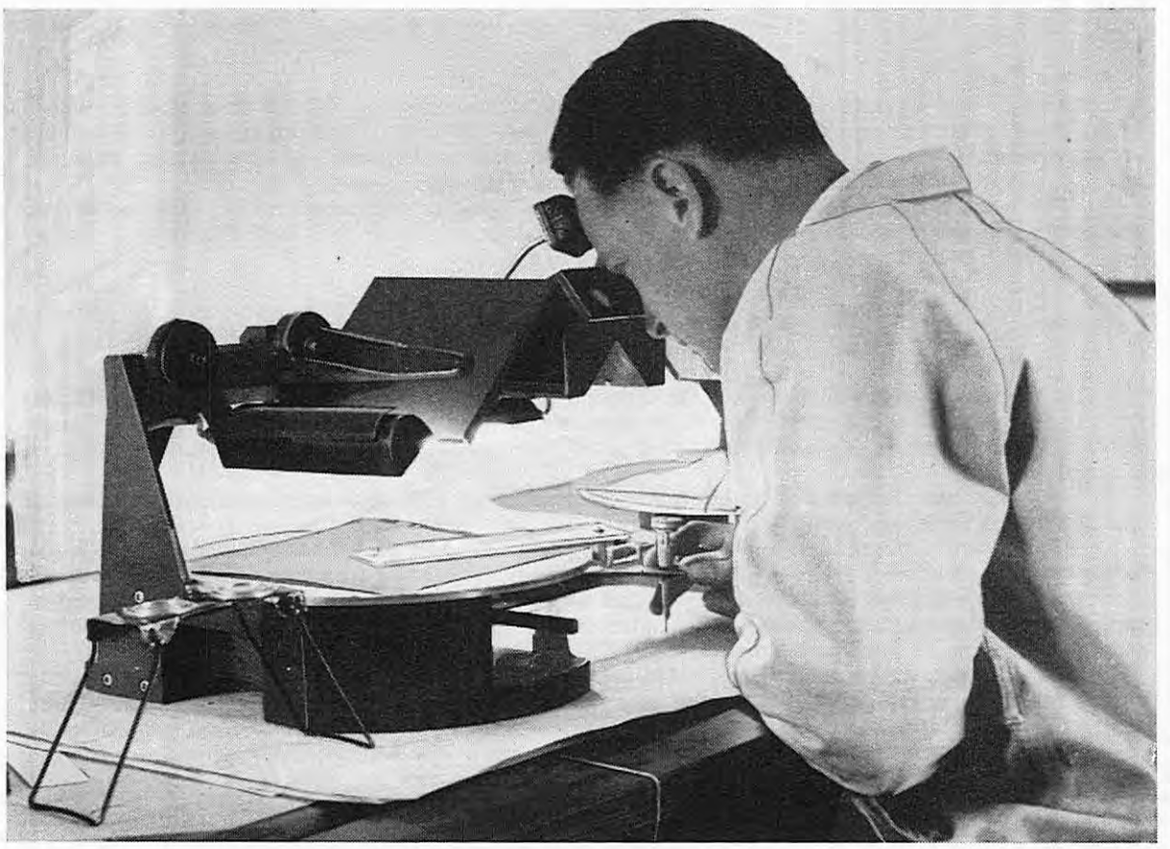
Compilation sheets covering 620 sq. miles were prepared for charting new work, together with base plans covering 1,900 sq. miles for air photo mapping. At the same time, one of the 1 inch to 1 mile topographical series, covering the Shannon River area was prepared for first stage photographic reproduction, and revision of a second sheet in this series was brought to a forward stage.

Air Photo Mapping

The value of vegetation maps of forest areas has been stressed in previous reports. They give a complete picture of forest and land use conditions on all areas including private property within the forest belt, and are used as a basis for planning.

Standard Mapping

Total coverage of standard 20 ch. to 1 inch maps was increased by 1,044,650 acres bringing the net total area to 7,517,250 acres. This figure allows for revision where previous work was below standard specifications and includes small scale photo mapping in the Goldfields and South-West. Standard maps show details of timber types classified by height, density and species. Land under development is shown as cultivated, pasture, ring-barked, or scrub, and the position of features such as dam sites and homesteads is also recorded.



Forest Mapping from air photographs. Plotting forest types from marked air photographs on to bare maps using the Watts Radial Line Plotter

Sketch Mapping

A limited amount of lower order sketch mapping was completed bringing the total coverage to 923,400 acres allowing for revisions. This work, although less detailed, is more rapidly produced and is suitable for initial investigation and reconnaissance purposes.

Other reconnaissance projects involved the lay down of uncontrolled photo mosaics covering some 644,500 acres in such widely separated localities as Cambridge Gulf and Frankland River.

Shadow Zone

After some years' delay, new photographs covering prime forest in the Nalyering, Dwellingup and Marradong districts were received from the State Mapping Committee. Although permitting work on the forests north of Collie, they are not entirely suitable for detailed forest mapping due to a defect known as "shadow zone." To avoid this, in future, photographs should be taken, as far as possible, between March and October when incidence of "shadow zone" is least.

Regrowth Stands

As most of the virgin forests in the lower South-West had been mapped, activities were extended into the northern forests.

Here regrowth resulting from earlier cutting complicates the *types* of timber stands, but a satisfactory method of classifying them has been developed and is now standard practice.

Local Checking of Difficult Areas

Field centres interpreted and checked selected photos or "key strips" which were then used to assist interpretation by the central staff. This work was particularly valuable in doubtful cases where the central staff did not have access to the field.

Relatively Low Cost of Aerial Mapping

Mapping of regrowth has proceeded at almost the same rate as that of virgin forest, and all information necessary for forest administration and planning can be produced for approximately 1d. per acre. This represents a minute fraction of the cost of producing maps of similar standard and detail by conventional ground methods.

Working Plans

An intensive drive to appraise the forestry value of the remaining 750,000 acres of Crown lands in the South-West was completed. Of this total, only one-third, or 230,000 acres, was found suitable for permanent forest use. The balance will become available for agricultural development after the removal of the small quantities of remaining marketable timber.

This work was undertaken to obtain basic data for a balanced approach to the question of land utilisation, and was centred in the following areas :—

Wandering—Tone River ;
Lake Muir—Kent River ;
Donnybrook—Bridgetown ;
Manjimup—Nannup.

In connection with the revision of the General Working Plan, which is due in 1960, over 900,000 acres of State Forests were covered by check assessments. Information regarding all standing timber including small poles and regrowth is recorded with a view to determining present volumes and future production.

This work was also based on air photo maps wherever possible, and was carried out at an over-all cost of only one penny per acre.

For the first time, preliminary calculations of the anticipated perpetual timber yield from major forest areas was undertaken on a pilot scale by methods established from earlier detailed research.

Although regarded as tentative due to lack of complete long term growth studies, these calculations were a major advance towards better planning for the utilisation of the State's forest resources and will be continued in connection with the revision of the General Working Plan.

Progress with the National Forest Inventory was continued and two large scale projects covering timber resources on alienated land in the south-west zone were initiated late in the year. These projects cover a total area of some 1,403,000 acres and will provide valuable data for areas not previously covered by direct assessment. It is anticipated that a preliminary National Forest Inventory for the State will be completed by the end of 1960.

Drafting

Drafting in connection with changes in land tenure, and renewals of sawmilling permits, etc., involved almost a thousand plan revisions and amendments, whilst eight new fire tower plans and five office plans were prepared to assist fire detection and co-ordination of suppression activities. Plans and specifications for eight buildings were also prepared.

With the establishment of Working Plans Offices at Manjimup and Harvey, it has been possible to decentralise a large portion of routine mapping ; and progress plans revisions for all major divisions, together with repairs and renovations to fire look-out tower plans, are now carried out at the field centres.

New equipment which permits the immediate supply of prints with a saving of 33 per cent. in costs has been installed.

Forest Mapping from air photographs. A marked air photo showing interpretation of karri and jarrah forest in the far south

Forest Engineering

Engineering projects completed during the year are set out in the following table :—

Item	Completed in current year	Present Total
Construction of roads, firelines and tracks	1,025 miles	17,681 miles
Maintenance of roads, firelines and tracks	4,069 miles	17,681 miles
Telephone Lines	26 miles	1,762 miles
Houses	4	442
Offices	1	49
Divisional workshops	....	13
Fire Look-out Towers	2	38

Housing

Four new houses were constructed during the year, while five houses were shifted from the more isolated settlements to the larger towns and centres.

Two houses were destroyed by fire, originating within the building. One of these was at Mundaring and the other Kulikup.

Maintenance of houses under control of the Department was kept up to date.

Private garages were erected for a further 59 houses, bringing the total to 251.

A further 72 septic system installations were completed during the year, bringing the total to 351. Eighteen houses at Collie are at present being connected to deep sewerage. It is expected that all Departmental houses on an adequate water supply will be provided with septic systems by June, 1960.

Plant and Equipment

The staff of the Plant and Maintenance Branch was increased by eight during the year, bringing the total employed to 48, including six apprentice motor-mechanics. The maximum number of apprentices commensurate with suitable training facilities is being maintained, the view being that the training of apprentices from country centres helps to build up a nucleus of local tradesmen who are likely to remain in these areas.

The fleet of wheeled and crawler vehicles now totals 452 after the disposal of 19 worn-out units, and the purchase of 15 ex-army vehicles from the Department of Supply. Other purchases totalled 33 vehicles.

Two new lighting plants were installed at Huntly and Tallanalla Settlements, respectively, to replace worn-out units and a used plant with increased capacity was installed at Grimwade.

The total number of stationary engines in use remains at 172, and the number of power saws was increased by 30 to 127.

Communications

With the installation and successful testing of the prototype 40 watt (FT1/FR1) radio set, improved radio communication between gangs in the field and Divisional Headquarters was evident. A further eight sets are being completed in preparation for the coming fire season.

The temporary fixed station at Shannon River was replaced with a permanent installation, while the Collie fixed Station was completely re-installed to the simplified AT14-3B system.

Twenty-six miles of new telephone line were erected and improvements and modifications were made to the telephone systems at Mundaring, Dwellingup, Gnangara, Wellington and Hoffman's.

A new prototype telephone system has been installed at Dwellingup and is now under test.

Routine maintenance to radio and telephone communications was kept up to date and improved equipment to meet the changing field conditions has been developed.

II. REFORESTATION

To control the quantity of timber removed from the forest and to ensure that trees are felled in such a way as to protect immature growth and to encourage regeneration, all trees felled on sawmilling permits in State Forests are selected and branded by authorised officers of the Department.

During the year, 58,490 acres of virgin State Forest were cut over and treated for regeneration which in many cases required only top disposal.

This consisted of 3,813 acres of karri, 44,761 acres of jarrah, 9,761 acres of wandoo, and 245 acres of other species.

Hauling a karri log near Pemberton. The two-wheeled logging arch enables the nose of the heavy log to be raised clear of the ground and so facilitates hauling

12. AFFORESTATION

The need for pine plantations to provide timber and paper pulp for an increasing population has been stressed in previous reports and the 1955 Working Plan set a target area of 2,000 acres per annum.

Planting fell a little short of this figure, only 9,433 acres being planted for the five years 1955–1959 inclusive, due to shortage of funds, staff and plant, but during the last three years work has been brought to a forward condition with a target area of 2,500 acres per annum for the five years commencing 1960.

Loan funds of £100,000 per annum are insufficient for the effective work of 2,500 acres plus the maintenance of the 27,044 acres of existing plantation and the Reforestation Fund has to be drawn on for pine plantation work.

