Report

on the operations of

THE FORESTS DEPARTMENT

WESTERN AUSTRALIA

for the

YEAR ENDED 30th JUNE, 1957

by

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

Forests Department,

Perth, 2nd September, 1957.

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, 1957.

Yours faithfully,

A. C. *Harris,*

Conservator of Forests.

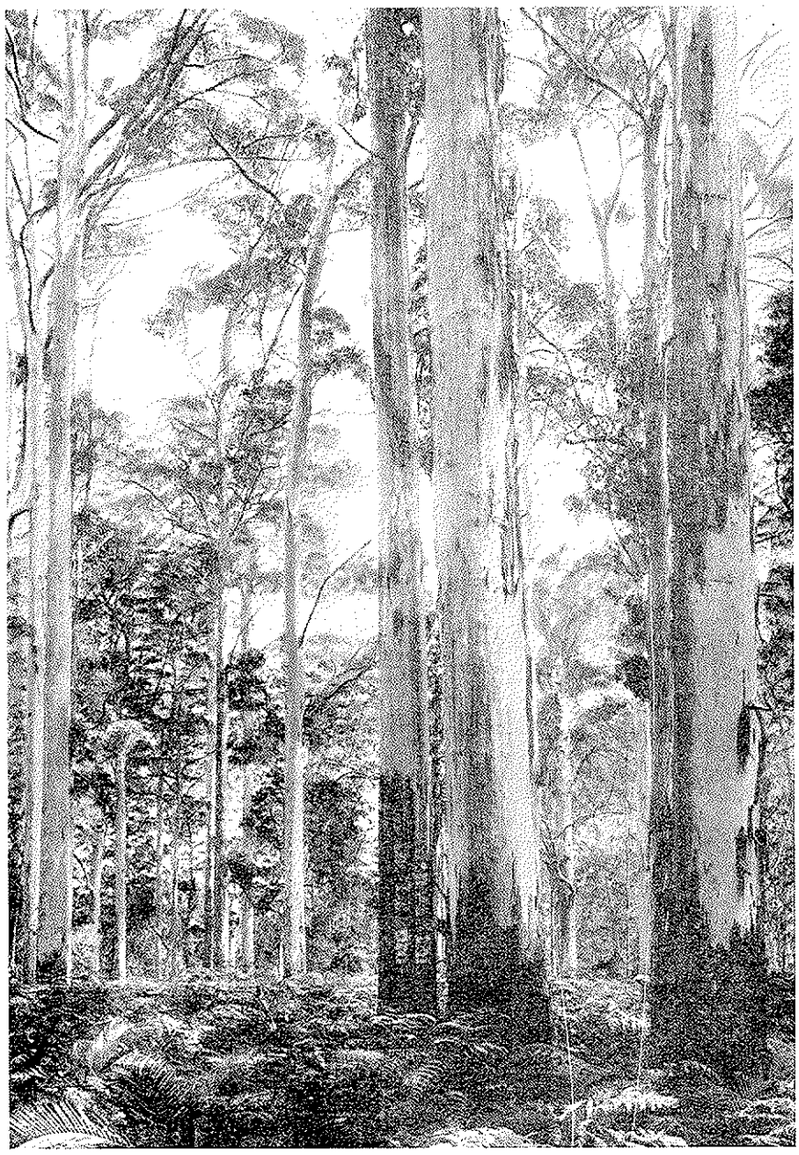


Plate I.—Prime Karri Forest near Pemberton.

FORESTS DEPARTMENT

Annual Report on the Operations of the Department for the Year ended 30th June, 1957

1. SUMMARY OF MAJOR OPERATIONS.

Timber Production (in cubic feet).

Total production in square	17,802,774	Sawn	17,798,984
		H wn	3,790
Exports—Interstate	2,801,829	(15·7%)	
Overseas	1,878,150	(10·5%)	
Local Consumption	13,122,795	(73·8%)	

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

Total Cut.

Log Volumes (in cubic feet)	51,011,455	Jarrah	36,884,608
		Karri	9,143,497
		Other sp.	4,925,451
		Pine	57,899

Made up as follows :—

From State Forest and Crown Land	39,426,080	
From Private Property	11,585,375	

Value Produced.

	£	
Total Value Sawn Timber	10,343,131	
Total Value of Other Forest Products	2,000,000	(estimated)

Departmental Revenue and Expenditure.

	£	£	£
Gross Revenue :—			
Royalties—Timber....	804,310		
Sandalwood	68,399		
		872,709	
Departmental		290,671	
			1,163,380
General Loan Fund		100,000	
Federal Aid Road Grant		72,000	
			172,000
			1,335,380
Gross Expenditure :—			
Consolidated Revenue Fund	331,695		
Reforestation Fund	757,941		
General Loan Fund	100,000		
		£1,189,636	

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

The Forest Area. ....

Additions to State Forest during the year	98,608	acres.
Land purchased for Pine Planting	3,974	acres.
Total Area of State Forest	3,990,295	acres.
Area of National Parks	320,800	acres approx.

Reforestation.

Cut over area treated for regeneration	34,403	acres.

Afforestation.

Area planted with Pines in 1956	1,594	acres.
Area cleared for Pines (includes some purchased areas already cleared)	6,350	acres.
Area Soil-surveyed for Pines	14,000	acres.
Total Area of Pine Plantation established	23,150	acres.

Management.

Survey :—		
Theodolite Surveys	205	miles.
Lower Order Surveys	257	miles.
Map Sheet compilation	2,430	square miles.
Assessment :—		
Detailed Assessment	1,635	acres.
Reconnaissance Cruises	296	miles.
Type Maps Produced Covering	2,169,000	acres.
Engineering :—		
Roads and Tracks	696	miles.
Telephones	53	miles.
New Houses	18	
New Offices and Other Buildings	4	
Vehicle Fleet increased by	23	vehicles.
New Lighting Plants	2	

Protection.

Fire Outbreaks (No.)	359	
Area burnt by uncontrolled fires	11,192	acres.
Controlled burning	456,000	acres.

State Nurseries (Hamel and Dryandra).

Trees Produced for :—	
Forests Department	203,455
Private Buyers	80,814
Plantation Nurseries apart from the above, produced approx.	2,500,000

Sandalwood.

Quantity Exported	573	tons.

Fixation of Sand Dunes.

Western Australia faces some serious problems arising out of the movement of sand dunes and for several decades the Forests Department has carried out the work of fixation.

Recently the Department of Agriculture has taken over this work with special funds and the time is therefore opportune to summarise the problem and the past work of the Forests Department.

The story of the sand dune is set out at some length as Appendix 4.

2. REVENUE AND EXPENDITURE.

Revenue.

Revenue for the year ended 30th June, 1957, reached the record figure of £1,163,380 as compared with £1,151,115 for the previous year. The following tabulation shows a comparison of the two years :—

	Year ended 30th June, 1956.	Year ended 30th June, 1957.
	£	£
Timber Royalties etc.	800,621	806,962
Sandalwood	65,803	68,399
Pine Conversion Sales	126,427	127,236
Hardwood Conversion Sales	122,136	114,041
Other Departmental	16,751	20,115
Recoupable Projects	19,377	26,624
	£1,151,115	£1,163,380

It will be noted that the only item in which revenue did not exceed that of the previous year, was in Hardwood Conversion Sales, and it is expected that this item will be reduced again next year, in view of the more difficult trading conditions.

Details appear in Appendix 1A.

Expenditure.

The total expenditure charged against Consolidated Revenue Fund amounted to £331,695. This mount was expended as follows :—

	£
General Administration of the Forests Act and Regulations including refunds o. Royalty to Settlers	155,327
Direct Conversion of Pine	80,059
Direct Conversion of Hardwood	76,497
Recoupable Projects	19,812
Details appear in Appendix 1A.	£331,695

APPORTIONMENT OF NET REVENUE OF DEPARTMENT.

	£	£
Gross Revenue for year 1956–57		1,163,380
Less Revenue from Recoupable Projects		26,624
		1,136,756
Consolidated Revenue Fund Expenditure and Direct charges by Treasury	336,016	
Less Expenditure on Recoupable Projects	19,812	
	316,204	
Less Timber Industry Regulations Salaries and Incidentals	3,494	
		312,710
Net Revenue		824,046
Nine-tenths of Net Revenue Credited to Reforestation Fund for the year 1956–57		£741,641

FORESTS IMPROVEMENT AND REFORESTATION FUND.

	£	£
Balance 1st July, 1956		59,875
Nine-tenths Net Revenue		741,641
Federal Aid Road Grant		72,000
Direct Credits		8,719
		882,235
Less Expenditure—		
General Account	685,941	
Federal Aid Road	72,000	
		757,941
Balance as at 30th June, 1957		£124,294*

Details appear in Appendix 1B.

* This balance is made up as follows :—

	£
Outstanding Plant and Equipment	42,000
Housing (including purchases not completed)	11,000
Forest and Plantation Stabilisation Reserve	60,000
Unspent due to only one pay to the 6th June being included in this year's expenditure	11,000

LOAN FUND EXPENDITURE.

	£
Plantations	76,172
Administration	23,828
Details appear in Appendix 1C.	£100,000

GROSS EXPENDITURE.

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

	£
Consolidated Revenue Fund	331,695
Reforestation Fund including Federal Aid Road Grants	757,941
General Loan Fund	100,000
	£1,189,636

Plate 2.—Felling a Karri tre
with a modern chain saw.

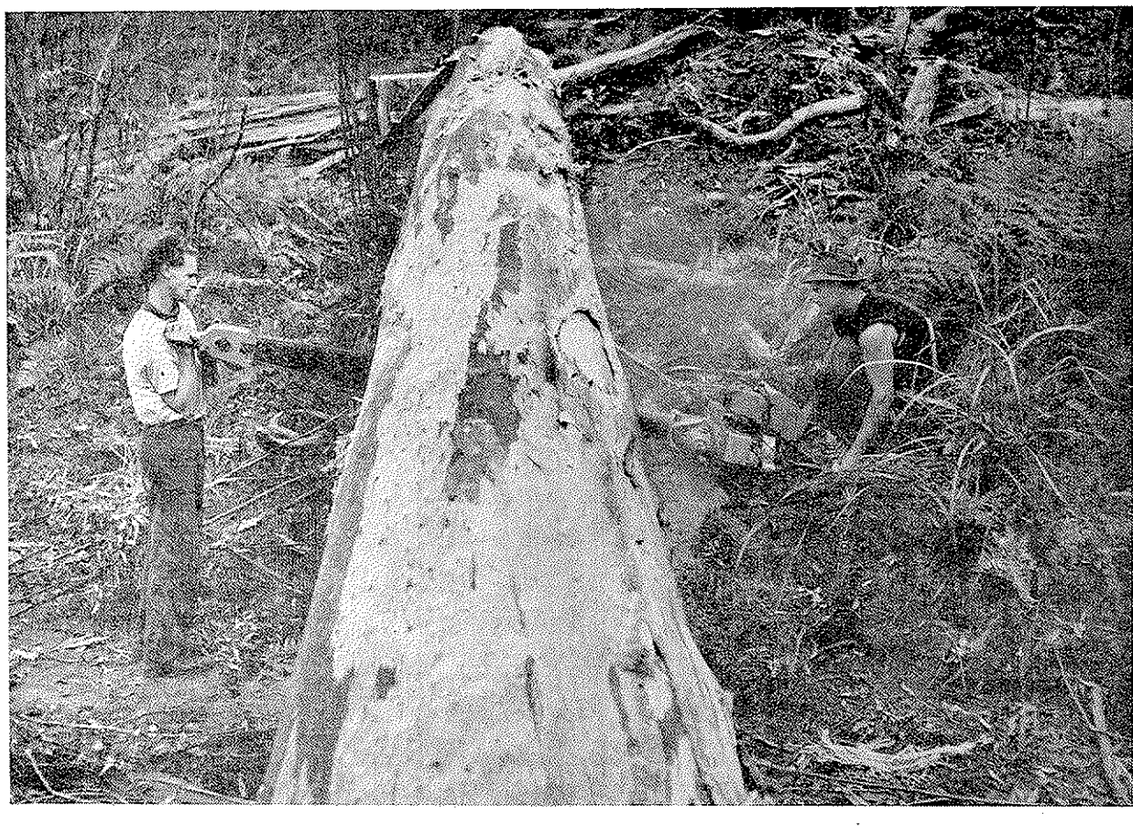


Plate 3.—Cross-cutting a large Karri log prior t
snigging to the landing.

3. THE FOREST AREA.

State Forests.

The importance of increasing the area of State Forest must again be stressed as Western Australia has so little land in high rainfall regions capable of growing timber in perpetuity. Land, as well as forest, is needed to grow forests and maintain sawmills and other industries. It is frequently mistakenly thought that because a Jarrah forest has been cut over it is cut out and should be alienated, but if this view is persisted with, there is little doubt that the State must run short of timber in a few decades. The forest is cut over under a Selection System and much good growing stock always remains.

The State Land Utilisation Committee have been generally favourable to the dedication of good forest areas. A resume of areas added to State Forest over the last few years is as follows :—

	State Forest area.	Additions for the year.
June 1954	3,462,239	....
June 1955	3,834,207	371,968
June 1956	3,891,687	57,480
June 1957	3,990,295	98,608
Total additions for 3 years		528,056

Areas agreed to by the Land Utilisation Committee and expected to be dedicated shortly are :—

Denmark catchment	100,000 approx.
South of Blackwood River	64,500
North-East of Margaret River	3,500
Gnangara-Moore River (for pine)	153,000
	321,000

It is anticipated that following current studies of Crown Lands at least a further 400,000 acres are suitable as State Forest, made up of :—

Chapman Brook	24,600 acres
Eastern Wandoo areas from Mundaring to Kulikup	200,000 acres
Kent River-Denmark River	150,000 acres
Sundry small areas of Crown Lands	50,000
	424,600 acres

The final areas of State Forest thus are unlikely to exceed 4,800,000 acres, which are none to much for the State's long term requirements.

Timber Reserves under the Forest Act.

During the year the area of timber Reserves increased slightly to 1,821,389 acres.

Land Acquisition.

Suitable land for the growing of Pinus radiata is still sought by the Department as there is so little of this land now available within the relatively poor soils of State Forest. In addition the possibility of a large paper pulp and a charcoal-iron industry in the far South has focused attention on the desirability of acquiring, as it is offered, areas of Karri forest particularly which have, after clearing for Group Settlement and other purposes, reverted to regrowth.

Some 16,760 acres were acquired during the year ended June, 1956, and a further 3,974 acres during the current year. The purchase price paid for the land during the year totalled £31,940.

Land Released.

Apart from decisions made by the State Land Utilisation Committee, there is a constant stream of applications for release of both State Forest and Crown Lands received direct from the public and through the Department of Lands. These applications are investigated carefully and wherever the land is considered unsuitable for forestry purposes it is released and dealt with as available Crown Lands by the Under Secretary for Lands.