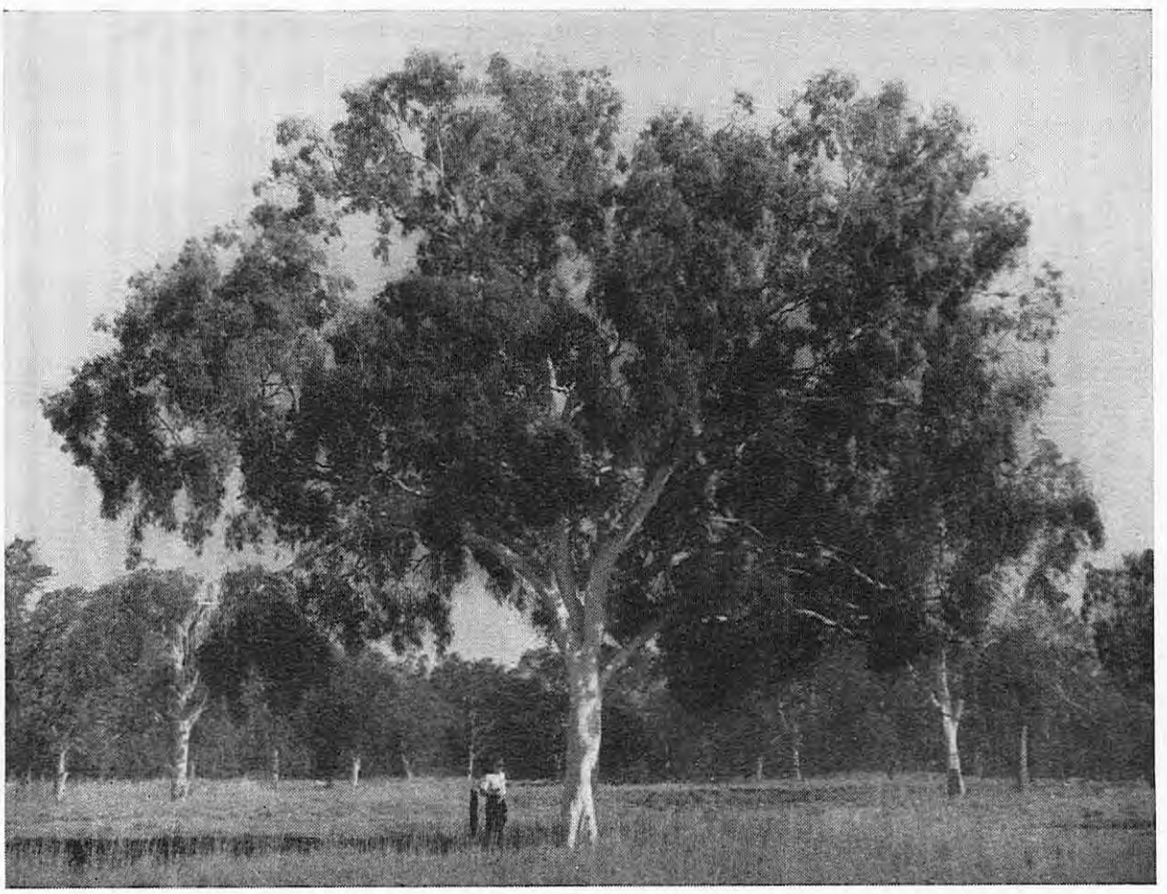
The loss of the small Scaddan plantation (at Mt. Lawley) by fire and the fact that eventually both Collier and Somerville plantations are likely to give way to city developments make it desirable to step up the rate of planting at other centres.

A total of 1,658 acres of pine were planted in established plantations during the current year and 16 acres were clear felled bringing the total net area now under pines to 26,193 acres.

In addition, 54 acres of pine experimental areas were established, bringing the total experimental areas to 851 acres.

The 1958 planting was distributed as follows :—

	Acres
Ludlow	3
Mundaring	112
Collie	210
Grimwade	324
Gleneagle	40
Gnangara	241
Pinjar	57
Harvey Weir	49
McLarty	46
Myalup	174
Blackwood	402
Experimental	54
	1,712



Drooping white gum (*Eucalyptus papuana*) near Fitzroy Crossing. This graceful tree occurs widely through tropical Western Australia and offers great possibilities for ornamental use in the Kimberley region

Ground preparation in readiness for future planting was continued and the position after the above planting was as follows :—

	Acres
Cleared awaiting initial burn	6,138
Part cleared	510
Cleared awaiting cultivation	423
Part cleared following initial burn	805
Cleared and cultivated	438

Soil Surveys

Land suitable for the establishment of pine plantations is carefully selected after intensive soil survey and the following work was carried out during the year :—

Reconnaissance surveys	3,190 acres
Detailed surveys	11,250 ,,
Chemical analyses	317 samples

The total areas now covered since this standard of survey was initiated in September, 1954, are :—

	Acres
Reconnaissance surveys	148,670
Detailed surveys	39,920
Coastal Plain reconnaissance	111,390

Site Quality Mapping

Having overcome the backlog in this work during the previous year, no further mapping was carried out because insufficient areas reached the age limits for site quality work during the year.

However, this work has now become standard practice and will be continued next year to cover the relatively small area resulting from restricted planting programmes in the late war years.

Production of Pine Timber

Thirteen sawmills and case factories, two plywood factories and Departmental mills draw part of their timber supplies from pine plantations.

This supply is mainly in the form of thinnings and amounted to 1,257,638 cubic feet.

Logs produced by the various plantations were as follows :—

	Cub. ft.
Busselton—	
Ludlow-Willcock	33,152
Keenan	31,116
Mundaring	555,396
Carinyah	1,551
Collie	14,164
Kirup—	
Grimwade	116,911
Metropolitan—	
Collier	49,655
Scaddan	17,675
Somerville	131,363
Gnangara	132,706
Harvey—	
Myalup	80,028
Harvey Weir	81,321
Hamel	12,600
Total	1,257,638

Mallet Plantations

The total net area of mallet plantations was increased to 19,001 acres by the establishment of a further 200 acres during the current year.

The Department produced 229 tons of chipped bark and 1,811 cub. ft. of mining timber during the year from thinning operations.

Inspection of the Kimberley Region

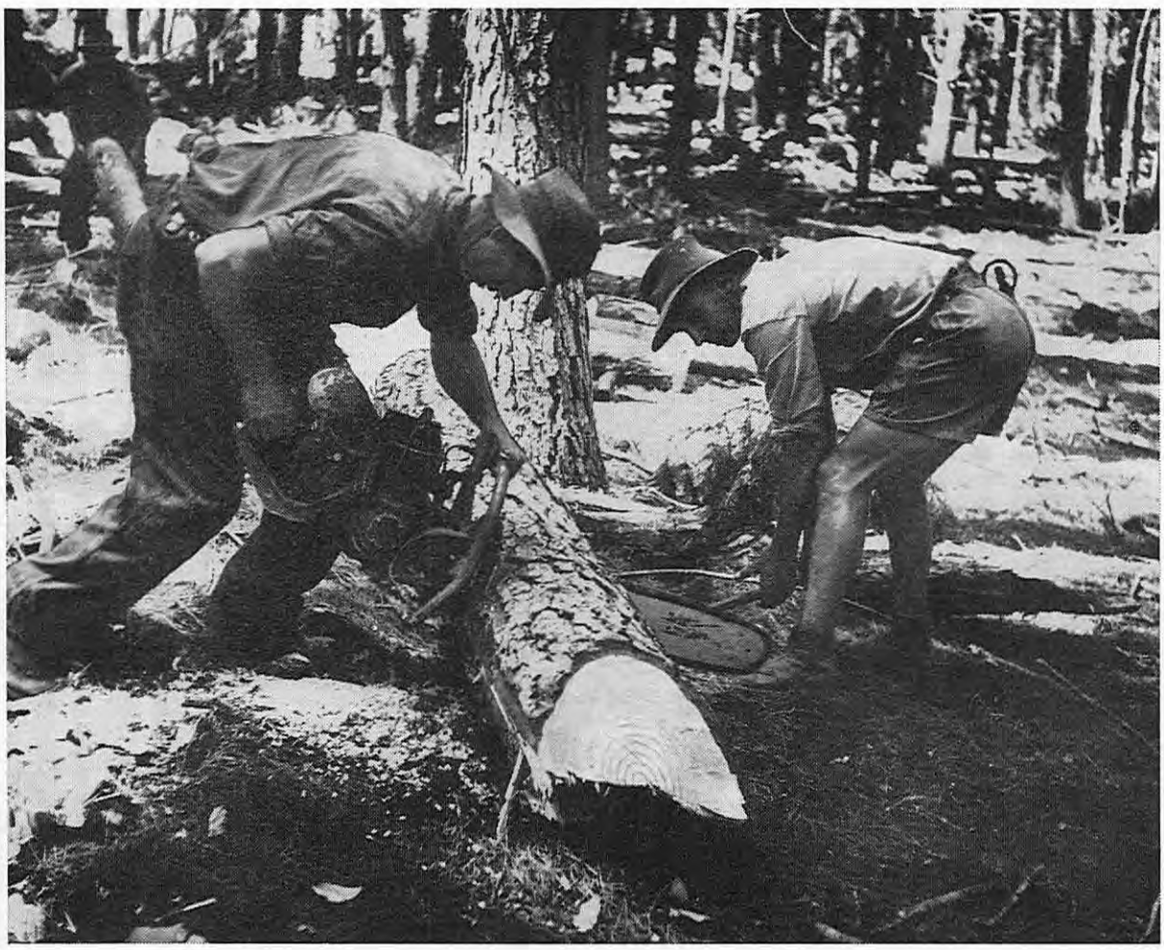
Following representations from Members of Parliament, the Conservator of Forests, accompanied by Mr. Brockway (who had recently spent two years in Pakistan), and the Forester in charge at Kalgoorlie, visited the Kimberleys during 1958 and made an extensive tour by Land Rover.

The primary object of the visit was to study the possibilities of propagation of the native pine (*Callitris*). Observations were made on native timber species and the burning and grazing effects on native vegetation and regeneration.

It was found that stands of native pine had suffered very severe damage from fire and that regeneration was very scarce. Ring counts showed that the timber was extremely slow growing and the youngest regeneration encountered was some 25 years old. Groups of immature pine over extensive areas had been completely killed by fire and regeneration was not in evidence. Everywhere the degradation of the native flora was obvious and it was felt that there was an urgent need for a study of the impact of the pastoral industry on the native vegetation of the region before it was too late.

Introduced tropical trees were noted wherever encountered, with a view to advising on future ornamental tree planting in this region.

The Kimberleys obviously offer many problems with regard to tree planting, which will require further study.



Cross cutting *Pinus radiata* into " peeler logs " using a power chain saw at Mundaring Plantation

New Arboreta

(1) As an extension of investigational work on tree establishment on naturally treeless areas, two new aboreta were initiated, in collaboration with the War Service Land Settlement Scheme, on the Eneabba settlement area. Two reserves of 20 acres and 10 acres respectively were set aside on widely separated sections of the scheme and an initial planting of five acres on each was carried out. In addition a length of 2½ miles of road strip planting was carried out to test the possibility of establishment of tree lines in this way. These plantings included Eucalyptus, Casuarinas, exotic pines, native pines (*Callitris*) Acacias and Melaleucas.

(2) At Dryandra five acres of a newly established arboretum was planted. This is representative of an intermediate zone between the wheat belt proper and the wetter forest areas of the South-West.

Extensive plantings were carried out at Yuna (salt land investigations), Narrogin and Kalgoorlie.

A pleasing feature has been the extension of plantings by other Government Departments, local governing bodies and private farmers. Advantage is being taken of this Department's investigations into species suitable for various sites and the availability of appropriate species, from the Forests Department nurseries.

The co-operation of the Department of Agriculture in testing species at Agriculture Research Stations has been an important factor in the investigation.

Although a number of arboreta have been established, these do not as yet cover all site conditions. Subject to availability of suitable sites and assurances of co-operation of local bodies, additional areas will be established.

Detailed soil studies, including moisture determinations during the critical late summer period, and tree survivals and development of the various species, were carried out at Yuna, Mendels and Morawa with the object of establishing the relative drought resistance under adverse conditions of the wide range of species planted since the inception of the arboreta in 1949.

Roadside Planting in State Forests

Clearing was carried out of thirty small areas of three acres or less in extent and three larger areas each of ten acres, in areas of die back forest adjoining the Albany Highway in the Gleneagle District.

This represents the initial step in the investigation of the possibilities of establishing fast growing species of economic or aesthetic value on sites where the native forest has seriously deteriorated following trade cutting.

Arbor Day

Departmental officers again took part in Arbor Day activities throughout the State.

School children were addressed on the value of trees and in a number of cases were taken on tree planting excursions.

Tree Nurseries

The demand for tree seedlings by country people and local authorities has increased rapidly over the last few years indicating a growing appreciation of the value of trees on farms and in country towns.

The two Departmental nurseries at Hamel and Dryandra encourage this trend by raising a variety of suitable trees and shrubs and supplying them at the lowest possible cost.

The year's work of the two nurseries is summarised in the following table :—

Nursery	No. of Plants				No. of Species	Revenue	Expenditure
	Sold			Departmental Use			
	Potted Stock	Tray Stock	Open Rooted Plants				
						£	£
Hamel	25,015	2,832	31,040	56,811	73	4,274	5,195
Dryandra	20,911	2,125	....	5,084	66	2,974	1,884

The above figures for Revenue and Expenditure are for the period 1st October, 1957, to 30th September, 1958.

Seed Distribution

The Departmental Seed Store increased the value of its stock to £16,030. There are now 195 different species of seed held.

Sales were made to both Australian and Overseas buyers, but were down from last year's figure of £1,852 to £1,729, for the current year.

The majority of the seed was collected by Departmental officers and staff as opportunity offered.

There were 270 germination tests carried out.

Pine Using Industries in the Metropolitan Area

The importance of retaining areas of poor sandplain country north of Perth for the establishment of pine plantations is indicated by the following facts.

In the vicinity of Perth there are 13,500 acres of pine plantation, mainly on coastal sandplain of which only 4,000 acres are old enough to provide thinnings, yet from these thinnings 315 men were directly gaining a livelihood in 1958—105 in the forest and 210 in small city sawmills and plywood operations—with a direct production attributable to this pine material alone of £370,000 per annum. These figures have all increased over the past twelve months.

Probably the largest consumer of pine logs is the case industry. Metropolitan plantations supplied 844,238 cub. ft. of pine logs to 13 case factories during 1958–59. Local pine is well suited to the manufacture of cases as it is clean and easily handled, and free from unpleasant odours.

The two plywood manufacturers in Western Australia used approximately 53,000 cub. ft. of pine from these plantations over the same period. In the past, most pine plywood was produced by rotary peelers, but recently a plywood firm has installed a heavy duty slicing machine, which produces ply with a more attractive patterned grain, which has been used in important public buildings and it is thought will be used as panelling in extensions to Parliament House.

The manufacture of wood-wool from pine logs is increasing. This product is used chiefly as packing for perishable and breakable commodities. When mixed with cement, it can be pressed into a hardboard with properties that make it an excellent partitioning material for buildings. This hardboard is now being manufactured in Perth. Twelve thousand five hundred cubit feet of pine logs were converted to wood-wool during the year. This industry can economically use the smaller sized logs (generally under four inches diameter). This aids in the Silvicultural treatment of the pine forest and gives a more complete utilisation of each tree.

During the year, 1,638 cubic feet of pine was sold in unit packs. There is a strong demand for this material as it is easy to work and when kiln-dried, makes an ideal material for home-builders and amateur furniture makers. The Education Department uses large quantities of pine in their manual training classes for the same reason.

Each year an increasing amount of local pine is used by furniture manufacturers in the Metropolitan Area. In addition, a multitude of products, such as toys, coat-hangers, etc., are made from local pine.

In all, a total of 912,325 cubic feet of pine was cut from Metropolitan plantations for local use, and this figure is expected to increase with the increasing demands of Perth's growing population.

13. FIRE PROTECTION

State Forest Under Protection

Indigenous forest	3,472,280 acres
Pine Plantation	27,044 acres
Mallet plantation	19,001 acres

Surrounding and adjacent to this protected forest, there are some 1,500,000 acres of private property and Crown land on which fires must be attended to promptly as they are a menace to the protected forest.

The Fire Season

	Jarrah	Karri
Rainfall	Above average in February and April with March the driest month	Below average from November to March
Temperature—		
Number of days 96° and over	15	5
Number of days 100° and over	3	2
Maximum temperature	105°F.	100°F.
Relative Humidity—		
Number of days below 25 per cent.	37	16
Fire Hazard—		
Number of days Dangerous	12	4
Number of days Severe Summer	20	3
Mean Fire Hazard	5·8	4·5

The fire season was characterised by an abnormally dry period from November to March in the karri forest, when the total rainfall was only 4·84 inches, compared with an average of 7·15 inches.

The first dangerous day in the jarrah forest occurred on the 16th November, and it is only the second time on record when a dangerous hazard occurred before December. One prolonged heat wave occurred from the 18th to 22nd February, when five consecutive dangerous days were experienced.

Controlled Burning

Late winter burning was possible in both the jarrah and karri regions, but an early spell of hot weather in November curtailed the spring burning programme. However, a satisfactory total was achieved, as set out in the following table :—

Prescribed Burning—	
General	312,704 acres
Advance and Top Disposal	56,482 acres
Firebreaks	29,000 acres
Total	398,186 acres

Detection

New towers at Mt. Seaview in the Ludlow-Willcock area and St. Patrick's Hill, north of Gnangara plantation, were brought into use for the first time this year.

	Jarrah Zone	Karri Zone
Manning of Towers—		
First Watch	21st October, 1958	14th November, 1958
Last Watch	21st April, 1959	17th April, 1959

Fires and Fire Damage

The following table sets out the causes of all fires attended by Departmental gangs :—

Escapes from settlers' fires	99
Escapes from prescribed burning	49
Lightning	42
Mill locomotives	38
Travellers	35
W.A.G.R. locomotives	31
Deliberately lit	25
Children	20
Hunters, fishermen	19
Other known cases (chiefly sawmills, householders, and other Government employees)	52
Unknown	24
Total	434

This total was nearly 100 less than last year's record 530, but is still considerably higher than the overall average of 359. This is partially due to the 42 lightning fires which occurred during the current year as compared with nine for 1957–58.

Once again, the most prolific cause of fires was escapes from settlers' burns, with a total of 99 or 23 per cent. This is nevertheless an improvement on the 25·6 per cent. in 1957–58 and the 42 per cent. in 1949–50.

The 25 fires deliberately lit shows a big increase but six of these were lit on the one occasion by a youth riding through the forest on a bicycle in the Collie district. The youth was seen but escaped apprehension.

Points of Origin of Fires—

State Forest	179
Private Property	168
Crown lands	57
Pine plantations	30
Total	434

Total Area Burnt—

Indigenous forest	22,405 acres
Pine plantations	98 acres

Summary of Damage—

Slight	4,827 acres
Moderate	6,436 acres
Severe	11,240 acres
Total	22,503 acres

Size of Fires—

Less than 1 acre	166
1–5 acres	96
6–10 acres	31
11–20 acres	18
21–50 acres	32
51–100 acres	28
101–200 acres	16
Over 200 acres	47
Total	434

Departmental gangs were largely responsible for arresting fires which threatened the two mill villages of Mornington and Jarrahdale.

In addition, Departmental gangs were of considerable assistance to the timber trade in assisting to extinguish several fires in sawmills.

Publicity and Public Relations

More fire hazard indicator boards were put into operation during the year and fire warning signs erected at picnic and fishing spots within the forest. There is evidence that the travelling public is becoming increasingly aware of the necessity for protecting these tourist attractions from damage by fire.

Local authorities are showing more willingness to police the Bush Fires Act and a considerable number of prosecutions were launched during the year, generally with good coverage from the local press. In some cases local authorities call for assistance from Departmental officers in investigating breaches of the Act, and this assistance is willingly given, as many local fire control officers have had little experience in matters of this nature.

Schools and youth camps were visited at various times during the year and children addressed on the principles of fire prevention. Two exhibitions of fire fighting and equipment were given at local Agricultural shows.

14. SILVICULTURE AND SOILS RESEARCH

A. KARRI SILVICULTURE

Seeding and Regeneration

Observations on flowering and seed formation have developed to a sufficient extent to enable the cycle over most of the karri region to be forecast. Apart from the value of this information in planning regeneration burning, apiarists will be able to forecast the honey flow with a greater degree of accuracy.

Seed was not available for regeneration work during 1958 but supplies will be available for seeding in the southern karri forest from Spring 1959 into 1960. Flowering in the north-western karri forest is expected in Spring 1959 and seed will be available from the Spring of 1960 into 1961. A good honey yield is expected from this flowering.

Ashbed Effects

At the centre of an ashbed two years old karri seedlings may be 10–12 feet in height compared with half this height on the edge and 1–2 feet high off the ashbed and on ashbeds with the topsoil removed. This initial height growth advantage of five feet is maintained during the young life of an even aged stand.

Recent observations of seedlings on ashbeds have revealed a strong development of fibrous lateral roots with numerous rootlets carrying terminal mycorrhiza bifurcations. This pattern has not been observed in seedlings off the ashbed.

A project to investigate the chemical and physical properties of karri ashbeds was commenced during the year.

Thinning in Regrowth Stands

Crown thinning treatments carried out in even aged 25 year old regrowth have produced marked responses within three years of thinning.

For treatments leaving 20, 40, 60 and 80 crop trees over 36 inches girth breast height per acre, basal area increment percentages of 1.7 per cent., 1.4 per cent., 1.1 per cent. and 1.0 per cent. respectively were obtained. Thinning (from below) to 60 crop stems produced an increment of 1.1 per cent. as compared with 0.7 per cent. for thinning (from above) to the same number.

Trade Cutting

A virgin stand of karri selected for felling trials will be treated in July. All unhealthy marketable trees are to be removed from the area. Plots have been marked to retain different levels of stocking in the remaining healthy stands. Information on the most desirable growing stock to retain and the problems of marking and cutting to achieve this aim will be obtained from the project.

Preliminary investigations confirm previous opinions that the quality and vigour of individual trees should determine the intensity of trade cutting. In view of the shortage of vigorous growing stock in old growth stands, the falling of this type of material cannot be justified in the first cut. The desirable objectives, when converting virgin forest to management, are :—

1. To retain the best trees as seed trees.
2. To retain a healthy growing stock of not less than one-third of the marketable material under virgin conditions.
3. To bring unproductive forest into production as soon as possible by salvage cutting.
4. To achieve dense, vigorous regeneration following logging, by burning when the trees are carrying ripe seed.

Enrichment Planting

Following inspection of early trial plantings of blackwood (*Acacia melanoxylon*), seed from elite trees has been obtained from the Forest Commission of Tasmania for further trials on recently burnt karri sites.

Original spot sowings of this species at Big Brook carried out in 1928 under open virgin karri forest produced a number of trees of indifferent form which now measure up to 60 inches girth and 70 feet in height. At approximately 10 years of age these original trees commenced regenerating by both seed and root sucker and today each tree has colonised an area up to half an acre in extent. The progeny are of good form and straight boles to 40 feet are not uncommon.

A blackwood colony of several acres has also developed at Quinninup Brook from a few old trees on an adjacent farm. Here the progeny appear to be mainly seedlings established in a mixed marri-karri formation within 8 chains from the stream.

Future enrichment planting trials will determine the extent to which this valuable understorey species can be employed.

B. JARRAH SILVICULTURE

Jarrah Regeneration

The reassessment of a number of regeneration plots established in the 1930s, on a range of forest conditions, has indicated that the successful regeneration of jarrah depends largely on the presence of well developed lignotuberous advance growth at the time of the cut. Observations over periods of up to 24 years have led to the following conclusions :—

1. Under the undisturbed canopy of virgin forest, seedlings and advance growth up to 3 feet high become established in varying quantities, greater numbers being found under a more open canopy and on old ashbeds. These plants will persist in an apparently suppressed condition for long periods, and dormant advance growth, well over 20 years old has been observed. The dynamic development as saplings is confined to openings in the forest, caused by the death of old trees.

A second growth jarrah plot at Mundlimup thinned in 1928 and 1957. Approximate age 82 years

2. Following the logging of an area, the reduction in competition results in a regeneration period, during which the remaining vegetation has the opportunity to make accelerated growth. The jarrah advance growth usually commences its dynamic development at this time.
3. The balance between the capacity of the site and the demands made on it, is restored in time, by the increased development of the regeneration, other understorey species, and the remaining trees. After this, throughout the interval between cutting cycles, there is no further dynamic development of advance growth except in response to the death of individual trees.

4. The establishment of seedling regeneration is encouraged by controlled burning treatment. The removal of the heavy litter apparently produces a suitable seed bed and seedlings become established in thousands per acre following a burn in seed year.