During the past year 234 applications were dealt with, most of which entailed careful inspections in the field by Divisional forest staffs, covering 344,602 acres and the Forests Department agreed to the release of 60,439 acres of Crown Lands for agricultural and pastoral purposes. This area released effected 61 of the above applications. During the year 728 acres were excised from State Forest.

Over the past 12 years the Forests Department has agreed to the release of 1,327,235 acres of Crown Land and State Forest for settlement and leases, a fact which should dispel some commonly held but erroneous ideas that the Forests Department will not release land.

4. SAWMILLING, HEWING AND TIMBER INSPECTION.

The production of 17,802,774 cubic feet of sawn and hewn timber was a decrease of approximately 1½ million cubic feet or 7½ per cent. on last year's record figure. Of the total production, 4,039,543 cubic feet were obtained from private property, a decrease of 908,779 cubic feet on last year.

The reduced production was caused by a temporary slackness in the timber trade with a resultant drop in production at some mills and the closure of others.

Twenty-three new mills were registered during the year and 36 ceased to operate, thus reducing the total to 261 as at 31st December, 1956. Of these, 149 operated on Crown Land and 112 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 (1829–1957) is given in Appendix 2E.

Departmental plantations yielded 22,950 loads of pine thinnings, which was an increase of 7 per cent. on the previous year's total.

Two thousand and eighty-eight loads of Karri and 943 loads of pine were used in local plywood factories.

A further increase was shown in the quantity of timber inspected.

Sawn sleepers produced during the year under review amounted to 3,844,176 cubic feet, of which 1,510,262 cubic feet were from private property. Of this quantity 3,613,579 cubic feet were inspected. Hewn sleepers produced and inspected totalled 3,790 cubic feet, of which 3,380 cubic feet came from private property.

Other sawn timber inspected totalled 717,749 cubic feet, of which 17,054 cubic feet were from private property. Of the 29,061 (623,101 lineal feet) piles and poles produced, only 517 (12,570 lineal feet) were inspected.

Export Policy.

The decline in the timber trade was Australia wide, caused partly by recession in the building trades due to credit restrictions, and partly by the large level of timber imports permitted under the Commonwealth licensing regulations. In spite of severe cuts in imports generally, timber imports to the Eastern States continued at the same high level as for 1955–56. Far the greatest percentage came from the dollar areas, and the remainder from low wage countries (Malaya, Borneo, etc.) being landed at prices which the Australian timber industry could not meet. Western Australian timber thus lost a large part of its important scantling trade with South Australia, and similar causes produced a serious crisis and widespread unemployment in Tasmania, and to a lesser degree, in other States.

An approach to the Department of Trade by Australian Sawmillers' Associations led to a series of conferences being called by the Commonwealth Minister for Trade in Melbourne during March 1957, attended by Ministers and Heads of Forest Services, and leaders of the Timber Trade from all States. As a result an inquiry was instituted by the Tariff Board to see what action could be taken to correct the serious position. The Tariff Board took evidence in Western Australia early in June 1957, but so far no report has been made public. Some relaxation of credits for housing have ensued, and helped to stop further deterioration in demand for timber, but the trade is at best in a state of precarious equilibrium.

Western Australia had suffered a loss of its timber export trade post-War, due to export restrictions imposed by the Commonwealth in wartime. These restrictions had been continued largely to protect South Australian and Commonwealth Railway sleeper and scantling supplies. While they had some merit in the national interest for some years, they were continued for far too long in spite of strong protests from this State, where the impending timber crisis was foreseen and prophesied as early as 1954.

With the failure of Australian demand, it was not possible for Western Australia to recapture its former overseas trade sufficiently or quickly enough to offset this decline. Overseas trade requires long-term advance planning and cannot be successful against other timbers in free supply when every Western Australian quotation has to be qualified by saying "subject to export licenses being approved." In addition, the securing of favourable advance shipping charters is hindered or made impossible by such uncertainty.

When, however, the South Australian markets were being lost to imported Far-east and dollar area timbers, no spirit of reciprocity was exhibited in South Australia, which had benefitted so long at Western Australia's expense because of export control.

The failure to lift export control has recently left the Western Australian timber trade in a weak bargaining position through lack of time to develop adequate alternative markets, and virtually forced the acceptance recently of very unprofitable prices for sleepers for South Australia to avoid drastic mill closures here.

In short, Western Australian forests and timber industry have been rigidly controlled by the Commonwealth virtually for the benefit of other parts of Australia, to the great detriment of this State. This is not the only recent instance of the treatment of Western Australia as a "colonial possession," and it is considered desirable that any future export control proposals should be closely scrutinised and adequate safeguards insisted on to avoid a recurrence of such a situation.

Export control was eventually lifted in July 1957 (after long and determined efforts by the Conservator), but the threat of its restoration still hangs over the Timber Industry. It cannot be too strongly stressed that any such restoration is likely to be detrimental to Western Australia's timber industry and the proper management of its forests. If reimposed it will benefit only other parts of Australia. Any really necessary action to protect legitimate national interest can be better taken through the Conservator's control of sawmilling permits, which would provide an instrument more flexible than rigid Commonwealth controls, and would ensure that Western Australia's legitimate interests were better considered and not completely sacrificed.

Where sacrifices become necessary in the national interest some form of compensation should be forthcoming.

TIMBER PRODUCTION.

Production of Timber for year ended 30th June, 1957. (Exclusive of Mining Timber, Firewood, Piles and Poles.)

	Mill Logs.					Hewn Timber.		Grand Total.	
				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	27,865,244	8,526,834	*3,031,952	39,424,030	13,762,821	2,050	410	39,426,080	13,763,231
Private Property	9,000,414	616,663	†1,951,398	11,568,475	4,036,163	16,900	3,380	11,585,375	4,039,543
Grand Total	36,865,658	9,143,497	4,983,350	50,992,505	17,798,984	18,950	3,790	51,011,455	17,802,774

Figures in columns (1), (2), (3), (4), (6) and (8) are in the round based on full volume measure. Figures in columns (5), (7) and (9) are the volumes of sawn or hewn timber in the square.

* Comprises :—1,212,760 cub. ft. Wandoo ; 1,147,507 cub. ft. Pine ; 330,817 cub. ft. Yarri ; 237,261 cub ft. Sheoak ; 63,111 cub. ft. Tuart ; 37,773 cub. ft. Marri ; 964 cub. ft. Red Tingle Tingle ; 950 cub. ft. Mallet ; 794 cub. ft. Yellow Tingle Tingle ; 15 cub. ft. Banksia. † Comprises :—1,577,304 cub. ft. Wandoo ; 214,740 cub. ft. Yarri ; 85,355 cub. ft. Sheoak ; 57,899 cub. ft. Pine ; 13,199 cub. ft. Tuart ; 1,992 cub. ft. Marri ; 890 cub. ft. Flooded Gum ; 19 cub. ft. Banksia. In addition to the above, a total of 73,499 tons of Wandoo logs were treated for Tannin extract.

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.	£
1955–56	11,898,145	2,371,371	1,241	3,719,139	1,225,116	4,067	19,219,079	10,189,700
1956–57	11,428,907	2,333,914	410	2,525,901	1,510,262	3,380	17,802,774	10,343,131

5. TIMBER PRODUCTION AND DISTRIBUTION.

The distribution of timber production was as follows :—

Distribution.	Sleepers (including hewn).		Other Sawn Timber.		Total.
	Karri.	Jarrah and other species.	Karri.	Jarrah and other species.	
	loads.	loads.	loads.	loads.	loads.
Interstate	871	18,026	11,294	25,846	56,037
Overseas	*Nil*	22,450	8,422	6,690	37,562
Local	*Nil*	35,612	43,244	183,600	262,456
Total	871	76,088	62,960	216,136	356,055

6. TIMBER UTILISATION SECTION.

After a lapse of several years this section was reconstituted with the appointment of a Utilisation Officer, Mr. H. C. Wickett, B.Sc.For. ; M.Sc. ; Dip.For. ; A.M.I.E., in October 1956. Mr. Wickett has had wide experience in sawmilling, paper pulp, and is a trained forester and lectured in Forest Engineering at The Australian Forestry School, Canberra, for some time.

The most important work undertaken to date has been the collection of all available information on the mechanical and physical properties of the commercial timber species of the State. This has enabled the gaps in the existing knowledge to be clearly seen and has indicated the work that should be done to fill these gaps. " Scout " work is being done by the Division of Forest Products, C.S.I.R.O., to fill these gaps tentatively. As it will take some years to carry out this work it is proposed that the data already on hand should be published towards the end of 1957 to provide a helpful, even though incomplete, reference for foresters, the timber trade and the general public.

The West Australian Joint Timber Committee which makes reports and recommendations to the Australian Standards Association has been actively engaged during the year on the task of modernising the timber grading rules prepared many years ago and bringing them into better agreement with the practice of the timber trade and timber users. This work is likely to occupy at least twelve months.

Two non-Forests Department sawmills, Wundowie Charcoal Iron Industry, and Kauri Timber Co., Nannup, were studied fairly closely from the operational and mechanical points of view. A number of other private mills were similarly studied, but less closely, in order to compile a record of practice in the State. It is anticipated that, when this study has progressed further, it should provide the basis for a better understanding of the industry.

Four small Forests Department sawmills, Dryandra, Ludlow, Harvey and Dwellingup have been studied briefly and further information is in course of being collected with a view to preparing long-term policies for these plants.

Many trade enquiries relating to seasoning, physical and mechanical properties of timber and alternative timbers for various uses, were dealt with.

The necessary computations were made and drawings showing layout, arrangement and some vital details, were prepared for the proposed extensions to the Wundowie Charcoal-Iron Industry Wood Handling Plant.

Extensive data were collected on some important aspects relating to a possible wood pulp project in the Pemberton area.

The possibility of using blackbutt and red tingle for veneer is being investigated, without much success to date, but the work is continuing.

A start was made to sort the collection of timber specimens at Como office. For this collection to be of value it must be in accessible form.

Plate 4.—Karri logs at bush landing showing logging arch and crawler tractor used in snigging operations.

7. FIREWOOD PRODUCTION AND CONSUMPTION.

Firewood consumption for the State was estimated at 789,870 tons, over half of which was used for industrial and mining fuel. The quantity of sawdust consumed as fuel increased from 103,000 to 127,400 tons.

In the following table approximately 55 per cent. of the firewood consumed is accounted for, the balance being obtained from private property for which specific records are not available.

Of the total quantity consumed, 50 per cent. was obtained from Crown Lands.

Production :	Crown Lands.	Private Property.	Total.
Domestic Firewood—	tons.	tons.	tons.
Firewood Permits (South-west ....)	55,646	478	56,124
Mill Waste sold as firewood (estimated at 50 per cent of total)	34,272	18,422	52,694
Domestic use on Goldfields....	27,798	....	27,798
Total Domestic Firewood as shown by returns received	117,716	18,900	136,616
Industrial Firewood—			
Supplied under License—Nos. 3 to 8 pumps	29,513	....	29,513
Other pumps	801	....	801
Factories, etc.	66,899	478	67,377
Mill Waste sold as firewood (estimated at 50 per cent. of total)	34,272	18,422	52,694
Mill Waste used as firewood	98,251	3,201	101,452
Total Industrial Firewood as shown by returns received	229,736	22,101	251,837
Mining Firewood	47,097	....	47,097
Total Firewood produced (as shown by returns received)	394,549	41,001	435,550

Consumption :	tons.	
Estimated Domestic	382,000	(at 2 tons per dwelling)
Industrial	330,459	(ex Govt. Statistician)
Pumping Stations	30,314	(as per F.D. returns)
Mining	47,097	(as per F.D. returns)
Total	789,870	

8. SANDALWOOD.

Although increased supplies of Sandalwood were delivered to Fremantle during the year, the demand from overseas continued to exceed the supply.

The quantity of Sandalwood delivered during the year (including deliveries from orders placed during the previous year) was 788 tons as compared with 566 tons to 30-6-56 and was made up as follows :—

Crown Lands—	tons.
Logwood (including roots and butts)	682
Pieces	106
Private Property	*Nil*
Total	788

The total quantity of Sandalwood exported was 573 tons as compared with 492 tons for the previous year. A further shipment of one ton of shavings resulting from machine cleaning at Fremantle, was made during the year.

No orders were placed by oil distillation but 111 tons of roots and butts severed from the logwood were delivered to distillers for oil distillation purposes.

Six thousand six hundred and eighty-six lbs. of Sandal wood oil were produced by local distillers during the year and this was exported.

The base price paid to pullers for Sandalwood pieces was increased to £20 per ton F.O.R. country sidings as from the 1st February, 1957, and the subsidy paid to certain pullers to compensate for longer hauling was increased from £4 to £9 per ton as from 1st May, 1957.

In October, 1956, the Conservator of Forests, in his capacity of Chairman, Australian Sandalwood Export Committee, visited Singapore and Hong Kong to investigate the Sandalwood trade position, and negotiate new price agreements.

As a result, increased prices were secured, which will make it possible to send pullers further afield to tap new areas.

Sandalwood Plots.

Sandalwood has in the past provided considerable revenue to the State, but the economic regeneration of this species has not been found possible, owing principally to the depredations of rabbits. Sandalwood, being parasitic is dependent for its development on the ability of the host plant to support it, and consequently cannot be established in dense formation. However, it is desirable that this species should not be allowed to disappear entirely and a number of plots were established in areas of Jam country within the Mallet plantations in the Narrogin Division. Special protection is being given to individual trees to ensure their survival.