Artificial Establishment of Jarrah

Assessment at the end of the first summer, of a series of planting trials with one year old jarrah seedlings, indicates that cultivation is of great benefit in the survival of the young plants. The mean survival and increment figures for the trials were as follows.

	Cultivated only	Cultivated plus fertilizer	Control
Survival	81 per cent.	50 per cent.	46 per cent.
Height increment	4.7 in.	6.6 in.	2 in.

The low survival of the fertilizer treatment, was due largely to summer deaths. The plants responded to the manurial treatment by vigorous leaf production in the spring, but could not survive the hot dry summer so well as the unfertilised plants.

Nutrition Trials on Jarrah Seedlings

A potting trial to test the effect of various fertilisers on jarrah seedlings, growing in laterite soil, has yielded the following information. Heavy dressings of mixed inorganic fertilisers containing nitrogen, are toxic to jarrah seedlings. Light dressings of NP and NPK fertilisers produced vigorous plants, but survival was only 56 per cent. due to scorching by the fertiliser. The most successful treatment was an enriched compost which produced vigorous growth and 100 per cent. survival. All the control plants survived but were less than half the height of those receiving compost.

An unthinned second growth jarrah plot at Mundlimup. Approximate age 82 years

Flowering and Seed Production in Jarrah

Observations of jarrah crowns indicate that there has been a further shedding of immature fruit since the flowering in November-December last year. The situation as regards seed production for next summer is at present as follows :—

1. Normal healthy second growth trees—such as saplings and poles have generally shed their fruit in an immature stage soon after flowering.

2. Occasional young trees have retained their fruit. These are usually trees in abnormally open situations.
3. Mature trees have generally retained their fruit since flowering and are carrying a fairly heavy crop.

Indications are that there will be no shortage of jarrah seed next summer.

In the course of seed collection last summer, samples of a small beetle whose larvae develop in the jarrah fruit and eat the seed, were discovered. The beetle has not yet been identified.

A forest cut under management is not necessarily cut out. A group of young jarrah left by the tree-marker in 1928 matures for a future cut

Jarrah Thinning Studies

Re-measurement has been carried out of a series of thinning plots established in young jarrah regeneration in 1929. The trees were no more than 15 years old at the time of thinning, and the results 30 years later, show that very little benefit was obtained from thinning at such an early age. This is due to a vigorous development of coppice on the thinned plots and a natural thinning in the control plot, which has resulted in a very similar stem distribution in all plots at the present time.

Some indication of the benefit derived from thinning jarrah is provided in the study of an 80 year old regrowth forest near Jarrahdale.

The area has experienced two trade cuts. Prior to 1875 an extremely heavy cut was carried out. A salvage cut followed in 1928. Since this latter date, stand treatment has consisted of a crown thinning in 1928 and a revisionary regeneration treatment in 1934.

Sample plots established in unthinned and thinned areas in the 1928 treatment (see accompanying photographs) have yielded the following results.

	Age	Co-dom. Height	Total u.b. Volume	B.A.u.b. sq. ft.	Vol. u.b. > 54 in.	Vol. u.b. > 72 in.	Bole Height	Number of Stems per Acre
	Years	ft.	lds.		lds.	lds.	ft.	
Thinned 1928	80	91	54	105·2	45	20·6	44	77
Unthinned	80	91	61	132·7	23	86	48	188

This data shows that while thinning does not materially reduce the total volume, annual increment is effectively placed on a limited number of selected trees. This has the economically desirable effect of markedly reducing the period from seedling to sawlog.

Appointment of Research Officer by Forestry and Timber Bureau

A research officer was appointed to the Dwellingup Research Station, in June, 1959, by the Commonwealth Forestry and Timber Bureau. This officer is to be engaged on fundamental research into jarrah silviculture.

C. PINE SILVICULTURE

Selection of Elite Trees (*Pinus pinaster*)

Fifty-one trees of high standard selected in *Pinus pinaster* stands over 20 years of age have been measured and classified for the tree breeding programme. Ten trees (six Leiria and four Landes strains) of first quality and 20 trees (6 Leiria and 14 Landes) of second class quality are available for grafting.

Sufficient work has been carried out to allow a high standard to be set for elite tree selection. With selection work extending to the 1941 and 1942 Leiria strain plantings in the next 12 months, more than 20 good parent trees will be available for seed orchard establishment in the 1960 grafting season.

Vegetative Propagation

Grafting trials were initiated last spring to determine suitable techniques for future large scale programmes.

Conditions for these trials were far from optimum. Stocks were generally undersize and fully adequate lath house facilities were not available. All grafts were cared for in a small temporary lath house and hand watered.

Results obtained were as follows :—

(i)	Total number of grafts attempted .... =	122	
	Number of grafts available for planting .... =	80	
(ii)	Number of bottle grafts attempted .... =	105	(100%)
	Number of bottle grafts survivals .... =	79	(75%)
	Number of vigorous survivals .... =	68	(65%)
(iii)	Number of side veneer grafts attempted .... =	17	
	Number of side veneer grafts survivals .... =	1	

A glass house and lath house with automatic overhead misting systems are being constructed for future grafting work. Stocks are available for 350 grafts in the 1959 programme and this number will be increased to 500 for 1960.

The first seed orchard will be commenced in 1960.

Variation in *Pinus pinaster*

Form and vigour assessments during the past 12 months provide an indication of the standard of crops established from various, imported seed batches. For this work the Queensland system of form and vigour assessment has been adapted very successfully.

Results at present available indicate that Portuguese seed produces 14 per cent. of acceptable crop stems. Included in this value are 1.5 per cent. of elite stems. Seed of French origin averages in the vicinity of seven per cent. of suitable crop stems.

An assessment of provenance trials established at Gnangara in 1933 proves that up to the age of 26 years, Leiria strain is significantly superior to the other three races planted in Western Australia from the viewpoints of total height, volume to four inches D. u.b. and volume in the pruned 20 foot stem section. Landes is superior to the Corsican race in height growth but not from the viewpoint of volume in the pruned section. Landes and Corsican are superior to Esterel in all three points.

These comparisons are for average trees of final crop quality. Data at present being analysed to determine basal area and volume differences between the races on a per acre basis definitely indicates the superiority of Leiria in this further aspect of the assessment.

Seed Treatment to Stimulate Germination

A large scale trial to determine a suitable prescription for improving germination in imported Portuguese seed has proved satisfactory.

One hundred and fifty pound of seed was used to devise techniques for bulk handling. The most successful treatment tried consisted of an eight day soaking in water at room temperature followed by a seven week stratification period at 36°F. Seed was dried before sowing.

Treatment was successful at all stages of testing over a germination period of eight and a half weeks in both sand flats and nursery beds. Rate of germination and total germination per cent. were both significantly improved over this period.

Further tests were initiated in June to confirm results and to determine the effect of longer stratification periods.

Nutrition

All nutrition plots at Gnangara were remeasured in February.

Fading areas or areas of subsequent degrade which occur in the plantation after an initial period of satisfactory growth can be brought back to vigour by second applications of fertilizers.

Phosphate, zinc and nitrogen have been found to be deficiency factors in these degraded areas. However, neither zinc nor nitrogen are obvious deficiency factors at time of planting on these soils.

The most satisfactory treatment to rehabilitate degraded areas, tested to date, consists of five cwt. of superphosphate plus two cwt. of ammonium sulphate, broadcast per acre. Superphosphate plus pyrites slag also has a consistently superior effect probably due to the minor elements contained in the slag.

Treatments have given appreciable basal area responses in the second year after treatment and these values of up to double the normal growth rate, are maintained for at least seven years after treatment. Plot analyses indicate that, from the stumpage value viewpoint, the combined NP treatment is economical.

Pinus pinaster **Volume Table**

A two-way table providing volumes to a four inch top diameter under bark has been compiled for use with *Pinus pinaster* within the State.

The table, based on diameter over bark at breast height and total height measurements, is set out in 0.1 inch diameter classes and two foot height intervals. The height range covered is 36 feet to 86 feet ; diameter range is four inches to 18 inches depending on the height class.

Eight hundred and ten sample trees (464 Leiria and 346 Landes) were used for compilation on a system based on Hummel's Volume—Basal Area Line Method.

The table is at present being extended and tested to provide volume under bark conversion factors.

D. SOILS RESEARCH

Forest Litter Studies

The measurement of litter fall in the jarrah, wandoo and mallet forests was concluded at the end of the year. Complete summaries of litter fall are now available for :—

Jarrah forest for the period 1951–1958.
Wandoo and mallet forests, 1954–1958.

Effect of Fire on Forest Soils

A paper entitled " The Effect of Frequent Burning on the Jarrah Forest Soils of Western Australia " was presented to the 1958 A.N.Z.A.A.S. Conference in Adelaide.

During the year a project was commenced to study the chemical properties of karri ashbeds and their effects on the forest soil.

It was shown that these high temperature burns cause marked chemical changes in the surface soils of the ashbeds. The most pronounced of these changes are increases in pH, total soluble salts, nutrients extracted by 2.5 per cent. acetic acid and the formation of calcium carbonate. By contrast, however, soil organic matter is reduced by the high temperature burns.

Forest Nursury Studies

The analysis of nursery plants to measure the uptake of nutrients was continued during the year.

Pine samples from Hamel, Gnangara, Grimwade, Nannup and Wellington nursuries were analysed, and the data confirmed that nitrogen and potassium were the major elements removed by the nursery crop.

Pot Culture Trials with *Pinus radiata*

A further series of pot trials with this species were established during Spring, 1958. These experiments were designed to investigate the effect of superphosphate placement on the growth of *Pinus radiata*. In the early stages, young pines have grown faster on laterite soils that have been treated with superphosphate as compared with controls grown on kraznozen soils under identical conditions.

Pinus pinaster **studies**

A series of profiles were sampled from the groundwater podsol soil type at Gnangara. The profiles were selected from *Pinus pinaster* plantations of different ages and ranged from virgin soil to soils under a 25 year old plantation.

From the data it is evident that the present practice of clearing, cultivating and planting *Pinus pinaster* has had a very marked effect on the soil. There was a decline in organic matter, potassium, phosphorus and exchangeable cations for at least 16 years after planting, but in the older pines there does appear to be a slight improvement in these soil properties, due to the return of litter to the soil.

Wheatbelt Arboreta

In conjunction with the establishment of arboreta in the wheatbelt areas, detailed analyses of the soils from two of the established arboreta, *viz.*, Yuna and Morawa, were carried out. The aim of this work is to investigate the influence of the soil factors on tree growth.

Pine Plantation Soils

Routine phosphorus analyses of prospective pine plantation soils have again been an important feature of the analytical work carried out at the laboratory, with 318 analyses being carried out on samples collected by the soil surveyors.

15. LIBRARY

With the increase in professional field staff in recent years the demand for libarary services has grown steadily.

Stock and accessions have in the past taxed available space to the limit but the provision of extra floor space during the year has eased the position for the present and allowed a small area for readers' tables. Work space has been increased slightly and improved equipment and mobile units have done much to promote the best use of the area available.

The classified catalogue has been increased to 12,500 cards and remains of interest to other libraries and students.

The Librarian's advice on special library technique and layout has been sought by several other Departments during the year.

Author and country indexes have been completed for the papers delivered to the Seventh British Commonwealth Forestry Conference, 1957, and are available on request.

16. EDUCATION AND PUBLICITY

Education

Two professional staff meetings were held in the field during the year and a field day was utilised to study the silviculture of jarrah in relation to past treatment and second growth forest.

Training of staff has received continued attention and the following short duration schools were held :—

Fire Control	3
Timber Inspection	1
Plantation Techniques	1
Field Officers (General)	1
Forest Assistants (Clerical)	1

A new intake of 18 Forest trainees was formed into two groups for training and these were established at Gleneagle and Pemberton. These recruits are receiving training and practical experience in various aspects of forest operations including fire control, road construction, tree felling and plantation methods.

The number of students enrolled for the Forestry Course at the University of Western Australia and the Australian Forestry School, Canberra, has been maintained and the present position is as follows :—

	Commonwealth Scholarship	State Scholarship	Independent
4th Year—Canberra— To graduate, 1959	1	....	....
3rd Year—Canberra	1	2	....
2nd Year—University of W.A.	2	....	....
1st Year—University of W.A.	1	2	3

Publicity

Publications.—The telephone Communications Pamphlet of the Forester's Manual has been completed and is in the hands of the printer. Other sections of the Manual have been amended to cover all recent instructions.

To ensure a wide circulation amongst the farming community, two articles were published in the Journal of Agriculture, one entitled "Tree establishment in the wheatbelt" (Bulletin No. 2616) and the other "Tree establishment on Esperance Plains" (Bulletin No. 2644).

The following papers were delivered by officers of the Department at conferences during the year :—

A. C. Harris—The need for dedication of more publicly owned forested land and the multiple use of all forested land.

G. W. M. Nunn—Australian Forest Resources and their assessment with special reference to the forestry inventory of Western Australia.

H. C. Wickett—Accidents in the timber industry.

Opportunity was taken to utilise the new floor space allotted to this Department as a demonstration area of Western Australian timbers. Floors were laid with parquetry of jarrah, karri, wandoo and tuart ; office partitions are of plantation-grown *Pinus pinaster* lining board, and cupboards and doors of rotary and sliced veneers of *Pinus radiata* and sliced jarrah. The plywood veneers for this purpose were kindly donated by Westralian Plywoods Pty. Ltd.

Exhibits.—Departmental exhibits were staged during T.D.A. week in Perth and Manjimup and for the Australian Inland Mission at Kalgoorlie. Support was also given to other bodies, including the Tree Society, by means of posters and general assistance.

Keynes Forestry Prize.—A practical expression of interest in Western Australian forestry was made during the year by Miss H. N. Keynes of Blackwood, South Australia, who made a bequest of £100 to the Department.

This money has been invested in a Government security, the interest from which will be used annually to award a prize known as the "Keynes Forestry Prize" to the best article or essay on the subject of Forestry by secondary school students in Western Australia.

In this way, it is hoped that students will be encouraged to take more interest in the management and protection of the forests of the State, and possibly may become interested in a forestry career.

17. TENTH AUSTRALIAN FORESTRY CONFERENCE

The Tenth Australian Forestry Conference was held in Tumut in May, 1959, and was attended by the Conservator and Superintendents G. W. M. Nunn and W. R. Wallace.

Resolutions of the Conference are given hereunder :—

Resolution No. 1

This Conference, having regard to the anticipated requirements for forest products to meet the needs of an increasing population, and in view of the continuing depletion of the national forest resource, recommends that the Australian Forest Authorities complete their forest inventories in a manner that will enable a co-ordinated Commonwealth total to be compiled by the end of 1965 and that, to assist in this work, the Commonwealth Government be asked to help as necessary in the preparation of the base maps upon which the early completion of such inventories depends.

Resolution No. 2

In view of the continued high level of timber imports, and the rising timber needs of a rapidly increasing population and of the inadequacy of the existing area reserved for forestry, Conference recommends that early attention be given to the dedication of all forested and other Crown Land necessary to meet such need.

Resolution No. 3

Conference recommends that a determined effort be made by all Forest Services to standardise the unit of log volume measurement in Australia, using true volume in cubic feet, under bark, and to secure its introduction into the forestry and timber industry, over a period of years, if need be.

As a first step, every Australian Forest Service is requested to use the cubic foot, true volume, as a standard unit for log volumes in published reports and bulletins.

Resolution No. 4

Conference noted the increasing need facing many Forest Authorities for the expenditure of large sums of money on the provision and maintenance of major access roads to State Forests.

While the construction of such roads is essential for the continuity or further development of local wood-using industries, they can, and do in many instances, provide improved communications for the travelling public and the district at large.

Conference recommends that when these circumstances apply, Governments adopt the principle of supplementing forestry funds directed to the construction and maintenance of such roads with amounts proportionate to the services provided for the public.

Resolution No. 5

TOWN WATER SUPPLY CATCHMENTS

By reason of evidence of a developing trend towards prohibition of timber utilization in forested areas which serve as town water supply catchments, and :

Because it is the considered opinion of Conference that, in view of the inadequacy of land in Australia suitable for commerical timber production to meet the anticipated future timber requirements of the Commonwealth, such a practice must ultimately have a very serious effect on the national economy.

Conference *resolves* that it be a recommendation to all Governments of the Commonwealth of Australia that, as foresters are fully competent to prescribe and regulate logging and similar operations in a water catchment in such manner as to protect the interests of the water consumer, the forest management of Lands within such catchments be entrusted to the State Forest Authority concerned.

Resolution No. 6

FORESTRY RESEARCH

This Conference, re-affirming the opinion expressed by the Ninth Australian Forestry Conference that :

(a) Expanded forest research is vital if full productivity and development of Australian forest resources are to be achieved.

(b) Present facilities and qualified personnel allocated to such work, are still inadequate.

(c) The establishment of a central Forestry Research Institute to conduct fundamental reasearch into matters of national forestry interest, would result in an overall economy and :

Recognising that :

(a) Such forestry research, can best be carried out only with the closest possible co-operation between the Forestry Services of the States and the Commonwealth.

(b) The present research activities of the several States cannot hope to cover the whole field.

Recommends that :

(a) The Commonwealth Government establish a Forest Research Institute in association with the Forestry and Timber Bureau.

(b) The Forest Research Institute, when established, be advised by a Board of members which shall include representatives from the Commonwealth and State Forest Authorities, and the C.S.I.R.O., together with a limited number of other scientists of eminence.

Resolution No. 7

INSECTS

By reason of evidence of serious damage and financial loss caused by forest insects to the native forests of Australia, and :

Because of the example of the widespread and continuing devastation resulting from phasmid attack in New South Wales and Victoria.

Conference *resolves* that the Forest Authorities of Australia should, with whatever assistance as can be obtained from other departments and institutions, actively pursue research into the control of destructive forest insects.

18. TIMBER INDUSTRY REGULATION ACT, 1926-1950

The number of mills registered under the provisions of the Act at the close of the year totalled 260 (137 Crown land, 123 Private Property).

The average number of persons employed on timber holdings each month throughout the year was 5,155, compared with 5,227 last year.

The District and Workmen's Inspectors made 1,558 inspections of timber holdings.

There were 805 notifiable accidents, four of which were fatal.

The number of accidents per 100 persons employed was 15.61, compared with 14.67 for last year.

The cost to the Forests Department of administering the Timber Industry Regulation Act for the year ending 30th June, 1959, was as follows :—

Salaries	£2,306
Mileage and travelling allowances and sundries	£1,302
Total	£3,608

19. FOREST OFFENCES

Ninety-seven forest offences were reported during the year. Legal proceedings were taken in 16 cases and resulted in convictions. Fines totalling £147 10s. and costs of £52 8s. were imposed.

Warnings were issued in 38 instances and the remainder were dealt with by charging royalty, forfeiture of deposits, collection of damages or confiscation and sale of timber illegally cut. The amount received by the Department in this way totalled £1,495 15s. 3d.

20. EMPLOYMENT IN FORESTRY

The number of wage earners directly employed in Forestry has been estimated at approximately 6,624, made up as follows :—

Direct Employees of the Forests Department—		
Professional Officers	31	
General Field Staff	133	
Clerical and Drafting	64	
Wages employees	584	
Contractors and employees (estimated)	20	
		832
Sawmill employees including bush workers at 31st December, 1958*		5,155
Firewood cutters, pole getters, etc., on permits		418
Goldfields firewood cutters, contractors, and woodline employees and carters		59
Apiarists, estimated (400 sites are registered)		160
Total		6,624

* Includes employees of registered sawmills.

21. STAFF MATTERS

The continuous extension of the Department's activities and the increased areas brought under forest management have necessitated considerable re-organisation. This was given effect in the recent reclassification of the Public Service and the Field Staff of this Department which operated from 1st January, 1959.

Two graduates of the Australian Forestry School and a graduate of the Edinburgh University were appointed Assistant Divisional Forest Officers during the year, and three officers of this rank resigned, one to join private enterprise, one to accept an appointment with State Building Supplies, and the other to join the Commonwealth Forestry and Timber Bureau, but on forest research work in Western Australia.

Two (2) forestry graduates (one from Edinburgh University and the other from the Australian Forestry School) were employed as Forest Officers under the Forests Act and six (6) forest guards, one (1) forest assessor, one (1) technical assistant, one (1) forest ranger Grade I, and two (2) clerical assistants were appointed during the year. Two forest guards were promoted, one to forest ranger Grade II and the other to forest ranger Grade I, and two forest guards resigned.

Mr. H. E. Rose, after completing more than 31 years' clerical service with the Department, reached the retiring age on the 15th August, 1958, and Mr. J. C. Adams was subsequently promoted to the vacancy.

Two officers of the field staff, Forest Assistant T. C. Davis and Assistant Forester T. J. Price, reached the retiring age after long and faithful service.

APPENDIX 1A

CONSOLIDATED REVENUE FUND

Statement of Revenue and Expenditure for 1958–59

Revenue	£	£
Territorial—		
To Timber :		
Log and Sawn Timber Royalties	786,786	
Piles and Poles	24,466	
Miscellaneous Royalties	89,411	
Goldfields Revenue	7,183	
Rents and Leases	3,865	
		911,711
Departmental—		
To Inspection Fees	27,615	
,, Miscellaneous Sales	7,173	
,, Pine Conversion	145,307	
,, Hardwood Conversion	93,295	
,, Miscellaneous Receipts	11,011	
,, Recoupable Projects	29,261	
		313,662
		£1,225,373

Expenditure	£
By Salaries	129,293
,, Incidentals	38,483
,, Timber Industry Regulations	1,302
,, Pine Conversion	91,667
,, Hardwood Conversion	78,109
,, Recoupable Projects	23,409
,, Forests Improvement Collie Area	7,237
,, Excess of Revenue over Expenditure	855,873
	£1,225,373

APPENDIX 1B

Statement of Reforestation Fund Expenditure for the Year ended 30th June, 1959

	£	£
To Division 1—		
Busselton	11,066	
Keenan	931	
		11,997
,, Division 2—		
Mundaring		46,092
,, Division 3—		
Dwellingup	45,897	
Research Station	1,561	
		47,458
,, Division 4—		
Collie		46,868
,, Division 5—		
Kirup		27,638
,, Division 6—		
Manjimup		88,929
,, Division 8—		
Gleneagle		32,367
,, Division 9—		
Collier	70	
Gnangara	572	
Julimar	1,013	
		1,655
,, Division 10—		
Harvey		39,639
,, Division 11—		
Pemberton		48,097
,, Division 12—		
Nannup		44,478
,, Division 13—		
Shannon River	40,151	
Denmark	1,604	
Kalgoorlie	305	
		42,060
Total Divisional Expenditure		£477,278
Plantation Expenditure—		
To Division 2—		
Mundaring		6,784
,, Division 4—		
Collie		7,542
,, Division 5—		
Grimwade		16,626
,, Division 7—		
Narrogin		9,812
,, Division 8—		
Gleneagle		1,302
,, Division 10—		
McLarty	115	
Brunswick	3,724	
		3,839
,, Division 12—		
Nannup		30,077
Total Plantation Expenditure		£75,982
Head Office Expenditure—		
To Training of Staff		1,398
,, H.O. Research		1,409
,, Working Plans		1,170
,, Salaries and Allowances		139,108
,, Incidentals		14,280
,, Manjimup Drawing		79
,, Workers' Compensation		8,985
,, Fire Insurance		1,395
,, Vehicle Insurance		6,123
,, Radio Branch		7,485
,, Purchases Equipment		116,389
,, Purchases Land		17,107
,, Collier Buildings		1,365
,, Miscellaneous Projects		752
,, Pay Roll Tax		11,052
,, Cash Order Account		2,350
Total Head Office Expenditure		330,447
Total		£883,707

Source of Funds	£
By Forests Improvement and Reforestation Fund General Account	762,698
,, Federal Aid Roads Grant	76,000
,, Miscellaneous Recoups of Overheads, Drum Refunds, Sale of Equipment, etc.	45,009
	£883,707