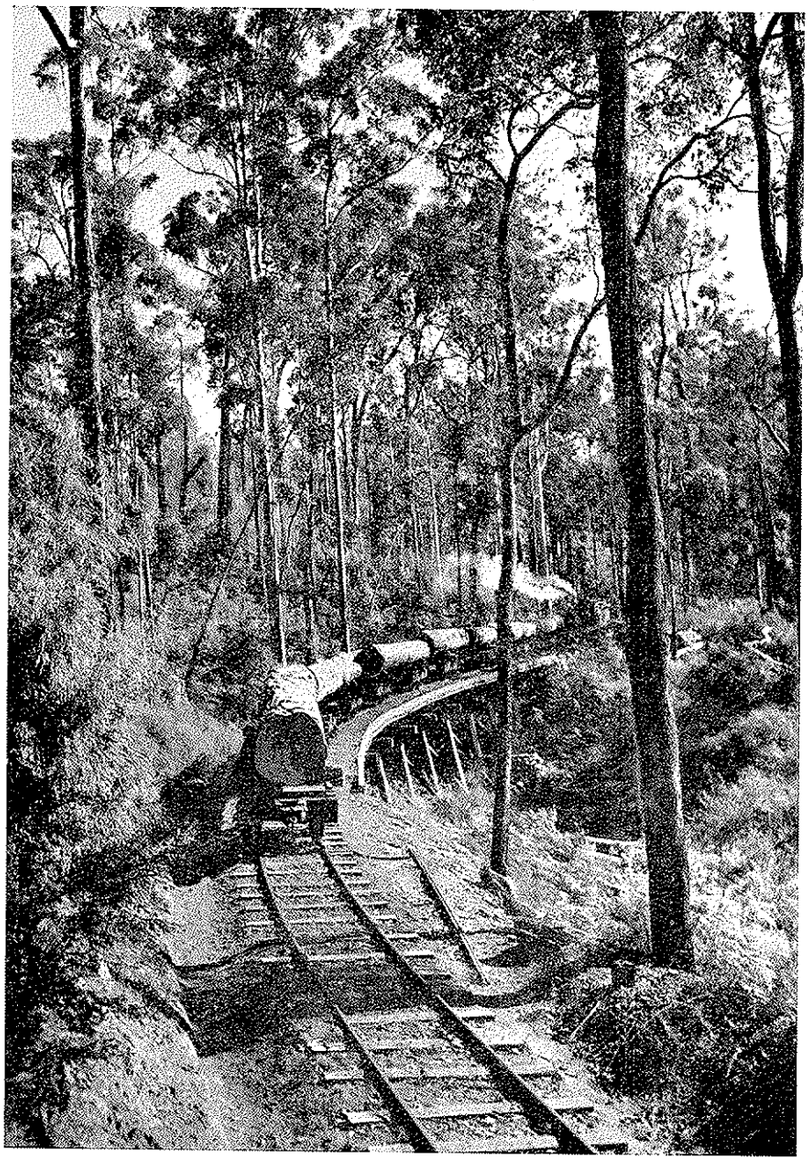


Plate 5.—Bush locomotive hauling Karri logs from bush landing to mill.

9. FOREST PRODUCE.

Piles and Poles obtained from Crown lands during the year amounted to 351,884 lineal feet, which is an increase of approximately 80,000 lineal feet on last year's figure. Departmental cutting supplied 24,617 lineal feet of this production. From private property, available records indicate a further 271,217 lineal feet, but an unknown quantity from private property which was used locally, is not recorded by the Forests Department, due to lack of information.

Approximately 425,000 fence posts and strainers were recorded for the year of which over 20,000 were produced by the Forests Department. The actual consumption of fence posts must be far in excess of this figure as returns are not received from private owners.

A total of 1,013 tons of Mallet Bark was produced of which 149 tons came from the Mallet plantations as thinnings. Wandoo timber for tannin extract amounted to 73,499 tons of which 31,586 tons came from Crown lands and 41,913 tons from private property.

Nearly 35,000 tons of mining timber were used apart from timber supplied by sawmills. Approximately 31,000 tons of this came from Crown Lands and, of this, almost half was from the Inland forests.

Pine Christmas Trees were again very popular and sales reached a new peak of 3,483 trees.

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

The estimated total value of this forest produce, excluding sawn timber, was approximately £2 million.

FOREST PRODUCE NOT ELSEWHERE INCLUDED IN PRODUCTION TABLES.
OBTAINED DURING YEAR ENDED 30th JUNE, 1957.

Description of Forest Produce.	South-West Division and Agricultural Areas.			Northern Central and Eastern Goldfields.	Total.
	Supplied by Department.	Other Crown Lands.	Private Property.*	Crown Lands.	
Mining Timber .... Tons	247	16,990	3,353	14,067	34,657 tons
Sleepers for Goldfields Wood Lines .... Cub. ft.	....	....	....	11,137	11,137 cub. ft.
Charcoal (includes 14,485 tons ex Wundowie) Tons	....	14,490	....	....	14,490 tons
Piles and Poles .... Lin ft.	24,617	327,267	271,217	....	623,101 Lin. ft.
Fencing Posts and Rails .... No.	20,211	199,822	36,264	165,660	421,957 No.
Strainer Posts .... No.	280	2,732	152	....	3,164 No.
Mallet Bark (includes 149 tons Thinnings) .... Tons	149	141	723	....	1,013 tons
Wandoo Timber for Tannin Extract .... Tons	....	31,586	41,913	....	73,499 tons
Bean etc. Sticks .... No.	....	29,000	12,000	2,920	43,920 No.
Boronia Blossom .... Lbs.	....	294	86	....	380 lbs.
Stone .... Cub. yds.	....	14,796	....	....	14,796 cub. yds.
Sand .... Cub. yds.	....	78	....	....	78 cub. yds.
Loam .... Cub. yds.	....	33	....	....	33 cub. yds.
Manna Gum .... Lbs.	....	95	....	....	95 lbs.
Sawdust consumed as fuel etc.† .... Tons	....	....	....	....	127,399 tons

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

10. FOREST MANAGEMENT.

Surveys and Map Production.

The task of survey and map production, which is essential to the introduction of forest management in undeveloped areas, has continued throughout the year.

Theodolite traverses for ground control of air photo mapping, amounted to 205 miles. Reconnaissance, in conjunction with the Lands Department, for a major triangulation project, was carried out in the far south. Other surveys of lower order covered some 257 miles mainly connected with the revision of the Department's 1 inch to the mile map series, whilst many miles of approximate surveys were carried out to provide permanent records of trade cutting and other operations in the form of Progress Plans.

Map sheet production included standard compilations covering some 1,180 square miles which were prepared during the year, together with other standard maps covering some 1,250 square miles. In addition, two 1 mile to the inch maps covering the Collie and Dwellingup Divisions were revised and re-published and work was commenced on a third map sheet revision for the Manjimup Division. Numerous other maps were prepared for administrative purposes and for the co-ordination of fire-fighting activities in newly established field centres, whilst normal routine revisions recording the progress of works completed throughout the Department were kept well up to date. Art work was carried out in connection with three public exhibitions and six Departmental publications.

Air Photo Interpretation.

Modern techniques for mapping forest types from air photos are employed as standard practice with considerable economies in mapping costs. The area covered by controlled type maps was increased by some 2,169,000 acres to a total of 5,810,000 acres, whilst reconnaissance maps were prepared for a further 129,000 acres and photo-mosaics covering pine plantations amounting to 22,100 acres, were also prepared.

At the same time experimental work, which included the use of infra-red photography and the Multiplex plotter, and the development of a pilot scheme for mapping more complex re-growth forest, was continued.

Plate 6.—Loading logs o
truck at bush landing.

Plate 7.—Crane-truck loading pine logs in M
daring Pine Plantations.

Assessment and Working Plans.

Both Working Plans Offices have completed a full programme of field assessments and reconnaissance, during the year. This work is the basis of planning efficient and sustained exploitation of the State's forest resources and has included some 1,635 acres of sampling assessments, 285 miles of reconnaissance cruises and 11½ miles of minor cruises for stereogram work, together with sundry inspections and extensive classification cruises designed to assist photogrammetry, which is the basis of modern forest inventory.

Improved methods of applying assessment data are constantly being sought and, to this end, two pilot working plans containing a critical review of current practice and detailed yield calculations based on increment values derived from the re-measurement of 101 permanent sample plots, were prepared for separate areas of virgin Karri forest and re-growth Jarrah forest. The methods outlined by this work will be developed for use in future revisions of the General Working Plan, whilst on the Plantation side, site quality mapping to determine growth and yield, was also commenced.

A revised volume table for jarrah, covering both re-growth and mature sizes, has been prepared for field assessments. This table, a combination of the recently prepared re-growth table and the standard volume table for jarrah, has been satisfactorily tested both in the office and in the field.

Several other major resources projects were commenced during the year, these included investigation of supplies available for possible use as industrial fuel, paper pulp, and for tannin extraction. Normal revision of resources estimates is still impeded by lack of suitable air photographs.

Some decentralisation of the Drafting organisation has now become possible at the Manjimup Office where routine revisions of Divisional Progress Plans and fire tower plans are now carried out for the Southern Region, and it is hoped to extend this work, together with some field interpretation of air photographs, to the Dwellingup Office as suitable Staff becomes available.

Forest Engineering.

Work on engineering projects completed during the year is set out in the following table :—

Item.	Completed in Current Year.	Present Total.
Construction of roads, firelines and tracks	695¾ miles	16,043½ miles.
Maintenance of roads, firelines and tracks ...	4,498½ miles	16,043½ miles.
Telephone lines	53 miles	1,725¼ miles.
Houses *	18	434
Offices	1	45
Divisional Workshops	3	12
Fire lookout towers	—	35

*Housing.**

During the financial year, seven houses commenced during 1955–56 were completed and a further eight new houses were erected and three houses were purchased. A further seven houses were transferred, six from the isolated settlement of Wuraming and one isolated house from the Harvey Weir Plantation to Harvey.

A new office was erected at Mount Barker.

Construction was commenced on one more house and a district office at Wanneroo.

Rent Revision.

Although the basic wage had almost doubled and the rent index as shown by the Government Statistician had more than doubled since rents were fixed in 1950, there had been no revision of rents for departmental houses since that year. As provided in the Forestry Workers' Award, a Rent Board met during the year and a revision of house rents was made.

The principles adopted in 1950 were followed setting a base rent at a very low figure for the more isolated settlements with few amenities, with a progressive scale for increased rents at the more favourably situated centres.

The new rental scale took effect as from 29th March, 1957.

Plant and Equipment.

The continued increase in the Department's Works programmes necessitated the establishment of three new Divisional workshops bringing the present total to 12 Garages and Workshops which are now adequately staffed and equipped to meet immediate demands of repairs and maintenance, and to permit some modifications to specialised equipment in connection with logging and other utilisation projects. Workshop staff has also increased by a total of 7, bringing the present Plant and Maintenance strength to 36, including 5 apprentices.

During the year the Department's fleet of vehicles, logging and road construction equipment, showed a net increase of 23 units, after the disposal of 14 worn-out units, and now consists of 377 automotive units, 172 stationary engines and 91 power saws. Five of the additional units were reconditioned ex-Army vehicles specially adapted for heavy-duty bush work.

Further provision of power supplies for isolated settlements was made during the year by the installation of a lighting plant at Gnangara, and the replacement of the worn-out plant at Willow Springs, whilst further improvements are provided for by the replacement of the Gleneagle plant during the coming year.

Communications.

Improvements to the Department's two-way radio system, giving direct communication between gangs in the field and fixed stations, were completed by modification and standardisation of the fixed stations at Pemberton and Manjimup, whilst the process of standardising field sets to operate from 6 or 12 volt systems was also almost completed. This process included the wiring of 24 new vehicles with radio connections.

Maintenance and expansion of the field telephone system was continued with the installation of twenty switchboards and the modification of 75 replacement sets. Fifty-three miles of new telephone line were erected to bring the total mileage of line to 1,725 miles.

Installation of lighting plants at all major settlements where S.E.C. power is not available, was completed, whilst connection to S.E.C. mains has progressed elsewhere.

Routine maintenance to field radio and field telephone systems was kept up to date, and the development of improved equipment to meet field conditions, was continued.

11. REFORESTATION.

Silvicultural control of felling under the West Australian system of tree marking, ensures that trees are removed in such a way as to protect existing immature growth and encourage regeneration. Under this system the trees to be felled are selected and branded by an authorised officer of the Department and this control is exercised over all sawmilling permits in State Forest. The top disposal operation or the burning of the debris following the felling encourages regeneration by providing a good seed bed and fire protection for the young crop.

During the year 34,403 acres of maiden State Forest were cut over and treated for regeneration.

For regeneration experimental work, see Research Notes.

12. AFFORESTATION.

The need for a large area of Pine Plantation in Western Australia was recognised by the acceptance of the 1956 Pine Plantation Working Plan, which sets a goal of 200,000 acres. This Working Plan has placed the development of plantations on a sound economic basis.

The rate at which plantations can be established is limited chiefly by finance and depends largely on availability of Loan Funds.

Another serious limitation on the expansion of plantations is the shortage of suitable land available to the Forests Department for planting of the important fast growing Pinus radiata. It has become necessary, therefore, to acquire suitable soils for Pinus radiata projects and considerable areas of steep, rocky, bracken-infested land are available which have proved uneconomic for farming. Land acquisition is discussed under Section 3.

Large areas of land which may be suitable for Pinus pinaster are available on the coastal plain North of Perth between Lake Pinjar and Lancelin Island. This country, which consists mainly of Banksia flats and sand hills, is of little value for other purposes and does show promise as plantation land. Seventy-seven pilot plots have now been established and so far are showing promising growth.

In the 1956 planting season, 1,536 acres of new plantation were established plus 58 acres of experimental plots and 147 acres of plantation were clear felled, bringing the total net area of pine plantations in the State to 23,150 acres. Three hundred and thirty acres of plantation were damaged by fire and salvage operations are being carried out.

The details of afforestation works are set out hereunder :—

Soil Surveys for Pine Plantations.

All plantation proposals both in State Forest and Private property offered for sale are the subject of careful soil survey.

In the search for Pinus radiata country, the Department has carried out numerous reconnaissance and detailed soil surveys throughout the South-West. Over 200 soil analyses were carried out at the Department's research laboratory at Dwellingup during the year. Approximately 19,900 acres of land, largely composed of repurchased property which is suitable and available for Pinus radiata planting, has been delineated by the soil surveys. This will provide for a planting programme for some years.

A specialised survey party is engaged on full time soil survey work, as the importance of careful selection of suitable soil is well demonstrated in our earlier plantations. During the year, approximately 14,000 acres of detailed soil survey were carried out.

There are large areas of land of uncertain quality which would be available for plantations if they are proved suitable. To this end, a programme of establishment of pilot plots, with an aim of 500 acres in widely separated areas is being pursued. Fourty-eight plots totalling 45 acres were established this year.

Land Preparation for future planting.

Areas in the process of clearing for plantations now total 11,818 acres, being made up as follows :—

	acres.
Cleared and cultivated for 1957 planting	2,698
Further areas cleared in the Nannup District	3,400
Part cleared for 1958 planting	2,320
Cleared but awaiting initial burn	3,400
Total	11,818

1956 *Planting.*

Areas planted at the various plantations in the 1956 planting season were as follows :—

	acres.
Ludlow	60
Mundaring	240½
Grimwade	283
Gleneagle	55
Gnangara	150
Pinjar	201½
Somerville	23½
McLarty	196¼
Harvey Weir	36
Blackwood	290
Experimental	58
	1,593¾

Site Quality Assessment of Plantations.

In closely managed forest areas such as plantations, where a considerable amount of funds are invested in the establishment, it is essential to have a reliable estimate of the production capacity of the forest.

To this end, a Site Quality Assessment of all plantations, based on South Australian practice, has been initiated. From sample plot data, together with information from South Australia and overseas, Tentative Yield Tables for P. radiata and P. pinaster have been prepared. These are subject to checking in the next six months when a large number of additional plots will be measured. Yield Tables for both species in Western Australia should therefore be available in the coming year.

Production of Pine Timber.

Timber production from plantations, consisting largely of thinnings, amounted to 22,950 loads. Eleven sawmills and case factories, in addition to Departmental mills, are now partly supported by this supply. Two plywood factories also draw supplies of local pine " peelers."

Logs produced by the various plantations were as follows :—

	cubic feet.	
Busselton—		
Ludlow-Willcock	15,135	
Keenan	43,632	
Boranup	2,085	
Mundaring	442,698	
Carinyah	275	
Collie	18,681	
Kirup—		
Grimwade	102,096	
Metropolitan—		
Collier	78,665	
Scaddan	116,575	
Somerville	107,484	
Gnangara	150,609	
Harvey—		
Myalup	42,034	
Harvey Weir	20,108	
Willowdale	340	
Pemberton—		
Pimelia	7,099	
Total	1,147,507	cub. ft.
or	22,950	loads.

In common with the hardwood trade, the reduction in pine sales which commenced in April, 1956, continued throughout the year. Production at the departmental pine mills was therefore intermittent, and one mill more remote from markets was closed for most of the year. Production for the year amounted to 70,274 cubic feet in the square consisting mainly of shorts, boards, lining and case timber.

There are signs of an increase in the demand for pine cases by fruit growers southwards from Bunbury and this forms a useful outlet for thinnings from the Southern plantations.

Mallet Plantations.

During the current year 345 acres were established, bringing the total net area of the Mallet plantations to 18,625 acres.

Thinning operations in the plantations produced 149 tons of bark and 7,416 cubic feet of lagging poles for the mining industry.

Assistance to the Public.

Arboriculture.—The demand for trees from local authorities and private buyers was the highest on record. A charge is made for these plants to cover the cost of raising them.

The following table summarises the year's work for the two State nurseries :—

Nursery.	Number of Plants.		Number of Species.	Revenue.	Expenditure.
	Sold.	Departmental Use.			
				£	£
Hamel	68,126	199,891	78	3,010	3,502
Dryandra	12,688	3,564	53	1,050	661

The above figures for Revenue and Expenditure of the nurseries are for the period 1st October, 1955, to 30th September, 1956.

They do not take into account :—

(a) Trees supplied free to divisions.

(b) Seeds supplied to the nurseries by the Seed Store.

(c) Incidentals used by nurseries from divisional stocks.

The most popular species sold were :—

From Hamel.—P. radiata, P. pinaster, Sugar Gum, Victorian Titree, Brush Box, Tuart.

From Dryandra.—River Gum, Coral Flowered Gum, Goldfields Blackbutt, Sugar Gum.

Seed Distribution.—The Departmental Seed Store continued to supply Western Australian seed to Australian and overseas buyers. The store has on hand supplies of seed of 157 different species, valued at approximately £8,700. The seed is collected by Departmental officers and staff as opportunity offers.

Sales for the year amounted to £2,282.

Most of the overseas enquiries for seed are from the Middle East and Mediterranean countries.

The most sought after species are, in order of popularity :—

Tuart	Eucalyptus gomphocephala
Salmon Gum	Eucalyptus salmonophloia
Dundas Mahogany	Eucalyptus Brockwayi
Merrit	Eucalyptus Flocktoniae
Giant Mallet	Eucalyptus oleosa and varieties
Gimlet	Eucalyptus salubris
Coastal Wattle	Acacia cyanophylla
Mulga	Acacia aneura

Prospects of the supply of seed of the popular Red Flowering Gum (Eucalyptus ficifolia) have been improved by the discovery of new areas of the species along freshly opened forest tracks in the far South.

Abour Day.—Revival of interest in Arbor Day is being encouraged by the Department. A window display in the city was organised, and officers gave talks to school children followed by instruction in tree planting in many centres.

Private Afforestation.—It is pleasing to note that some interest is now being taken by private firms in the establishment of private plantations. One firm has purchased a large number of pine seedlings from the Department as well as a quantity of pine seed with the object of establishing their own nursery for future planting.

Another large firm has carried out a soil survey on their own property, with assistance from thi Department, to determine the suitability of the land for growing pines.

Arboreta and Tree Planting Information.

Western Australia, in common with many countries, is faced with the problem of establishing trees in its semi arid and arid areas. As a step towards forestalling the development of treeless conditions which have occurred in some of the older settled regions of the world, the Forests Department has for a number of years been testing species of trees considered as possibly suitable for planting in such areas. Particular attention has been paid to finding trees suitable for areas which under natural conditions produced only heath or scrub.

A number of the trees in the Departmental arboreta have now reached an age of eight years, and useful information is now becoming available regarding the suitability of various species for different site conditions, desirable spacing distances under conditions of low rainfall, site preparation, necessary tending, water requirements, drainage, best planting techniques, condition of planting stocks, parasites, etc. A comprehensive study to interpret this information is being initiated.

The demand for trees for country planting and the numerous enquiries answered during the year indicate a growing interest in the planting of trees throughout the farming areas of the State.

Plate 8.—Karri log on mill landing.

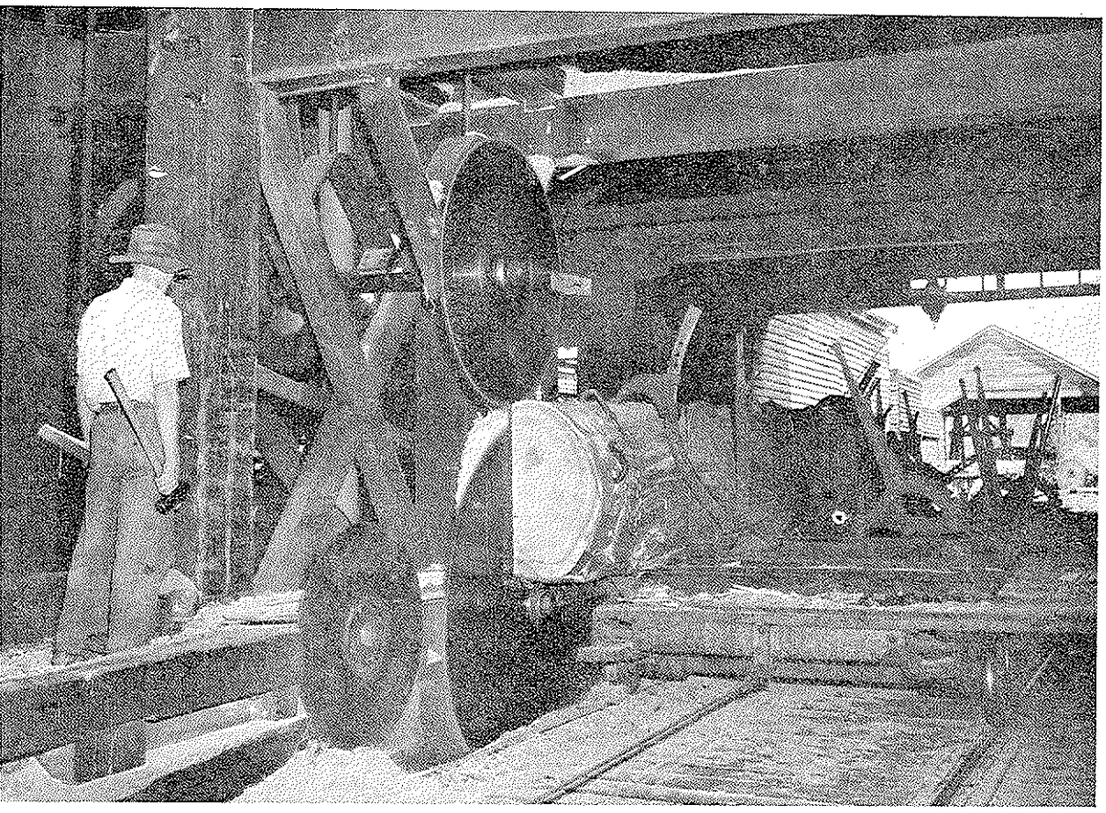


Plate 9.—Breaking down a Karri log with twin circular Saws.

13. ANNUAL FIRE REPORT—1956-57.

The area of State Forest, exclusive of plantations, covered by this report, amounts to 3,306,270 acres to which must be added 18,625 acres of Mallet plantation and 23,150 acres of pines.

The fires on a further 1,500,000 acres of private property and Crown lands surrounded by, or adjacent to, State Forest must be attended to promptly as they menace the protected forest.

Considerable areas of State Forest in the far South and on the eastern fringe in the Wandoo forest have been brought under some degree of protection as roads of access are constructed and further equipment made available.

During the year under review 696 miles of new roads were constructed and many miles of existing roads widened and improved to provide faster access for early attack on outbreaks of fire as they occur.

The Fire Season.—Generally throughout the South-West the rainfall during the fire season was below average.

In the Northern areas the four months October, December, February and March, had a rainfall deficit of nearly 350 points and in the South the accumulated deficit for the period August, 1956 to April 1957, was 962 points.

December rainfall was above average in the Karri region, but after December 19th only 51 points were received up to 7th March.

In the Jarrah forest maximum temperatures for the five months November to March inclusive, were above average but extreme heatwave conditions were not experienced during the fire season.

Dwellingup recorded only one day over the century and six days with temperatures between 96° and 100°.

Air masses were not abnormally dry but 34 days were experienced with a minimum relative humidity of less than 25 per cent. and of these five were in the 11–15 per cent. group.

The mean fire hazard for the Jarrah forest was 5·9 which is half a unit lower than the previous year and the lowest since 1953–54 which had an equal rating.

A total of six dangerous days and 16 of severe summer were recorded as against 11 and 29 for the previous year.

In the Karri zone, temperatures were not excessive and no dangerous days were recorded and only seven severe summer hazards occured.

The average hazard was 4·8 as compared with 5·0 for 1955–56, both of which are the highest since 1949–50.

Controlled Burning.

In the Jarrah forest dry spells in the Autumn permitted much mild early burning ; 12 days in August and 13 in September were suitable for burning and every advantage was taken of this opportunity.

On the Eastern fringe some burning was done in July.

Generally, however, despite lower rainfall figures, sufficient wet days occurred throughout the Autumn and Spring to curtail burning very considerably.

In the Karri forest late rains precluded early Spring burning but an unusually dry spell in the Autumn permitted burning well into April to an extent rarely possible in this region.

The extra burning time in the Karri zone, coupled with increasing experience in controlled burning techniques and previous breaking up of large areas of heavy fuel, permitted a very satisfactory amount of prescribed burning to be carried out throughout the area generally.

During the year, just under 400 miles of fire breaks were burnt which is very close to the figure for last year, but the prescribed burns reached just over 400,000 acres which is some 50,000 acres more than last year.

Advance burns and top disposal operations accounted for a further 56,000 acres.

Detection.

No new towers were brought into operation during the season under review.

In the Jarrah forest the first tower was manned on 26th October and the last watch was on 5th May although most towers were not manned after the middle of April.

In the Southern region the first tower was manned on 5th November and the last watch ceased on 17th April.

In the Metropolitan area, towers were manned from 1st September to 1st June.

Jandabup lookout and Greenbushes tree were not manned ; Eagle Hill was used for odd cross bearings only and George tower was manned for three days only.

Publicity and Co-operation.

Co-operation with neighbouring settlers and Bush Fire Brigades continues to be more close, more co-operative burning along boundaries is done every year and, in some districts particularly, there is spontaneous turn-out of local brigades to all forest fires in the vicinity.

Some Local Authorities are lacking in fire consciousness but the number is small and decreasing.

Fire prevention notices were displayed at District Offices, Railway Stations, bus stops and other prominent points and two further fire hazard boards were placed on main roads close to Divisional headquarters and drew much favourable comment from the travelling public.

Advice on fire control matters and equipment was given to local authorities and bush fire brigades whenever requested.

Fires during the Season.

The first fire of the season was a small fire lit by children in the Metropolitan plantations on 7th September, 1956, and the last fire was also in the Metropolitan plantations on 26th May, 1957.

The total number of fires attended by Departmental gangs was 359 which is just above average.

Of these fires 15 occurred within pine plantations and 111 in managed indigenous forest ; the remaining 233 fires were confined to private property, Crown lands or waste land within the forest.

The year under review was the most disastrous in the history of the Department as far as pine plantations were concerned when 330 acres of pines were killed by fire. In the Metropolitan plantations two simultaneous fires in separate areas killed 150 acres of good quality pines and 103 acres of poor malformed strain, while a further 77 acres were burnt at Collie by a fire lit by a spark from a railway locomotive. The timber from these pines is all salvageable.

In the natural forest, two thirds of the fires were confined to areas of under 10 acres, but three large fires, two in the extreme south and one at Collie, caused severe scorching to 5,000 acres of forest.

The total area of natural forest burnt over was 11,192 acres.

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

W.A. Government Locomotives	31
Mill Locomotives	22
Escapes from Controlled burning	2
Bush workers	7
Bush navvies	1
Hunters and Fishermen	27
Householders	8
Farmers burning	90
Firewood cutters	3
Travellers	25
Lightning	13
Incendiary origin	30
Children	14
Mill surroundings	16
Mine surroundings	1
Other Government employees	5
Stockmen	2
Tractors	4
Unknown	36
Total	359

Once again farmers' burning operations head the list of causes with 90. or 25 per cent. of all fires attended. Besides being the most frequent, these fires cause the most damage because they usually begin as legitimate fires which are already large fires when they escape.

W.A. Government Railways and bush locomotives contributed between them 53 fires, or 14 per cent. of the total, though fires from bush locomotives declined on last year, partly because rail haulage is giving way to road tran port.

Once again locomotives fitted with Brew arresters did not light any fires and arrangements are in hand to have all bush locomotives so fitted next year.

Hunters, fishermen and travellers through the forest lit 52 fires, the same percentage of all fires as last year.

Thirty fires were deliberately lit in the forest, but 16 of these were lit by one person on the same day.

A suspect was apprehended by the Police and questioned at some length, but they were unable to obtain sufficient evidence to launch a prosecution.

Three small Sawmills were destroyed by fire during the year.

It is pleasing to put on record that efforts of Departmental gangs were directly responsible for saving at least five private homes from destruction by fire and much valuable farm property saved.

14. RESEARCH.

Departmental research activity is largely concerned with continuing long term projects which carry on over a period of years. Several new projects were initiated during the year, and these were mainly concentrated on silvicultural problems of the karri zone.

Interesting results of tuart regeneration work at Ludlow were evident in the first progress report received. Figures indicating the effect of thinning in jarrah regrowth were first placed on record.