APPENDIX 1C

Statement of Loan Expenditure for the year ended 30th June, 1959

	£	£		£
To Division 1—			By General Loan Fund	100,000
Keenan	11,534			
Ludlow	20,595			
		32,129		
,, Division 9—				
Applecross	2,731			
Collier	3,216			
Gnangara	32,147			
Scaddan	90			
		38,184		
,, Division 10—				
Harvey Weir	6,323			
McLarty	3,455			
Myalup	9,406			
Hamel	45			
		19,229		
Total Plantation Expenditure....		89,542		
Head Office Expenditure—				
To Salaries	7,984			
,, Workers' Compensation Premium	1,596			
,, Travelling Allowances	1,620			
,, Head Office Wages	1,659			
,, Pay Roll Tax	2,166			
		15,025		
		104,567		
Less recoups on Overheads, etc. and Cash Order Account		4,567		
		£100,000		£100,000

APPENDIX 1D

Statement of Afforestation Expenditure for year ended 30th June, 1959

	£	£
To Division 1—		
Keenan	12,465	
Ludlow	20,596	
		33,061
„ Division 2—		
Mundaring		6,784
„ Division 4—		
Collie		46,869
„ Division 5—		
Grimwade		16,626
„ Division 7—		
Narrogin		9,811
„ Division 8—		
Gleneagle		1,302
„ Division 9—		
Applecross	2,731	
Collier	3,286	
Gnangara	32,719	
Scaddan	90	
		38,826
„ Division 10—		
Harvey Weir	6,323	
McLarty	3,570	
Myalup	9,406	
Hamel	45	
Brunswick	3,724	
		23,068
„ Division 12—		
Nannup		30,078
Total, Plantations		£206,425
„ Head Office Charges—		
Salaries—Loan	7,984	
Reforestation	16,521	
		24,505
Workers' Compensation Premiums—		
Reforestation	1,493	
Loan	1,596	
		3,089
Pay Roll Tax—Reforestation	1,096	
Loan	2,166	
		4,150
Purchase of Land		10,042
Other		3,278
		£251,489

	£
By General Loan Fund	100,000
„ Reforestation Fund	151,489
	£251,489

APPENDIX 2A

Exports of Timber, Tanning Substances and Essential Oils from Western Australia during the year ended 30th June, 1959

Item No.	Item and Country of Destination			Quantity	Value
				Cubic ft.	£
6300	*Wicker, Bamboo and Cane and all Manufactures, N.E.I.*—				
	Hong Kong			....	35
	Australian States:		£		
	New South Wales		3		
	Northern Territory		226		
				....	229
	Total			....	264
	TIMBER				
6340	*Logs—Hardwoods*—				
	Australian States:				
	South Australia			6,440	1,210
6352	*Sleepers*—				
	United Kingdom			1,476	975
	Christmas Island			2,400	1,735
	India			1,537,439	1,066,714
	Malaya			991	615
	Mauritius			77,637	52,096
	New Zealand			392,622	278,377
	Pakistan			213,081	141,953
	South Africa, Union of			298,650	190,996
	Iraq			285,317	179,002
	Egypt			14	9
	Japan			1,403	837
	India (Portuguese)			1,500	945
	Australian States:				
	South Australia (only):	cub. ft.	£		
	Jarrah	532,234	296,220		
	Karri	30,296	14,538		
	Other	4,678	2,606		
				567,208	313,364
				3,379,738	2,227,618
6410	*Sawn Timber, Undressed, N.E.I.*—				
	Softwoods:				
	Cocos Islands			238	313
	Christmas Island			148	215
	Australian States:	cub. ft.	£		
	Victoria	17	20		
	South Australia	114	341		
	Northern Territory	3,085	4,267		
				3,216	4,628
				3,602	5,156
6426	*Sawn Timber, Undressed, N.E.I.*—				
	Hardwoods:				
	Jarrah:				
	United Kingdom			81,820	56,937
	Cocos Islands			7,958	5,011
	Christmas Island			1,339	1,580
	Canada			2,549	2,105
	Ceylon			3,231	2,747
	India			65,049	44,642
	Mauritius			27,454	18,037
	New Zealand			60,282	40,597
	South Africa			57,220	42,046
	Bahrein			2,094	1,695
	Kuwait			909	738
	Saudi Arabia			1,183	961
	Iraq			14,096	9,607
	Belgium-Luxemburg			7,744	4,798
	Germany, Federal Republic of			228	160
	Netherlands			3,876	2,672
	Australian States:	cub. ft	£		
	New South Wales	5,031	2,989		
	Victoria	197,779	123,688		
	South Australia	1,078,932	620,252		
	Northern Territory	12,926	10,643		
				1,294,668	757,572
				1,631,700	991,905
6428	*Karri:*				
	United Kingdom			9,303	6,668
	Christmas Island			673	431
	Canada			10	5
	India			6,891	5,331
	New Zealand			98,671	70,133
	South Africa			71,161	51,819
	Belgium-Luxemburg			2,096	1,432
	Germany, Federal Republic of			50,674	38,666
	Netherlands			14,542	11,129
	Australian States:	cub. ft.	£		
	New South Wales	5,020	4,863		
	Victoria	21,667	13,953		
	South Australia	792,237	402,187		
	Northern Territory	82,769	63,480		
				901,693	484,483
				1,155,714	670,097
6429	*Other:*				
	United Kingdom			10,921	7,902
	Cocos Islands			18	20
	Christmas Island			842	641
	India			52,545	34,837
	South Africa, Union of			750	540
	Italy			972	960
	United States of America			22	22
	Australian States:	cub. ft.	£		
	New South Wales	197	119		
	Victoria	1,674	1,345		
	South Australia	6,281	4,966		
	Northern Territory	1,993	2,005		
				10,145	8,435
				76,215	53,357

Item No.	Item and Country of Destination			Quantity	Value
				Cubic ft.	£
6431	*Box Shooks*—				
	Australian States:				
	Northern Territory			500	625
6435	*Shooks and Staves, Cask and Vat*—				
	Australian States:	cub. ft.	£		
	New South Wales	25,037	27,964		
	Queensland	1,830	1,978		
				26,867	29,942
6441	*Sawn Timber, Dressed or Moulded, N.E.I.*—				
	Flooring:				
	United Kingdom			2,026	1,573
	Cocos Islands			1,076	1,479
	Christmas Island			563	722
	Australian States:	cub. ft.	£		
	New South Wales	37,324	40,791		
	Victoria	20,953	23,185		
	South Australia	103,561	120,165		
	Northern Territory	3,404	3,989		
				165,242	188,130
				168,907	191,904
6449	*Other:*				
	United Kingdom			14	5
	Cocos Islands			105	121
	Christmas Island			106	189
	Australian States:	cub. ft.	£		
	New South Wales	589	495		
	South Australia	1,226	1,125		
	Northern Territory	9,812	22,297		
				11,627	23,917
				11,852	24,232
6469	*Veneers*—			sq. ft.	
	United Kingdom			40,000	475
	Australian States:	sq. ft.	£		
	New South Wales	381,385	4,921		
	Victoria	40,355	575		
	South Australia	10,080	191		
	Northern Territory	2,500	51		
				434,320	5,738
				474,320	6,213
6479	*Plywoods*—				
	Cocos Islands			1,564	157
	Christmas Island			25,526	6,960
	United States of America			168	17
	Australian States:	sq. ft.	£		
	New South Wales	195,186	7,081		
	Victoria	619,902	26,292		
	Queensland	3,438	450		
	South Australia	2,984,042	119,424		
	Northern Territory	275 159	10,314		
				4,077,727	163,561
				4,104,985	170,695
6505	*Casks and Vats, Empty, New*—			No.	£
	United Kingdom			196	709
6529	*Manufactures of Wood (except Furniture)*—				
	United Kingdom			....	450
	Cocos Islands			....	2,722
	Christmas Island			....	286
	Mauritius			....	60
	Singapore			....	4
	Other Australian States:		£		
	New South Wales		240		
	Victoria		2,902		
	Queensland		110		
	South Australia		2,157		
	Tasmania		39		
	Northern Territory		23,701		
				....	29,149
				....	32,671
6540	*Furniture of Wood*—				£
	United Kingdom			....	7
	Cocos Islands			....	1,136
	Christmas Islands			....	684
	Ceylon			....	9
	India			....	4,331
	Australian States:		£		
	New South Wales		85		
	Victoria		799		
	South Australia		583		
	Northern Territory		598		
				....	2,065
				....	8,232
	Total Wood Manufactures			....	41,612
	Total Wood and Wicker, Raw and Manufactures				4,414,830

* N.E.I. means Not Elsewhere Included

APPENDIX 2A—*continued*

Exports of Timber, Tanning Substances and Essential Oile from Western Australia during the year ended 30th June, 1958.

Item No.	Item and Country of Destination	Quantity	Value
		Cubic ft.	£
8710–8729	*Essential Oils, Natural, Non-spirituous*—	lb.	
	United Kingdom	11,994	10,045
	Canada	1,200	556
	Ceylon	1,783	839
	Ghana	56	157
	Hong Kong	1,008	2,308
	India	821	359
	Malaya	112	250
	New Zealand	20	51
	Singapore	840	1,323
	South Africa, Union of	514	257
	Belgium-Luxemburg	1,128	88
	Cuba	154	386
	France	336	840
	Germany	787	65
	Netherlands	398	33
	United States of America	6,675	477
	Australian States:	lb.	£
	New South Wales	22,280	14,331
	Victoria	24,989	18,086
	Queensland	695	1,101
	South Australia	1,081	1,291
		49,045	34,809
		76,871	52,843
1600	*Tanning Substances of Natural Origin*—	Cubic ft. cwt.	£ £
	United Kingdom	828	2,651
	New Zealand	1,813	6,579
	Iraq	81	327
	Austria	2,212	6,394
	Denmark	5,122	14,773
	France	508	1,364
	Germany	3,309	7,381
	Greece	895	2,543
	Indonesia	3,181	12,245
	Netherlands	5,046	9,418
	Norway	60	193
	Sweden	206	614
	United States of America	55,752	149,132
	Australian States:	cwt.	£
	New South Wales	3,590	10,285
	Victoria	10,127	21,518
	Queensland	2,037	6,103
	South Australia	1,906	6,881
	Tasmania	209	626
	Northern Territory	5	19
		17,874	45,432
		96,887	259,046

APPENDIX 2B

Imports of Timber, Tanning Substances and Essential Oils into Western Australia during the year ended 30th June, 1959

Item No.	Item and Country of Origin	Quantity	Value
		Sq. ft.	£
6301–6309	*Wicker, Bamboo and Cane and Manufactures thereof*—		
	United Kingdom	....	7
	India	....	148
	Malaya	....	13,202
	Hong Kong	....	10,958
	Singapore	....	1,223
	Burma	....	855
	China	....	63
	Germany	....	17
	Italy	....	75
	Japan	....	3,374
	Spain	....	32
	Other Australian States:		£
	New South Wales	....	785
	Victoria	....	3,712
	South Australia	....	741
		....	5,238
		....	35,192
	TIMBER		
6339	*Logs, not Sawn*—	cub. ft.	
	Softwood (Non-pored):		
	Other Australian States:		
	South Australia	43	58
6340	*Hardwood (Pored):*		
	Borneo, British	489,117	128,577
	Equatorial Africa and Cameroons (Fr.)	4,220	2,544
	West Africa (Fr.)	1,102	802
		494,439	131,923
6412	*Sawn Timber, Undressed*—		
	Softwoods (Non-pored):		
	Douglas Fir:		
	Canada	9,400	7,261
	United States of America	30,247	18,683
		39,647	25,944
6419	*Other*		
	Borneo, British	2,918	1,914
	Sweden	1,436	1,126
	United States of America	5,190	6,143
		9,544	9,183
	Composite Item for Undressed Softwoods:		
	Other Australian States:		
	New South Wales	384	970
	Victoria	38	19
	Queensland	2,327	2,577
	South Australia	851	687
		3,600	4,253
6421	*Hardwoods (Pored):*		
	Balsa:		
	United Kingdom	38	155
6424	*Hickory:*		
	United States of America	1,384	2,433
6429	*Other:*	Doz.	£
	Borneo, British	185,028	104,239
	Kenya	....	6
	Malaya	45,668	27,344
	Singapore	15	86
		230,711	131,675
	Composite Item for Undressed Hardwoods:		
	Other Australian States:		
	New South Wales	168	311
	Queensland	9,282	10,841
	Tasmania	22,541	13,781
		31,991	24,933
6431	*Box Shooks*—		
	Malaya	6,328	2,499
	Netherlands	140	280
		6,468	2,779
6441	*Sawn Timber Dressed or Moulded*—		
	Flooring:		
	Finland	2,328	2,199
	Sweden	6,880	5,891
		9,208	8,090
6442	*Lining:*		
	Norway	585	714
	Sweden	1,497	911
		2,082	1,625
6449	*Other:*		
	United Kingdom	94	211
	Germany, Federal Republic of	1	20
	Sweden	6,387	4,431
		6,482	4,662
	Composite Item for Sawn Timber, Dressed, N.E.I.:		
	Other Australian States:		
	New South Wales	....	5,620
	Victoria	....	31,452
	Queensland	....	359
	South Australia	....	172
	Tasmania	....	469
		....	38,072
6461–6469	*Veneers*—	sq. ft.	
	United Kingdom	14,488	362
	Other Australian States:	sq. ft.	£
	New South Wales	219,103	9,424
	Victoria	72,009	2,704
	Queensland	10,628	159
	South Australia	2,064	163
		303,804	12,450
		319,292	12,812

APPENDIX 2B—*continued*

Imports of Timber, Tanning Substances and Essential Oils into Western Australia during the year ended 30th June, 1959

Item No.	Item and Country of Origin			Quantity	Value
				Cubic ft.	£
6479	*Plywood*—				
	New Guinea			46,083	2,846
	Other Australian States:	sq. ft.	£		
	New South Wales	146,389	8,414		
	Victoria	70,139	3,608		
	Queensland	1,672,848	99,887		
	South Australia	2,148	143		
				1,891,524	112,052
				1,937,607	114,898
	WOOD MANUFACTURES				
6505	*Casks and Vats, Empty*—			No.	
	Australia, Re-imported			593	3,850
6508	*Clothes Pegs of any Material*—			Gross	
	Czechoslovakia			5,240	589
	Denmark			2,120	301
	Sweden			24,550	3,665
	Other Australian States:	Gross	£		
	New South Wales	2,151	1,150		
	Victoria	8,026	3,248		
	South Australia	125	105		
	Tasmania	19,290	6,601		
				29,592	11,104
				61,502	15,659
6511	*Blockboard (Corestock)*—			sq. ft.	
	Czechoslovakia			6,400	514
	Other Australian States:	sq. ft.	£		
	New South Wales	5,820	1,158		
	Queensland	8,316	1,621		
				14,136	2,779
				20,536	3,293
6515	*Last Blocks and Lasts*—*			doz.	
	United Kingdom			5	104
6516	*Match Splints*—*				
	Finland			....	21,709
6517	*Rules and Rulers, Wooden*—*				
	United Kingdom			....	7,064
	Netherlands			....	75
				....	7,139
6518	*Tool Handles, Unattached of any Material*—				
	United Kingdom			1,432	2,221
	Canada			36	344
	France			3	2
	Germany, Federal Republic of			48	61
	Japan			8	2
	Other Australian States:		£		
	New South Wales		21,546		
	Victoria		14,888		
	Queensland		3,963		
	South Australia		2,551		
	Tasmania		2,674		
				....	45,622
				....	48,252
6519	*Table Mats, Wooden*— *				
	United Kingdom			....	102
	Netherlands			....	30
				....	132
6528	*Oars and Sculls*—†			No.	
	Other Australian States:				
	New South Wales			471	852
	Victoria			24	54
				495	906
6529	*Manufactures of Wood (except Furniture, N.E.I., whether partly or wholly finished)*—				
	United Kingdom			....	4,882
	Hong Kong			....	97
	India			....	6
	Denmark			....	347
	Singapore			....	32
	France			....	1
	Germany, Federal Republic of			....	662
	Italy			....	53
	Japan			....	3,968
	Norway			....	190
	Netherlands			....	9
	Sweden			....	1,001
	Switzerland			....	3
	United States of America			....	209
	Yugoslavia			....	26
	Other Australian States:		£		
	New South Wales		26,109		
	Victoria		31,798		
	Queensland		3,736		
	South Australia		5,694		
				....	67,337
				....	78,823
6540	*Furniture, N.E.I., of Wood or partly of Wood*—				
	United Kingdom			....	1,887
	Hong Kong			....	439
	India			....	53
	New Zealand			....	4
	Singapore			....	70
	Austria			....	5
	Germany, Federal Republic of			....	149
	Italy			....	101
	Japan			....	268
	Netherlands			....	585
	Sweden			....	4,892
	Switzerland			....	2
	Other Australian States:		£		
	New South Wales		17,157		
	Victoria		38,268		
	Queensland		36		
	South Australia		22,330		
	Tasmania		500		
				....	78,291
				....	86,746
	Total Wood Manufactures			....	266,613
	Total Wood and Wicker, Raw and Manufactured			....	815,300
8701–8729	*Essential Oils, Natural, Non-Spirituous*—				
	United Kingdom			6	8
	Ceylon			1,125	245
	India			2,400	879
	China			4,785	2,209
	Jamaica			2	2
	France			1,065	835
	Madagascar			3,526	1,312
	Indonesia			2,249	526
	Italy			14	19
	Netherlands			2	4
	United States of America			400	776
	Other Australian States:	lb.	£		
	New South Wales	250,634	48,239		
	Victoria	10,052	5,268		
	South Australia	7,736	2,661		
				268,422	56,168
				283,996	62,983
	TANNING SUBSTANCES—NATURAL ORIGIN				
1602	*Tanning Bark*—			cwt.	
	Other Australian States:				
	South Australia			254	72
1611–1619	*Tanning Extracts*—				
	South Africa, Union of			1,500	5,047
	Germany, Federal Republic of			39	77
	Norway			512	446
	Sweden			200	205
	Other Australian States:	cwt.	£		
	Victoria	40	287		
	South Australia	42	240		
				82	527
				2,333	6,302
1620	*Other Tanning Substances of Natural Origin*—				
	India			1,839	2,991
	Total Tanning Substance of Natural Origin			4,426	9,365
	Total Value of all Imports shown on this Return			....	887,648

N.E.I. means Not Elsewhere Included. * Interstate Imports not recorded separately. † Oversea Imports not recorded separately.

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	1899	6,913,550	553,198			
1837	....	....	1900	5,725,400	458,461			
1838	....	....						
1839	....	....	1901	7,150,600	572,354	....	....	....
1840	....	....	1902	6,256,750	500,533	....	....	....
			1903	7,748,450	619,705	....	859	....
1841	....	....	1904	8,072,300	654,949	....	32,876	....
1842	....	....	1905	8,709,500	689,943	....	154,087	....
1843	....	....	1906	(c) 8,830,700	708,993	....	140,720	....
1844	(b)	163	1907	(c) 6,409,550	511,923	....	98,773	....
1845	....	....	1908	(c) 9,869,509	813,591	....	79,934	....
1846	2,550	255	1909	(c) 10,830,450	867,419	....	59,633	....
1847	12,200	1,120	1910	(c) 12,074,100	972,698	....	93,733	....
1848	3,350	333						
1849	....	....	1911	(c) 12,449,500	986,341	....	83,470	....
1850	10,500	1,048	1912	(c) 11,297,100	903,396	....	49,004	....
			1913	(c) 13,619,850	1,089,481	....	47,377	....
1851	1,250	268	1914 (d)	(c) 6,279,750	502,153	....	18,197	777
1852	7,050	806	1915 (e)	(c) 9,968,500	808,392	....	6,127	381
1853	52,200	5,220	1916 (e)	5,432,100	441,991	....	10,208	1,102
1854	58,500	7,023	1917 (e)	3,890,650	310,893	....	18,959	2,060
1855	76,900	12,076	1918 (e)	3,436,250	274,141	....	16,886	3,995
1856	70,500	9,671	1919 (e)	4,135,750	332,584	11,535	18,875	3,987
1857	69,200	9,449	1920 (e)	5,065,300	465,731	21,935	22,121	3,704
1858	29,250	2,340						
1859	67,250	6,051	1921 (e)	9,816,250	1,137,819	24,916	23,073	10,107
1860	54,800	4,932	1922 (e)	8,309,750	1,041,047	22,248	13,328	6,878
			1923 (e)	7,911,310	997,454	12,377	21,161	20,075
1861	27,750	2,497	1924 (e)	11,126,861	1,367,517	11,505	29,606	39,877
1862	68,800	7,151	1925 (e)	11,844,303	1,477,997	13,298	40,136	42,057
1863	32,900	2,963	1926 (e)	12,001,384	1,522,958	10,072	15,056	47,819
1864	58,300	5,508	1927 (e)	12,580,262	1,651,149	8,727	15,818	26,544
1865	183,950	15,693	1928 (e)	10,384,784	1,265,383	7,783	27,662	39,131
1866	85,650	6,849	1929 (e)	7,635,237	960,435	6,603	35,850	63,307
1867	56,750	4,541	1930 (e)	6,579,743	807,425	4,687	40,628	77,510
1868	8,000	638						
1869	179,900	14,273	1931 (e)	4,127,856	507,382	26,615	35,333	56,170
1870	157,200	17,551	1932 (e)	3,062,673	361,700	85,488	42,016	59,301
			1933 (e)	2,235,540	262,617	80,332	33,352	26,331
1871	218,500	15,304	1934 (e)	4,060,830	487,248	76,107	20,904	26,720
1872	37,000	2,590	1935 (e)	5,326,117	636,466	65,494	15,284	35,363
1873	68,150	4,771	1936 (e)	5,598,180	679,522	50,665	12,237	27,526
1874	345,600	24,192	1937 (e)	5,673,903	699,684	52,338	14,491	38,185
1875	342,350	23,965	1938 (e)	7,545,744	932,420	47,934	13,865	35,128
1876	219,050	23,743	1939 (e)	5,704,250	722,310	43,518	17,842	25,550
1877	336,150	26,979	1940 (e)	5,049,585	634,859	62,796	19,485	47,736
1878	580,900	63,902						
1879	627,250	69,742	1941 (e)	6,091,187	790,876	74,935	13,686	59,867
1880	662,550	66,252	1942 (e)	5,224,634	700,474	64,454	6,896	74,904
			1943 (e)	3,516,566	605,327	32,426	1,598	70,523
1881	792,750	79,277	1944 (e)	3,645,354	613,994	25,324	1,294	72,704
1882	936,500	93,650	1945 (e)	2,851,475	570,028	27,307	2,795	103,055
1883	997,000	79,760	1946 (e)	3,373,025	722,061	(f) 2,618	4,872	128,050
1884	861,700	68,936	1947 (e)	3,458,628	865,255	(f) 13,118	12,056	151,768
1885	848,150	67,850	1948 (e)	3,584,405	1,099,073	(f) 6,572	9,556	116,465
1886	626,150	50,092	1949 (e)	3,198,212	993,152	(f) 6,639	5,112	75,395
1887	354,800	28,384	1950 (e)	2,857,946	974,493	(f) 13,525	8,243	78,550
1888	525,750	42,060						
1889	788,500	63,080	1951 (e)	2,342,492	(g) 918,485	(f) 25,101	16,581	125,833
1890	1,172,200	82,052	1952 (e)	2,373,553	(g) 1,032,909	(f) 47,689	19,120	119,109
			1953 (e)	3,965,188	(g) 2,074,421	(f) 120,095	34,136	70,852
1891	1,273,950	89,179	1954 (e)	3,858,956	(g) 2,248,320	(f) 59,360	80,248	55,273
1892	1,082,650	78,419	1955 (e)	3,477,249	(g) 1,935,019	(f) 79,893	37,338	80,822
1893	512,950	33,888	1956 (e)	4,568,034	(g) 2,818,716	(f) 119,459	554,760	90,928
1894	1,063,700	74,804	1957 (e)	4,684,017	(g) 3,256,719	(f) 78,934	588,544	58,993
1895	1,255,250	88,146	1958 (e)	5,572,681	(g) 3,875,705	(f) 39,762	337,655	101,814
1896	1,545,600	116,420	1959 (e)	6,461,535	(g) 4,373,218	(f) 41,612	259,046	52,843
1897	2,393,300	192,451						
1898	4,086,150	326,195	Total	421,784,549	64,787,509	1,626,604	3,432,592	2,453,937