A. Karri Silviculture.

Silvicultural study in the Karri forest is at present directed towards obtaining a better understanding of the factors involved in regenerating cut over areas. Current projects will provide information on :—

(i) Flower and seed formation in the karri crown.
(ii) Quantities of seed shed from karri crowns in different seasons for different years.
(iii) Distance seed is dispersed from crowns.
(iv) Germination of seed and establishment of seedlings under natural conditions.
(v) The effect of different types of regeneration burns on improving the seed bed.
(vi) The effect of burning in reducing competition from weed species.

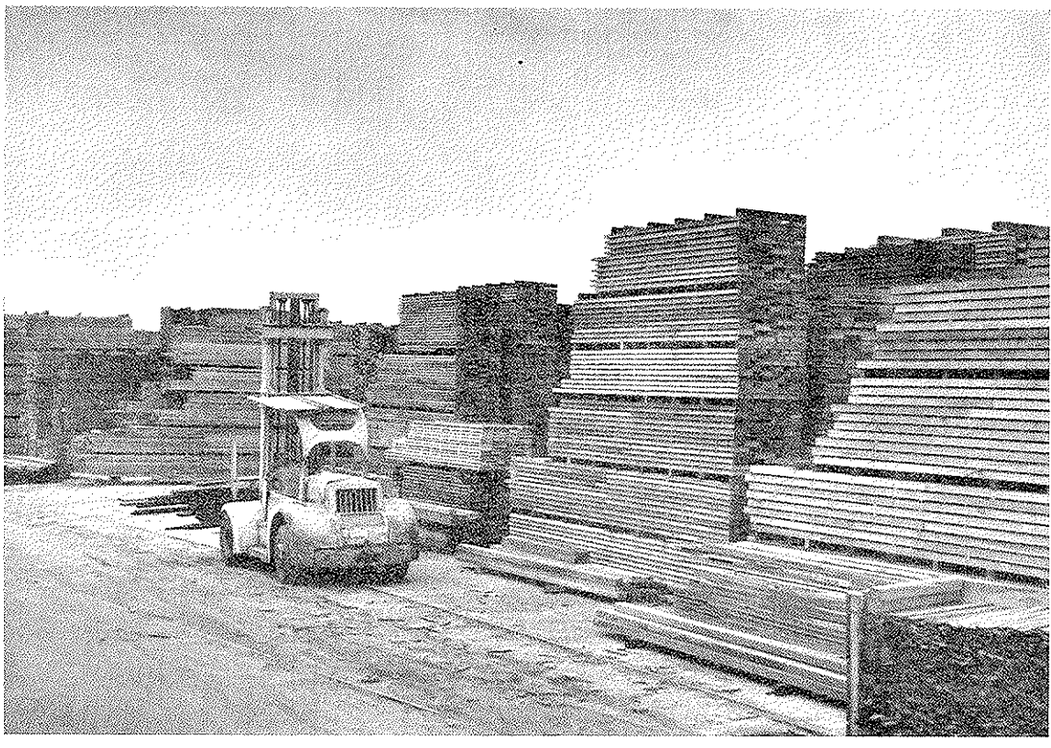


Plate 10.—Sawn timber mechanically stacked for seasoning.

Ashbed Effect.

The effect of an ashbed from a recent burn on the development of karri seedlings is striking. One year old seedlings on the ashbed are 5–10 times taller than seedlings of the same age off the ashbed. Also, 1[illegible] times greater competition from weeds has been found on areas off the ashbed than on an ashbed resulting from a severe burn.

Second Burn.

A second burn has a marked effect in reducing the number of competing weed species. Away from the ashbed, a second burn has reduced the number of competing weed seedlings by at least half.

B. Tuart Silviculture—Regeneration Studies.

At varying intervals over the past five decades, the extremely low survival of natural regeneration in the tuart forests of the Ludlow-Wonnerup area has been noted and recorded. Various theories have been put forward to explain this fact and some attempts to establish regeneration artificially have been made. A current research project was initiated in an effort to determine the major factors involved.

Spot Sowing.

To date the most significant fact established is the influence of ashbeds on successful germination and survival. Spot sowing trials indicate that germination on and off the ashbed is reasonably similar, being 90 per cent. and 71 per cent., and 93 per cent. and 97 per cent. in trials in 1955 and 1956 respectively. Survival and further development, however, depend entirely on the ashbed effect. Further development off the ashbed was almost negligible, most plants either died within a few weeks of germinating or remained very small and unthrifty. Ashbed seedlings showed much better development to take on a deep green colour, form normal leaves and to give small bushy plants approximately 6–9 inches in height by mid-summer.

Survival figures after 12 months on 110 spots were :—

Off the ashbed	2 per cent.
On the ashbed	38 per cent.

Seedlings.

Seedlings planted in 1955 also showed a much better survival and development on the ashbed. Survival figures were 70 per cent. and 24 per cent. respectively. Chipping away competing grass on plots off the ashbed raised the survival figures to 56 per cent. Vigour of these plants was less than that of the ashbed planting.

Fertiliser.

No effect of treatment was obtained with superphosphate. A definite response however was obtained with ammonium sulphate, which when applied at the rate of ½ oz. per tree to plants off the ashbed brought about development identical to that on the ashbed. Survival on this plot was 96 per cent. after the first 12 months in the field.

C. Jarrah Silviculture.

Sample plots established in 80 year old jarrah regrowth at Gleneagle provide an indication of the effect of thinning in prime regrowth stands.

Two plots were situated in a regrowth area resulting from a heavy logging cut in 1876. This area was again cut over in 1926 in a cleaning operation which removed most of the mature and over-mature stems left in the 1876 cut and retained good groups of pole and pile class stems. An unmerchantable crown thinning followed in 1928, a small area of approximately 2 acres being left untreated for future comparison. One of the plots was located in this unthinned area, the other being placed so as to be typical of the adjacent thinned area.

The following table summarizes the measurement data of the two plots :—

	Age.	Total (u.b.) Vol.	B.A. (u.b.) sq. ft./ acre.	Vol. (u.b.) under 54 in. girth.	Vol. (u.b.) over 54 in. girth.	Vol. (u.b.) over 72 in. girth.	Bole Ht.	Codom Ht.	Stems per acre.
	years.	loads.		loads.	loads.	loads.	feet.	feet.	
Thinned 1928	80	54	105·2	9	45	20·6	44	91	77
Unthinned	80	61	132·7	38	23	8·6	48	91	188

Some general conclusions may be drawn from this data :—

(i) The crown thinning in 1928 reduced the stand from a stocking of the order of 200 stems per acre to about 80 stems per acre. The total growing stock volumes from each plot indicate that a reduction of this order at age of approximately 50 years does not seriously affect the volume of the growing stock present at 80 years.

(ii) The thinning distributed the increment to a smaller number of stems and greatly increased the merchantable log volume on the area. The volume of timber available on stems greater than 54 in. girth breast height on the thinned plot is approximately twice the volume available on the unthinned plot. In 1957 a second thinning was carried out on the thinned plot.

Jarrah Nitrogen Experiment.

The final measurement of an experiment testing the effect of nitrogen fertilizers on growth in the jarrah forest showed no effect of treatment either from girth increment or chemical analysis of the leaves. This experiment, initiated in August, 1952, tested the effect of adding 2 cwt/acre of blood and bone and potato manure for three continuous years.

Litter Fall Studies.

Measurement of litter fall in various forest types continued over the period—complete summaries of litter fall are now available for :—

Jarrah forest types for period 1951–1956.
Wandoo and mallet forest for period 1954–1956.
Karri forest types for period 1956.

D. Soil Studies.

Ashbed Studies.

An analysis of mallet plantation soils from various aged ashbeds at Dryandra has shown that in the surface soils (0–1 in.) the soil nitrogen gradually increases, at least for the first twenty years after the burn. On the other hand, soil pH shows a very rapid decrease in the first few years after the burn (from 8·4 to 7·3 in 5 years and then to 6·4 in 20 years). Water soluble salts also decrease rapidly and are leached from the surface soil in the first five years after the burn.

One of the most interesting features of these analyses is that the ashbed is largely a surface feature and does not appear to have any permanent effect on the underlying horizons.

Soil Phosphate Studies.

Study was continued into the question of phosphate fixation in lateritic and basic soils. Work is also progressing to test the validity of using the amount of phosphate in the surface soil as an indicator for successful pine establishment on lateritic and gravelly soils.

A new project was commenced to investigate the factors involved in the establishment of P. radiata on laterite soils.

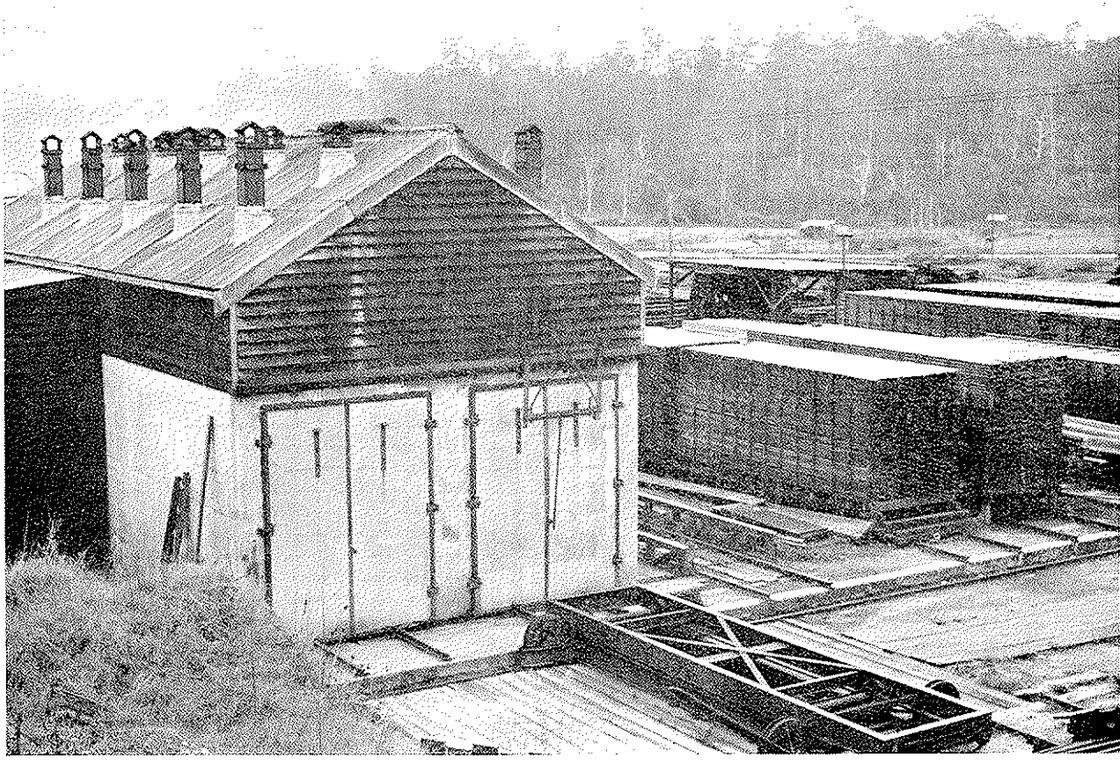


Plate 11.—Sawn timber stacked for loading into Kilns for seasoning.

15. LIBRARY.

Following a talk by the librarian to the technical staff and the use of more effective display boards, there has been a marked increase in library use during the year.

Loans have totalled 4,000 ; 650 specific enquiries (more than treble the previous year's total) have been dealt with, while searches and prepared bibliographies have increased to 43.

Re-organization has proceeded steadily and the most important and widely used sets of serials have now been boxed, shelved and labelled.

Twenty-nine books, 88 journal titles and 536 other publications were received during the year and the addition of 1,500 catalogue cards has now increased the total references to 8,500.

This classified catalogue is one of the few in Perth, and has been used for study purposes by student librarians.

A copy of the " Manual of Library Practice," prepared by the librarian, Miss L. S. Roberts, has been bound and added to the library. This manual, which details current practice in the library, has proved of considerable interest to officers, students and other librarians.

Close co-operation has been maintained with the libraries of the Division of Forest Products, C.S.I.R.O., Melbourne, Forestry and Timber Bureau, Canberra and the State Library, Perth, all of whom have given valuable assistance to this Department.

16. EMPLOYMENT IN FORESTRY.

The number of wage earners directly employed in forestry has been estimated at approximately 6,507 made up as follows :—

Direct Employees of the Forests Department—		
Professional Officers	27	
General Field Staff	117	
Clerical and Drafting	65	
Wages Employees	559	
Contractors and Employees (estimated)	100	
		868
Sawmill employees including bush workers, at 30th June, 1957 *		5,058
Firewood cutters, pole getters, etc. on permits		400
Goldfields Firewood cutters, contractors, and woodline employees and carters		46
Apiarists estimated (195 sites are registered)		135
Total		6,507

* Includes employees of all registered sawmills.

17. FOREST OFFENCES.

One hundred and nine forest offences were reported to Head Office during the year. Legal proceedings were taken in 13 cases and resulted in convictions. Fines totalling £185 and costs of £79 4s. 0d. were imposed.

Warnings were issued in 24 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 £1,095 15s. 7d.

18. EDUCATION AND PUBLICITY.

Education.

Conferences of Senior Staff were held from time to time to discuss matters of policy and procedure.

A study has been made of the anticipated Staff requirements of the Department for the next ten years, and it appears from this that an intake of 16 trainees is required every two years to maintain the force of the general staff.

A new intake of 17 lads between the ages of 17–19 years, commenced the two-year course of preliminary training in February this year, under the Department's Trainee Scheme.

A special Fallers School of three months duration, followed by a six weeks course of lectures in general forestry, completed the two years' training of the previous intake. Eight trainees completed the course and were appointed Forest Guards and, as such, will now undergo a further three years' training.

The position as regards the training of professional officers is as follows :—

1st Year University—5 Students	1 State Cadet 2 Commonwealth Scholarships 2 Independent
2nd Year University—2 Students	1 State Cadet 1 Commonwealth
1st Year Canberra—2 Students	1 State Cadet 1 Commonwealth
To Graduate in 1957—1 Student	1 Commonwealth

Publicity.

A number of publications were produced by the Department, for both publicity and scientific purposes, namely :—

1. Pamphlets for Arbor Day.—Five illustrated pamphlets designed to further public interest in Arbor Day were produced and distributed to schools. They were very well received.
2. Forester's Manual Pamphlet No. 7, entitled "Fire Control."
3. Revised Bulletins. Two Departmental Bulletins entitled "Jarrah" and "Karri" were revised and reprinted.
4. "Forestry as a Career"—a small booklet printed to provide details for students interested in taking up the forestry profession.
5. Two small illustrated pamphlets on fire prevention.
6. Papers for the Seventh British Commonwealth Forestry Conference. This Conference is being held in Australia and New Zealand in September, 1957, and the Forests Department has contributed five papers dealing with various aspects of Forestry in Western Australia.

Departmental exhibits were entered in the Wild Life Show and the Civic Centre Pageant of Industry, and window displays arranged in the city for Arbor Day and for Fire Prevention publicity.

Keen interest was shown in a demonstration of plans and aerial photos which was held at the Manjimup Working Plans Office and attended by local road board members, sawmillers and other interested bodies.

19. STAFF MATTERS.

Mr. G. E. Brockway returned to duty on the 7th May, 1957, after serving over two years in Pakistan as an adviser on "Arid Area Forestry" under the Colombo Plan.

Mr. W. H. Eastman was awarded the Russell Grimwade Prize for 1957 and left for London in February 1957, to commence a post-graduate course at the Imperial Forestry Institute, Oxford.

New appointments under the Public Service Act included Mr. H. C. Wickett, B.Sc.For., M.Sc., Dip.For., A.M.I.E., who was appointed Utilisation Officer on the 15th October, 1956, and Mr. F. D. Podger who was appointed as an Assistant Divisional Forest Officer.

Assistant Divisional Forest Officer S. J. Quain resigned to seek employment in Canada, and senior draftsman Mr. G. A. Pettitt reached the retiring age and ceased duty on the 11th March, 1957.

One cadet draftsman commenced duty and another who had almost completed his Diploma of Cartography course resigned and forfeited a £100 bond.

The Department suffered a serious loss when the Chief Timber Inspector, Mr. L. N. Weston, reached the retiring age and ceased duty on the 7th September, 1956. His supervisory duties on timber inspection were taken over by Senior Forester A. R. Kelly who was promoted to Acting-Senior Timber Inspector.

Assistant Forester S. Thompson also retired during the year.

Three officers under the Forests Act were reclassified during the year, one to District Forester, Class 5, and two to Assistant Forester, Class 3.

Promotions under the Forests Act were—one officer to Forester, Class 4 ; three to Assistant Forester, Class 3 ; one to Assistant Forester, Class 2 (permanent) ; two to Forest Assistant, Class 1 (permanent) ; and ten to the rank of Forest Guard. One Forest Guard resigned and another was granted leave without pay to take a University Course.

An Assistant Maintenance Engineer was appointed to take charge of the large Manjimup workshop and supervise workshops generally in the Southern Division.

I desire to place on record my appreciation of the active co-operation and loyal support of all members of both field and office staffs during the year.

LIST OF APPENDICES

APPENDIX 1A.

CONSOLIDATED REVENUE FUND.

Statement of Revenue and Expenditure for 1956–57.

Revenue.	£	£	*Expenditure.*	£
Territorial—				
To Timber :			By Salaries	123,444
Log Royalties	712,391		,, Incidentals	30,693
Sleeper Royalties	46,457		,, Timber Industry Regulations (Incidentals)	1,191
Sawn Timber Royalties	2,774		,, Direct Conversion of Pine	80,059
Miscellaneous Royalties	34,756		,, Direct Conversion of Hardwood	76,497
Goldfields Revenue	7,932		,, Recoupable Projects	19,812
Rents and Leases	2,652		,, Excess of Revenue over Expenditure	831,684
		806,962		
,, Sandalwood	....	68,399		
Departmental—				
To Inspection Fees	8,704			
,, Miscellaneous Sales	5,370			
,, Pine Conversion	127,236			
,, Hardwood Conversion	114,044			
,, Miscellaneous Receipts	6,041			
,, Recoupable Projects	26,624			
		288,019		
		£1,163,380		£1,163,380

APPENDIX 1B.

Statement of Reforestation Fund Expenditure for the year ended 30th June, 1957.

	£	£
To Division 1—		
Busselton	11,836	
Keenan	218	
		12,054
„ Division 2—		
Mundaring		31,961
„ Division 3—		
Dwellingup	56,853	
Research Station	755	
		57,608
„ Division 4—		
Collie		29,096
„ Division 5—		
Kirup		30,272
„ Division 6—		
Manjimup		69,580
„ Division 7—		
Narrogin		9
„ Division 8—		
Gleneagle		23,612
„ Division 9—		
Collier	347	
Gnangara	3,858	
Julimar	1,079	
		5,284
„ Division 10—		
Harvey		36,068
„ Division 11—		
Pemberton		45,887
„ Division 12—		
Nannup		41,666
„ Division 13—		
Shannon		51,710
„ Kalgoorlie		351
Total Divisional Expenditure		£435,158
Plantation Expenditure :—		
To Division 2—		
Mundaring		17,405
„ Division 4—		
Collie		11,315
„ Division 5—		
Kirup		18,901
„ Division 7—		
Narrogin		9,298
„ Division 8—		
Gleneagle		2,193
„ Division 12—		
Nannup		19,239
		£78,351
Head Office Expenditure :—		
To Training of Staff		617
„ Head Office Research		541
„ Working Plans		2,230
„ Head Office Salaries and Allowances		108,480
„ Incidentals		10,273
„ Manjimup Drawing		120
„ Workers' Compensation Premiums		6,722
„ Fire Insurance		1,287
„ Vehicles, Head Office Use		5,383
„ Radio Branch		6,224
„ Equipment not charged to Divisions		87,407
„ Purchase of Land		41,189
„ Buildings at Collier		727
„ Pay Roll Tax		9,693
		£280,893
Total		£794,402

	£
By Forests Department Improvement and Reforestation Fund—	
General Account	685,941
„ Federal Aid Roads Grant	72,000
„ Miscellaneous Recoups on Account of Overheads, Drum refunds, Sale of Equipment, etc.	36,461
Total	£794,402

APPENDIX 1C.

Statement of Loan Expenditure for year ended 30th June, 1957.

	£	£		£
To Division 1—			By General Loan Fund	100,000
Keenan	7,560		„ Sundry Recoups, Overheads, etc.....	
Ludlow	19,424		(Deducted as per contra.)	
		26,984		
„ Division 9—				
Applecross	3,526			
Collier	3,249			
Gnangara	26,155			
Scaddan	532			
		33,462		
„ Division 10—				
Harvey Weir	2,358			
McLarty	6,327			
Myalup	7,041			
		15,726		
Total Plantation Expenditure		£76,172		
Head Office Expenditure :—				
To Head Office Salaries		24,896		
„ Workers' Compensation Premiums		951		
„ Pay Roll Tax		1,659		
Total		£103,678		
Less Recoups on Account Overheads, etc.		3,678		
		£100,000		£100,000

APPENDIX 1D.

Statement of Afforestation Expenditure for year ended 30th June, 1957.

	£	£	£
To Division 1—			
Ludlow		19,424	
Keenan	7,560		
	218		
		7,778	
			27,202
„ Division 2—			
Mundaring			17,405
„ Division 4—			
Collie			11,315
„ Division 5—			
Kirup			18,901
„ Division 7—			
Narrogin			9,298
„ Division 8—			
Glencagle			2,193
„ Division 9—			
Applecross		3,526	
Collier	347		
	3,249		
		3,596	
Gnangara	26,155		
	3,858		
		30,013	
Scaddan		532	
			37,667
„ Division 10—			
Harvey Weir		2,359	
McLarty		6,327	
Myalup		7,041	
			15,727
„ Division 12—			
Nannup			19,239
Total Plantations			158,947
To Hed Office Charges			
Saalaries—			
Reforestation		6,398	
Loan		24,896	
			31,294
Workers' Compensation Premiums			
Reforestation		909	
Loan		951	
			1,860
Purchase of Land—			
Reforestation			31,355
Pay Roll Tax—			
Reforestation		1,068	
Loan		1,659	
			2,727
Fire Insurance—			
Property			214
			£67,450
Total			£225,397
Less Recoups on Account—Overheads, etc.			8,328
			£217,069

	£
By General Loan Fund	100,000
„ Reforestation Fund	117,069
	£217,069

APPENDIX 2A.

Exports of Timber, Tanning Substances and Essential Oils from Western Australia during the year ended 30th June, 1957.

Item No.	Item and Country of Destination.	Quantity.	£
	TIMBER.	cub. ft.	
6340	*Logs of Hardwoods—*		
	Commonwealth States :		
	Victoria	4,068	1,850
6352	*Jarrah Sleepers—*		
	United Kingdom	77,026	55,543
	Ceylon	161,444	132,384
	Mauritius and Dependencies	41,850	31,537
	New Zealand	666,667	507,328
	South Africa, Union of	154,137	111,841
	Iran	21,400	14,972
	Commonwealth States :		
	South Australia	900,794	540,266
		2,023,318	1,393,871
6354	*Karri Sleepers—*		
	Commonwealth States :		
	South Australia	43,553	20,646
6356	*Other Sleepers—*		
	Commonwealth States :		
	South Australia	488	300
	Sawn Timber, Undressed, N.E.I.—		
6410	*Softwoods :*		
	Christmas Island (Indian Ocean)	233	456
	Commonwealth States :		
	Northern Territory	3,018	3,807
		3,251	4,263
	Hardwoods :		
6426	*Jarrah :*		
	United Kingdom	79,221	57,109
	Canada	8,140	6,882
	Ceylon	9,590	8,257
	Christmas Island (Indian Ocean)	915	976
	India, Republic of	4,868	3,965
	Mauritius and Dependencies	26,311	15,783
	New Zealand	93,865	69,722
	South Africa, Union of	76,433	54,260
	Belgium	1,951	1,216
	Germany, Federal Republic of	1,453	1,177
	Iraq	11,033	9,163
	Netherlands	6,791	5,385
	United States of America	505	574
	Commonwealth States : cub. ft. £		
	New South Wales 1,597 919		
	Victoria 351,515 195,427		
	South Australia 751,295 440,190		
	Northern Territory 26,851 20,084		
		1,131,258	656,620
		1,452,334	891,089
6428	*Karri :*		
	United Kingdom	121,345	88,520
	Christmas Island (Indian Ocean)	1,533	1,999
	New Zealand	125,271	92,106
	Rhodesia and Nyasaland, Federation of	7,321	4,995
	South Africa, Union of	82,108	61,778
	Belgium	18,463	15,946
	Denmark	332	234
	Germany, Federal Republic of	12,698	10,720
	Netherlands	51,670	40,774
	United States of America	363	290
	Commonwealth States : cub. ft. £		
	New South Wales 48 140		
	Victoria 21,459 12,045		
	South Australia 520,796 278,765		
	Northern Territory 22,373 14,701		
		564,676	305,651
		985,780	623,013
6429	*Other Hardwoods :*		
	Cocos Island	1,245	863
	Christmas Island (Indian Ocean)	1,029	1,056
	Germany, Federal Republic of	6,465	7,500
	Commonwealth States : cub. ft. £		
	New South Wales 9,522 8,882		
	Victoria 20 16		
	South Australia 4,673 2,953		
	Northern Territory 858 1,332		
		15,073	13,183
		23,812	22,602

Item No.	Item and Country of Destination.	Quantity.
6431	*Box Shooks—*	cub. ft.
	Commonwealth States—	
	Northern Territory	1,375
6435	*Shooks and Staves, Cask and Vat (Undressed or Dressed)—*	
	Commonwealth of Australia—	
	New South Wales	27,222
	Queensland	1,654
	Northern Territory	493
		29,369
6441	*Sawn Timber, Dressed, N.E.I.—*	
	Flooring :	
	Christmas Island (Indian Ocean)	4,459
	Commonwealth States : cub. ft. £	
	New South Wales 21,023 22,525	
	Victoria 25,185 32,564	
	South Australia 53,152 46,833	
	Northern Territory 1,060 1,129	
		100,420
		104,879
6449	*Other, including Architraves and Mouldings :*	
	Christmas Island (Indian Ocean)	(a)
	Commonwealth States : cub. ft. £	
	New South Wales 228 472	
	Victoria 419 465	
	South Australia 6,644 6,814	
	Northern Territory 4,499 7,005	
		11,790
		..
6469	*Veneers—*	sq. ft.
	Commonwealth States :	
	New South Wales	9,744
6479	*Plywood—*	
	Commonwealth States :	
	New South Wales	9,600
	Victoria	457,609
	Queensland	162
	South Australia	3,247,685
	Northern Territory	241,720
		3,956,767
	Total Timber Exports (excluding Sandalwood)	....
	WOOD MANUFACTURES.	
6505	*Casks and Vats, Empty—New—*	No.
	United Kingdom	329
	Commonwealth States :	
	New South Wales	4,133
		4,462
6529	*Articles of Wood (except Furniture) N.E.I.—*	
	Ceylon	....
	Christmas Island (Indian Ocean)	....
	Singapore	....
	Commonwealth States : £	
	New South Wales 2,050	
	Victoria 2,503	
	Queensland 4	
	South Australia 6,223	
	Tasmania 76	
	Northern Territory 6,068	
		....
		....

(a) Not available.

APPENDIX 2A—continued.

Exports of Timber, Tanning Substances and Essential Oils from Western Australia during the year ended 30th June, 1957.

Item and Country of Destination.			Quantity.	£
Furniture of Wood or Partly of Wood—				
Christmas Island (Indian Ocean)			...	1,892
Commonwealth States—		£		
New South Wales		100		
Victoria		348		
Queensland		88		
South Australia		2,541		
Northern Territory		3,027		
			...	6,104
			..	7,996
TOTAL WOOD MANUFACTURES.			...	78,934
Essential Oils, Natural, Non-spirituous—			lb.	
United Kingdom			19,700	15,603
Canada			800	356
Ceylon			42	110
Uganda			224	98
Hong Kong			1,316	2,881
New Zealand			49	58
Singapore			1,472	2,328
South Africa, Union of			436	407
Burma			224	105
Cuba			112	280
France			3,600	2,475
Germany, Federal Republic of			778	134
United States of America			11,928	3,166
Commonwealth States :		lb.	£	
New South Wales		14,508	17,586	
Victoria		10,288	12,243	
Queensland		71	153	
South Australia		572	1,010	
			25,439	30,992
			66,120	58,993

Item No.	Item and Country of Destination.			Quantity.	£
1600-1620	TANNING SUBSTANCES OF NATURAL ORIGIN.				
				cwt.	
	"For Orders"			401	1,324
	United Kingdom			4,955	15,793
	Canada			1,105	4,226
	India, Republic of			281	861
	New Zealand			1,215	4,081
	Singapore			19	73
	Jamaica and Dependencies			606	2,152
	Trinidad and Tobago			2,659	10,136
	Denmark			10,114	30,510
	Germany, Federal Republic of			16,081	37,517
	Indonesia			2,654	11,679
	Iraq			1,000	3,938
	Italy			40	163
	Japan			60	195
	Netherlands			5,619	15,841
	Norway			169	536
	Philippines			400	1,261
	Thailand			300	1,125
	Trieste			203	670
	United States of America			128,975	389,939
	Commonwealth States :		cwt.	£	
	New South Wales		4,743	16,886	
	Victoria		8,437	22,250	
	Queensland		3,036	10,342	
	South Australia		1,593	5,783	
	Tasmania		401	1,263	
				18,210	56,524
				195,066	588,544
	Total Value of All Exports Shown on this Return			...	£3,983,190

APPENDIX 2B.