(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	570,755	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
				Total	16,802,782	515,214	1,700,793

* 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	1938 (c)	31,737,450	15,928,950	47,666,400
1917 (a)	19,333,100	2,144,500	21,477,600	1939 (c)	29,247,650	11,086,000	40,333,650
1918 (b)	7,665,550	504,950	8,170,500	1940 (c)	27,660,100	9,139,550	36,799,650
1919 (c)	19,987,050	3,390,450	23,377,500	1941 (c)	28,089,200	10,289,000	38,378,200
1920 (c)	28,292,200	5,762,900	34,055,100	1942 (c)	26,636,650	5,633,400	32,270,050
1921 (c)	29,308,950	7,018,450	36,327,400	1943 (c)	23,604,900	4,322,950	27,927,850
1922 (c)	36,122,400	15,640,150	51,762,550	1944 (c)	22,252,500	4,456,200	26,708,700
1923 (c)	26,807,300	9,867,050	36,674,350	1945 (c)	21,970,000	4,309,550	26,279,550
1924 (c)	42,004,450	9,342,800	51,347,250	1946 (c)	21,126,500	5,482,350	26,608,850
1925 (c)	43,832,900	18,142,250	61,975,150	1947 (c)	21,948,550	7,831,950	29,780,500
1926 (c)	48,823,750	25,037,600	73,861,350	1948 (c)	22,251,350	8,871,900	31,123,250
1927 (c)	46,887,600	31,356,100	78,243,700	1949 (c)	20,261,800	9,814,300	30,076,100
1928 (c)	42,781,250	23,334,450	66,115,700	1950 (c)	21,081,150	9,932,650	31,013,800
1929 (c)	32,289,750	11,098,950	43,388,700	1951 (c)	25,391,450	10,713,050	36,104,500
1930 (c)	31,654,150	11,653,600	43,307,750	1952 (c)	28,942,550	11,938,300	40,880,850
1931 (c)	18,822,600	12,148,500	30,971,100	1953 (c)	34,223,400	13,021,400	47,244,800
1932 (c)	11,742,850	4,115,950	15,858,800	1954 (c)	37,485,950	13,562,000	51,047,950
1933 (c)	13,165,650	2,456,650	15,622,300	1955 (c)	37,467,650	15,195,450	52,663,100
1934 (c)	21,263,100	6,330,400	27,593,500	1956 (c)	39,811,350	13,773,350	53,584,700
1935 (c)	27,458,250	11,451,750	38,910,000	1957 (c)	39,426,100	11,585,350	51,011,450
1936 (c)	31,400,600	13,436,150	44,836,750	1958 (c)	39,069,500	12,397,450	51,466,950
1937 (c)	31,703,850	15,902,200	47,606,050	1959 (c)	40,533,471	13,756,198	54,289,669
				Total	....	.....	2,378,011,469

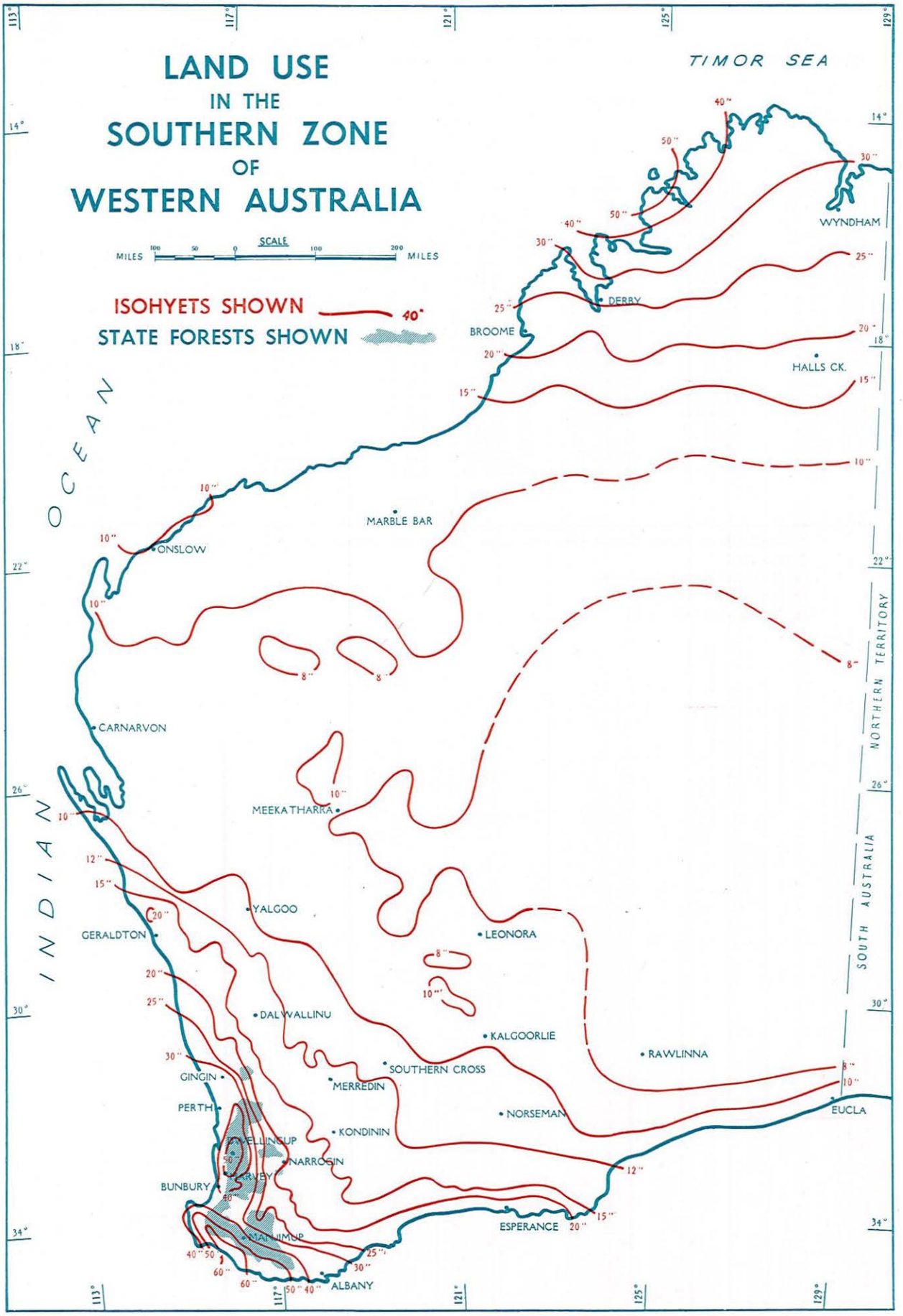
* Includes State Forest Timber Reserves, Crown Land and Private Property (Timber Reserved).

† Estimated.

(*a*) Year ended 31st December.

(*b*) Six months ended 30th June.

(*c*) Year ended 30th June.


LAND USE
IN THE
SOUTHERN ZONE
OF
WESTERN AUSTRALIA
SCALE
MILES 100 50 0 100 200 MILES
ISOHYETS SHOWN 40"
STATE FORESTS SHOWN
TIMOR SEA
INDIAN OCEAN
NORTHERN TERRITORY
SOUTH AUSTRALIA
WYNDHAM
DERBY
BROOME
HALLS CK.
MARBLE BAR
ONSLOW
CARNARVON
MEEKATHARRA
YALGOO
GERALDTON
LEONORA
DALWALLINU
KALGOORLIE
RAWLINNA
SOUTHERN CROSS
GINGIN
MERREDIN
PERTH
NORSEMAN
EUCLA
KONDININ
NARROGIN
BUNBURY
ESPERANCE
ALBANY
113°
117°
121°
125°
129°
14°
18°
22°
26°
30°
34°

APPENDIX 6

(Reprint from 1957–58 Annual Report)

LAND USE IN THE SOUTHERN ZONE OF WESTERN AUSTRALIA

Western Australia covers 624 million acres of the earth's surface. Fifty-eight per cent. of it has less than 10 in. rainfall, but with artificial water, could, and will, produce increasing food supplies.

The remaining 263 million acres is approximately equally divided between the two zones of the Northern Rivers and the Southern Rivers.

The Northern Zone has a vast potential for food production in the future, but is as yet relatively unknown, and unlikely to be fully utilised under the present position of population and economics of Australia.

The Southern Zone covers all that land between the 10 in. isohyet and the South Coast, approximately 104 million acres. Of this 104 million acres, looking forward to the provision of artificial water supplies and new sources of power, it could be envisaged that about 63 per cent. (65 million acres), lying between the 10 in. and the 15 in. isohyet, which is today only partly used for wheat and sheep, would become capable of the production of cereals and other farm crops. The other 37 per cent. (39 million acres) of this zone, from approximately the 15 in. isohyet to the South and West coasts where rainfalls run as high as 60 in., is today recognised as the main agricultural and forest area of Western Australia. This area of 39 million acres is further divisible into rainfall zones as follows:—

15 in. to 20 in.	....	16.9 million acres
20 in. to 30 in.	....	12.2 „ „
30 in. to 40 in.	....	5.6 „ „
40 in. to 50 in.	....	3.1 „ „
50 in. plus	....	1.7 „ „
		39.5 million acres

Economic forestry for timber production in Western Australia can be carried on only in areas of above 25 in. rainfall, estimated at 16 million acres, of which approximately 4 million acres are at present State Forest.

Thus, from the main agricultural area of 39 million acres with more than 15 in. rainfall, only 4 million acres are State Forest and probably not more than a 5 million total could be considered suitable.

Looked at from the wider angle of all land in the South of over 10 in. rainfall coming into use for food production the comparison is that out of 104 million acres of potential agricultural country, only a total of 5 million acres, or less than 5 per cent., can ever be devoted to economic wood production. This figure by all world standards is very low, and it is quite evident from figures produced in other publications that with the increasing development of food production throughout the South-West of Western Australia, an area of 5 million acres of State Forest should be carefully guarded, with a view to the reduction of the inevitable imports of timber to Western Australia.

Due to a number of factors, it is unlikely that forestry will be extensive in the small area of over 30 in. rainfall in the Kimberleys, so that if and when the vast Northern areas of over 10 in. rainfall are populated, the comparison will be still more striking, as the 5 million acres of forest cannot expand while the agricultural zone may grow to 41 per cent. of the land area of Western Australia, or 258 million acres, all of which activities will require timber, wood derivatives, paper and pulp products.

When we consider developments within the various rainfall areas of the Southern portion of the State, we find the following figures, as obtained from the Government Statistician. Developed land is taken as—Areas under crop, pasture, and fallow and areas newly cleared or used for grazing.

Within the 30 in. rainfall area of 10.4 million acres at the South-West, 2.94 million acres are privately held, but only 1.28 million acres are developed.

Between the 15 in. and 30 in. lines, the figures are given as 15.13 million acres privately held and 9.13 million acres developed.

Between the 10 in. and the 12 in. line we have 9.87 million acres privately held, of which 2.04 million acres are developed.

Between the 12 in. and the 15 in. line we have 15.83 million acres privately held of which 7.29 million acres are developed.

Thus, out of a total of 104 million acres, only 19.74 million are developed, although 43.77 million are privately held.

Below the 10 in. line there is, of course, virtually no development at present beyond extensive grazing on natural top feed.

Figures given must be taken as " of the order of," since it was necessary to compile them from Road Board Districts, which do not exactly conform with isohyets.

The Forests Department has carried out a special study from air photos of two important sections of the South-West—

(a) The area of high rainfall between Busselton-Margaret River-Augusta, in which it is found that out of 282,000 acres privately held, only 82,000 acres could be regarded as developed, *i.e.*, either cleared or having been ringbarked and carrying pasture. Portions of the under developed 200,000 acres had been at one time ringbarked but had reverted to Jarrah regrowth and/or dense scrub.

(b) A study of the Denmark area showed that out of a total area surrounding Denmark of 63,200 acres, only 13,100 acres had been cleared or could be regarded as developed by ringbarking and pasture. The remaining 50,000 acres fall into the same category as the under developed land in the Busselton-Margaret River-Augusta area.

29177/9/59—760

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