Imports of Timber, Tanning Substances and Essential Oils into Western Australia during the year ended 30th June, 1957.

Item No.	Item and Country of Origin.	Quantity.	£
6301-6309	*Wicker, Bamboo and Cane and Manufactures Thereof—*		
	*Commonwealth of Australia	....	166
	Hong Kong	....	7,456
	India, Republic of	....	153
	Malaya, Federation of	....	5,562
	Singapore	....	2,287
	Burma	....	477
	Indonesia	....	2,442
	Egypt	....	2
	Japan	....	3,544
	Commonwealth States :	....	£
	New South Wales	....	963
	Victoria	....	904
	South Australia	....	35
		....	1,902
		....	23,991
	TIMBER.		
6339	*Logs, not Sawn—*		
	Softwoods .		
	Canada	cub. ft. 135	182
6340	*Hardwoods :*		
	Borneo, British	487,995	127,225
	Dominican Republic	2	132
		487,997	127,357
6350	*Dunnage—*		
	Canada	....	5
	New Zealand	....	175
		....	180
6352	*Sleepers—*		
	Borneo, British	265	96
6411	*Sawn Timber, Undressed, N.E.I.—Softwoods—*		
	Redwood and Western Red Cedar :	cub. ft.	
	Canada	1,242	1,077
6412	*Douglas Fir :*		
	Canada	16,002	13,402
	United States of America	25,472	20,632
		41,474	34,034
6416	*Kauri and Kauri Pine :*		
	Borneo, British	1,263	575
6419	*Other Softwoods :*		
	Borneo, British	500	235
	United States of America	9,160	12,835
		9,660	13,070
	Composite Item for Undressed Softwoods—		
	Commonwealth States :		
	New South Wales	109	131
	Victoria	277	360
	Queensland	2,096	3,051
	South Australia	310	499
		2,792	4,041
6429	*Sawn Timber, Undressed, N.E.I. Hardwoods—*		
	Borneo, British	164,834	92,083
	Malaya, Federation of	38,045	25,928
	Thailand	6	23
	Commonwealth States : cub. ft. £		
	New South Wales 174 215		
	Queensland 29,614 32,884		
	Tasmania 26,317 20,571	56,105	53,620
		258,990	171,654
6431	*Box Shooks—*		
	Malaya, Federation of	21,240	12,398
	Netherlands	57	115
	Portugal	16,216	10,709
	Commonwealth States :		
	South Australia	6,180	8,851
		43,693	32,073
6435	*Shooks and Staves, Cask and Vat (Undressed or Dressed)—*		
	Commonwealth States :		
	South Australia	2,233	3,416
6441	*Sawn Timber, Dressed, N.E.I.—*		cub. ft.
	Flooring :		
	Norway		3,205
	Sweden		17,652
			20,857
6442	*Lining :*		
	Norway		4,588
6449	*Other, including Architraves and Moulding*		
	United Kingdom		100
			....
	Composite Item for Sawn Timber, Dressed, N.E.I.		
	Commonwealth States :		
	New South Wales		....
	Victoria		....
	Queensland		....
	South Australia		....
	Tasmania		....
			....
6469	*Veneers—*		sq. ft.
	United Kingdom		37,474
	Malaya, Federation of		2,000
	Singapore		10,000
	Germany, Federal Republic of		234,092
	Commonwealth States : sq. ft. £		
	New South Wales 362,624 10,362		
	Victoria 7,797 205		
	Queensland 251,473 3,565		621,894
			905,460
6479	*Plywood .*		sq. ft.
	New Guinea Trust Territory		71,942
	Commonwealth States : sq. ft. £		
	New South Wales 187,218 14,476		
	Queensland 1,220,039 67,508		
	South Australia 795 39		1,408,052
			1,479,994
	Total Timber Imports		....
			....
	WOOD MANUFACTURES.		
6505	*Casks and Vats, Empty.—*		No.
	Commonwealth of Australia		345
	Commonwealth States :		
	South Australia		430
			775
6508	*Clothes Pegs of any material—*		gross.
	Czechoslovakia		2,490
	Netherlands		1,590
	Sweden		12,175
	Commonwealth States : gross. £		
	New South Wales 1,887 1,000		
	Victoria 20,810 8,102		
	South Australia 68 30		
	Tasmania 35,168 12,529		57,928
			74,183
6511	*Corestock (also known as Blockboard)—*		sq. ft.
	Czechoslovakia		2,200
	Commonwealth States : sq. ft. £		
	New South Wales 2,520 506		
	Victoria 558 161		
	Queensland 3,687 631		6,765
			8,965
6515	*Dowels and Dowelling—*		
	Commonwealth States :		
	New South Wales		....
	Victoria		....
	Tasmania		....
			....
6516	*Match Splints—*		
	Belgium		....

* Produce of Australia, previously exported, now returned to this State.

APPENDIX 2B—continued.

Imports of Timber, Tanning Substances and Essential Oils into Western Australia during the year ended 30th June, 1957.

Item and Country of Origin.	Quantity.	£
Tool Handles, Unattached, of any material—		
United Kingdom		2,571
Canada		180
Germany, Federal Republic of		41
Commonwealth States :		£
New South Wales		23,488
Victoria		13,206
Queensland		169
South Australia		565
Tasmania		3,427
		40,855
		43,647
Oars and Sculls—	No.	
Commonwealth States :		
New South Wales	696	1,720
Victoria	228	443
	924	2,163
Articles of Wood (Except Furniture), N.E.I.—		
United Kingdom		6,664
Hong Kong		11
India, Republic of		4
Malaya, Federation of		111
Singapore		78
Austria		10
Belgium		12
France		2
Germany, Federal Republik of		433
Italy		238
Japan		417
Netherlands		181
Norway		4
Sweden		154
Switzerland		1
United States of America		44
Commonwealth States :		£
New South Wales		28,909
Victoria		67,677
Queensland		7,929
South Australia		8,496
		113,011
		121,375
Furniture, N.E.I. of Wood or Partly of Wood—		
Commonwealth of Australia		10
United Kingdom		1,511
Hong Kong		322
India, Republic of		44
Singapore		523
South Africa, Union of		2
Denmark		5
Germany, Federal Republic of		218
Italy		232
Japan		893
Netherlands		39
Sweden		2,590
Switzerland		9
United States of America		10
Commonwealth States :		£
New South Wales		7,862
Victoria		24,692
Queensland		404
South Australia		17,253
Northern Territory		36
		50,247
		56,655
Total Wood Manufactures		280,866
Total Wood and Wicker, Raw and Manufactured		830,700

Item No.	Item and Country of Origin.	Quantity.	£
	Essential Oils, Natural, Non-spirituous—	lb.	
	United Kingdom	12	45
	Ceylon	2,640	904
	Zanzibar	960	686
	India, Republic of	2,240	1,442
	Malaya, Federation of	28	140
	Seychelles and Dependencies	28,563	13,375
	Singapore	28	139
	Windward Islands	225	511
	Brazil	9	4
	China	2,445	2,131
	Czechoslovakia	8	7
	France	463	723
	Madagascar	2,646	1,291
	Indonesia	2,241	1,075
	Italy	....	5
	Netherlands	....	2
	Spain	1,112	398
	United States of America	3,870	8,618
	Commonwealth States :	lb.	£
	New South Wales	216,211	58,596
	Victoria	10,391	5,177
	South Australia	11,643	4,594
		238,245	68,367
		....	99,863
	TANNING SUBSTANCES—NATURAL ORIGIN.		
1600	*Tanning Bark—*		
	Commonwealth States:	cwt.	
	Victoria	6	19
	South Australia	6	18
	Tasmania	61	113
		73	150
1611–1619	*Tanning Extracts—*		
	India, Republic of	300	830
	Rhodesia and Nyasaland, Federation of	597	1,975
	South Africa, Union of	10,462	27,656
	Norway	100	85
	Sweden	881	915
	Commonwealth States :	cwt.	£
	Victoria	129	639
	South Australia	41	230
		170	869
		12,510	32,330
1620	*Other Tanning Substances of Natural Origin—*		
	India, Republic of	1,539	2,708
	Commonwealth States :		
	Victoria	104	215
		1,643	2,923
	Total Tanning Substances of Natural Origin	....	35,403
	Total Value of All Imports Shown in this Return	....	£965,966

APPENDIX 2C.

SUMMARY OF EXPORTS OF FOREST PRODUCE SINCE 1836.

Year.	Timber.		Year.	Timber.		Wood Manufactures.	Tanning Materials.	Essential Oils.
	Cub. ft.	Value.		Cub. ft.	Value.	Value.	Value.	Value.
		£			£	£	£	£
1836 (a)	10,000	2,500	1901	7,150,600	572,354	....	....	....
1837	....	....	1902	6,256,750	500,533	....	....	....
1838	....	....	1903	7,748,450	619,705	....	859	....
1839	....	....	1904	8,072,300	654,949	....	32,876	....
1840	....	....	1905	8,709,500	689,943	....	154,087	....
			1906	(c) 8,830,700	708,993	....	140,720	....
1841	....	....	1907	(c) 6,409,550	511,923	....	98,773	....
1842	....	....	1908	(c) 9,869,509	813,591	....	79,934	....
1843	....	....	1909	(c)10,830,450	867,419	....	59,633	....
1844	(b)	163	1910	(c)12,074,100	972,698	....	93,733	....
1845	....	....						
1846	2,550	255	1911	(c)12,449,500	986,341	....	83,470	....
1847	12,200	1,120	1912	(c)11,297,100	903,396	....	49,004	....
1848	3,350	333	1913	(c)13,619,850	1,089,481	....	47,377	....
1849	....	....	1914 (d)	(c) 6,279,750	502,153	....	18,197	77
1850	10,500	1,048	1915 (e)	(c) 9,968,500	808,392	....	6,127	38
			1916 (e)	5,432,100	441,991	....	10,208	1,10
1851	1,250	268	1917 (e)	3,890,650	310,893	....	18,959	2,06
1852	7,050	806	1918 (e)	3,436,250	274,141	....	16,886	3,99
1853	52,200	5,220	1919 (e)	4,135,750	332,584	11,535	18,875	3,98
1854	58,500	7,023	1920 (e)	5,065,300	465,731	21,935	22,121	3,70
1855	76,900	12,076						
1856	70,500	9,671	1921 (e)	9,816,250	1,137,819	24,916	23,073	10,10
1857	69,200	9,449	1922 (e)	8,309,750	1,041,047	22,248	13,328	6,87
1858	29,250	2,340	1923 (e)	7,911,310	997,454	12,377	21,161	20,07
1859	67,250	6,051	1924 (e)	11,126,861	1,367,517	11,505	29,606	39,87
1860	54,800	4,932	1925 (e)	11,844,303	1,477,997	13,298	40,136	42,05
			1926 (e)	12,001,384	1,522,958	10,072	15,056	47,81
1861	27,750	2,497	1927 (e)	12,580,262	1,651,149	8,727	15,818	26,54
1862	68,800	7,151	1928 (e)	10,384,784	1,265,383	7,783	27,662	39,13
1863	32,900	2,963	1929 (e)	7,635,237	960,435	6,603	35,850	63,30
1864	58,300	5,508	1930 (e)	6,579,743	807,425	4,687	40,628	77,51
1865	183,950	15,693						
1866	85,650	6,849	1931 (e)	4,127,856	507,382	26,615	35,333	56,17
1867	56,750	4,541	1932 (e)	3,062,673	361,700	85,488	42,016	59,30
1868	8,000	638	1933 (e)	2,235,540	262,617	80,332	33,352	26,33
1869	179,900	14,273	1935 (e)	4,060,830	487,248	76,107	20,904	26,72
1870	157,200	17,551	1935 (e)	5,326,117	636,466	65,494	15,284	35,36
			1936 (e)	5,598,180	679,522	50,665	12,237	27,52
1871	218,500	15,304	1937 (e)	5,673,903	699,684	52,338	14,491	38,18
1872	37,000	2,590	1938 (e)	7,545,744	932,420	47,934	13,865	35,12
1873	68,150	4,771	1939 (e)	5,704,250	722,310	43,518	17,842	25,55
1874	345,600	24,192	1940 (e)	5,049,585	634,859	62,796	19,485	47,73
1875	342,350	23,965						
1876	219,050	23,743	1941 (e)	6,091,187	790,876	74,935	13,686	59,86
1877	336,150	26,979	1942 (e)	5,224,634	700,474	64,454	6,896	74,90
1878	580,900	63,902	1943 (e)	3,516,566	605,327	32,426	1,598	70,52
1879	627,250	69,742	1944 (e)	3,645,354	613,994	25,324	1,294	72,70
1880	662,550	66,252	1945 (e)	2,851,475	570,028	27,307	2,795	103,05
			1946 (e)	3,373,025	722,061	(f) 2,618	4,872	128,05
1881	792,750	79,277	1947 (e)	3,458,628	865,255	(f) 13,118	12,056	151,76
1882	936,500	93,650	1948 (e)	3,584,405	1,099,073	(f) 6,572	9,556	116,46
1883	997,000	79,760	1949 (e)	3,198,212	993,152	(f) 6,639	5,112	75,39
1884	861,700	68,936	1950 (e)	2,857,946	974,493	(f) 13,525	8,243	78,55
1885	848,150	67,850						
1886	626,150	50,092	1951 (e)	2,342,492	(g) 918,485	(f) 25,101	16,581	125,83
1887	354,800	28,384	1952 (e)	2,373,553	(g) 1,032,909	(f) 47,689	19,120	119,10
1888	525,750	42,060	1953 (e)	3,965,188	(g) 2,074,421	(f) 120,095	34,136	70,85
1889	788,500	63,080	1954 (e)	3,858,956	(g) 2,248,320	(f) 59,360	80,248	55,27
1890	1,172,200	82,052	1955 (e)	3,477,249	(g) 1,935,019	(f) 79,893	37,338	80,82
			1956 (e)	4,568,034	(g) 2,818,716	(f) 119,459	554,760	90,92
1891	1,273,950	89,179	1957 (e)	4,684,017	(g) 3,256,719	(f) 78,934	588,544	58,99
1892	1,082,650	78,419						
1893	512,950	33,888	Total	409,750,333	56,538,586	1,545,230	2,835,891	2,299,28
1894	1,063,700	74,804						
1895	1,255,250	88,146						
1896	1,545,600	116,420						
1897	2,393,300	192,451						
1898	4,086,150	326,195						
1890	6,913,550	553,198						
1900	5,725,400	458,461						

(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 2D.

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
				Total	15,113,962	477,539	1,536,130

* 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 2E.

SUMMARY OF LOG VOLUMES PRODUCED IN W.A. SINCE 1829.

Year.	* Crown Land.	Private Property.	Total.	Year.	* Crown Land.	Private Property.	Total.
	Loads.	Loads.	Loads.		Loads.	Loads.	Loads.
1829–1916— Estimated	....	....	13,265,357	1937 (c)	634,077	318,044	952,121
1917 (a)	386,662	42,890	429,552	1938 (c)	634,749	318,579	953,328
1918 (b)	153,311	10,099	163,410	1939 (c)	584,953	221,720	806,673
1919 (c)	399,741	67,809	467,550	1940 (c)	553,202	182,791	735,993
1920 (c)	565,844	115,258	681,102	1941 (c)	561,784	205,780	767,564
1921 (c)	586,179	140,369	726,548	1942 (c)	532,733	112,668	645,401
1922 (c)	722,448	312,803	1,035,251	1943 (c)	472,098	86,459	558,557
1923 (c)	536,146	197,341	734,087	1944 (c)	445,050	89,124	534,174
1924 (c)	840,089	186,856	1,026,945	1945 (c)	439,400	86,191	525,591
1925 (c)	876,658	362,845	1,239,503	1946 (c)	422,530	109,647	532,177
1926 (c)	976,475	500,752	1,477,227	1947 (c)	438,971	156,639	595,610
1927 (c)	937,752	627,122	1,564,874	1948 (c)	445,027	177,438	622,465
1928 (c)	855,625	466,689	1,322,314	1949 (c)	405,236	196,286	601,522
1929 (c)	645,795	221,979	867,774	1950 (c)	421,623	198,653	620,276
1930 (c)	633,083	233,072	866,155	1951 (c)	507,829	214,261	722,090
1931 (c)	376,452	242,970	619,422	1952 (c)	578,851	238,766	817,617
1932 (c)	234,857	82,319	317,176	1953 (c)	684,468	260,428	944,896
1933 (c)	263,313	49,133	312,446	1954 (c)	749,719	271,240	1,020,959
1934 (c)	425,262	126,608	551,870	1955 (c)	749,353	303,909	1,053,262
1935 (c)	549,165	229,035	778,200	1956 (c)	796,227	275,467	1,071,694
1936 (c)	628,012	268,723	896,735	1957 (c)	788,522	231,707	1,020,229
				Total	....	....	45,445,697

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

(a) Year ended 31st December.

(b) Six months ended 30th June.

(c) Year ended 30th June.

APPENDIX 3.

TIMBER INDUSTRY REGULATIONS ACT, 1926-50.

Annual Report for the year ended 31st December, 1956.

The number of Mills registered under the provisions of the Act at the close of the year totalled 261 (149 Crown Land, 112 Private Property).

The average number of persons employed on timber holdings each month throughout the year was 5,574 compared with 5,804 last year.

The District and Workmen's Inspectors made 1,466 inspections of timber holdings and investigated and reported on 943 notifiable accidents of which 3 were fatal.

The number of accidents per 100 persons employed was 16·9 compared with 18·5 for last year.

The total period of incapacity as a result of accidents was 24,279 days, an average of 25·7 days per injured person (compared with 24·2 days last year).

Returns as listed hereunder have been prepared, but are not included in this report.

1. Number of notifiable accidents reported in accordance with Section 14 of the Act, according to months, and indicating the age and nationality of the injured person, the period of incapacity, and the number of cases on which the first-aid outfit was used.
2. The number of accidents reported during 1956, and their classification according to location and nature of injury.
3. The number of accidents classified according to cause of accident and location of injury.
4. The number of accidents according to cause of accident and nature of injury.
5. The number of accidents classified according to the months and days of the week, on which the accident occurred.
6. The number of hours worked on the day and up to the time of injury by the person injured.
7. A return showing by months the time at which the notifiable accidents occurred.
8. A return showing the personal cause of accidents as determined by the Inspectors.

The cost to the Forests Department of administering the Timber Industry Regulation Act for the year ended 30th June, 1957, was as follows :—

	£
Salaries	2,303
Mileage and Travelling Allowances and Sundries	1,191
Total	£3,494

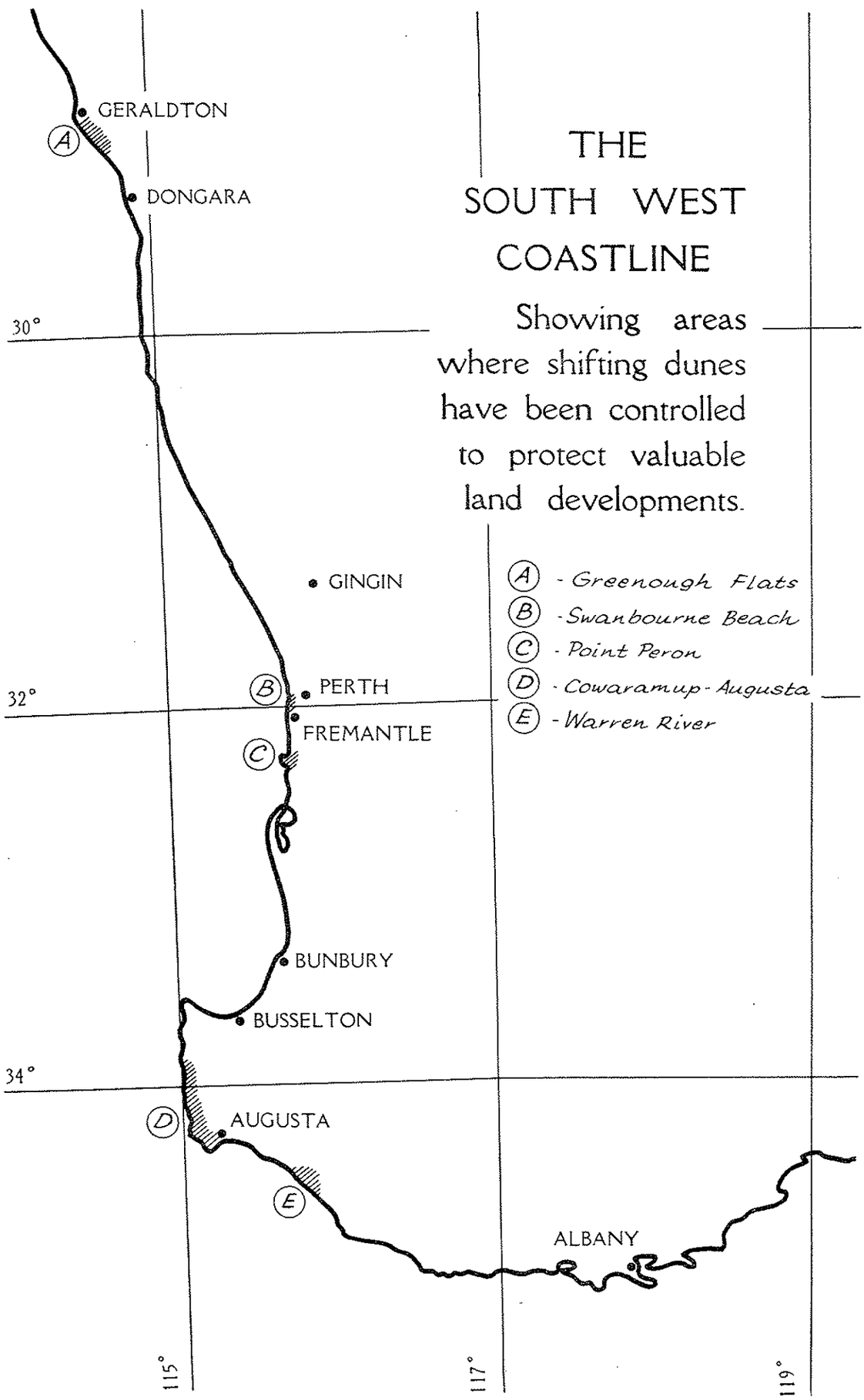

THE
SOUTH WEST
COASTLINE
Showing areas where shifting dunes have been controlled to protect valuable land developments.
A - Greenough Flats
B - Swanbourne Beach
C - Point Peron
D - Cowaramup - Augusta
E - Warren River
GERALDTON
DONGARA
GINGIN
PERTH
FREMANTLE
BUNBURY
BUSSELTON
AUGUSTA
ALBANY
30°
32°
34°
115°
117°
119°

Plate 12.

APPENDIX 4.

THE FIXATION OF COASTAL SAND DUNES.

Over the centuries, men of many lands have taken up the challenge thrown out by the inexorable march of the sea sands over arable lands, and even over forests.

In the classic example of the Landes of France, a Church was recorded as buried 60 feet below the " waves " of encroaching sea sand, but today, above this area, due to the ant-like persistence of the " forester," there flourishes a famous forest of Pine supporting a large and prosperous forest industry.

Closer to home, in the far South of Western Australia, giant Karri trees have been buried and ancient forests petrified by the march of the " sea sand ".

This Goliath still marches on the South and West coasts of our country, as will be seen from the illustrations, but he is easily arrested and slain by a David known as " Marram Grass "; a sickly child needing the forester's care and the statesman's finance in his early youth.

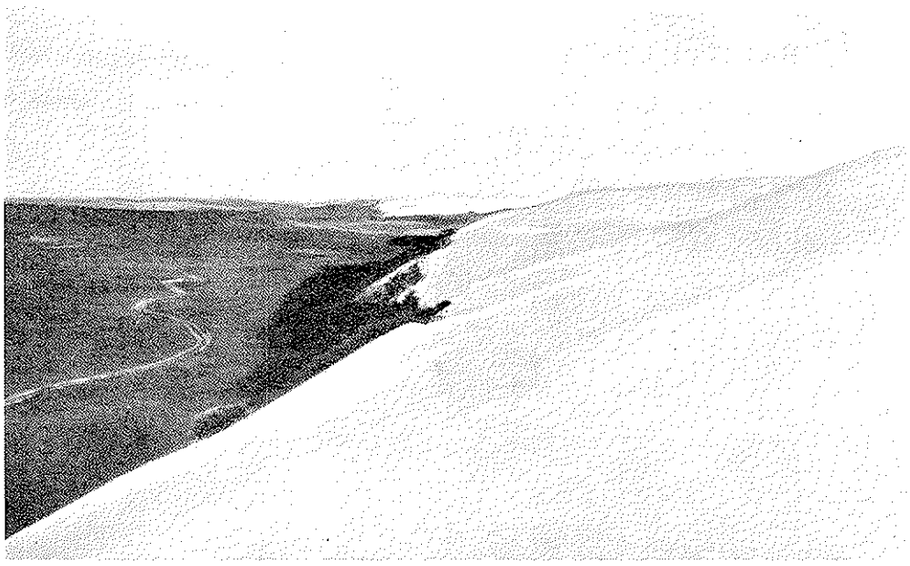


Plate 13.—Sea sand advancing south of Geraldton.

History of Dune Fixation in Western Australia.

It is to our credit that in a country little over 100 years old and still with a population of much less than 1 per square mile, battle has been joined and some victories already won against " sea sand ".

It is a curious fact that, way back in 1892, sawmillers, who as a class often reap the harvest without thought for the future, first challenged the wind and " sea sand ".

The firm of M. C. Davis & Sons of Karridale imported " Marram Grass " from South Africa and planted it on the Boranup Dunes over a hundred and fifty miles from the City of Perth. The sand dunes were fixed and remain stable. They confirmed the knowledge of the Old World and set the target for the pioneers of our State.

Little further work was recorded in the State until the early 1920's when the Forests Department with its knowledge of the Boranup Dunes and of similar work in other parts of the World gave advice where needed.

In 1919 and 1920 the Cottesloe and Swanbourne local authorities carried out successful fixation of dunes in the coastline near Perth, and from 1924 to 1927 the Forests Department planted about 100 acres of University Endowment Land at Swanbourne financed by University Funds.

In 1936 a report was received by the Forests Department that a very large shifting sand dune some 1000 acres in extent was threatening the flow of the Warren River near Caleup Ford. A forester visited the area and confirmed the seriousness of the report. Immediate steps were taken to fix this dune with Marram Grass, the work and supervision were done by the Forests Department with funds provided by the Lands Department. The whole surface of the dune was planted and no further encroachment took place.

In 1937 and 1938, after an inspection to ascertain the extent and economic loss being caused by the advance of the huge Yeagerup Dune North of the Warren River, a start was made to arrest the dunes which stretched for some 10 miles from the vicinity of the Warren River towards Mt. Silvertop. Marram Grass was established at a number of points on the dune to form nurseries from which large quantities of grass could be obtained at a later date to extend over the dune. Again the Forests Department carried out the work with funds provided by the Lands Department.

In 1938 and 1939 a number of dunes between Cowaramup and Augusta were fixed using the same arrangement for finance. The dunes were threatening valuable agriculture and grazing lands at Cowaramup, Ellensbrook, Groocardup, Kilcarnup, Gnarabup, Boodjedup and Caljardup.

Further small areas of moving sand have been dealt with during World War II at Rottnest Island, Garden Island and Point Peron ; the funds for the work being provided by the Department of the Army.

A complete lack of success has attended efforts to establish Marram Grass at certain Rottnest sand drifts due to the exceedingly high lime content of the sand. This sand consists almost solely of fine shell particles and analyses 98 per cent. calcium carbonate.

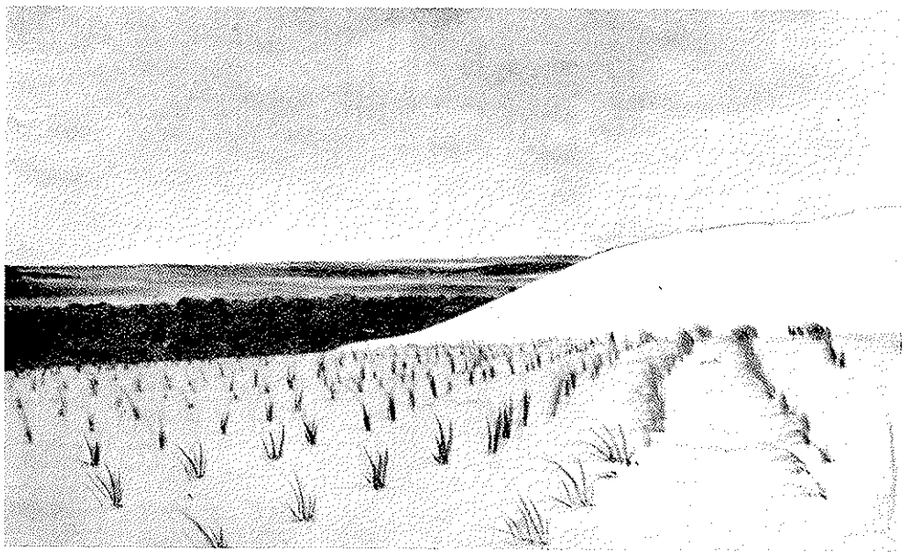
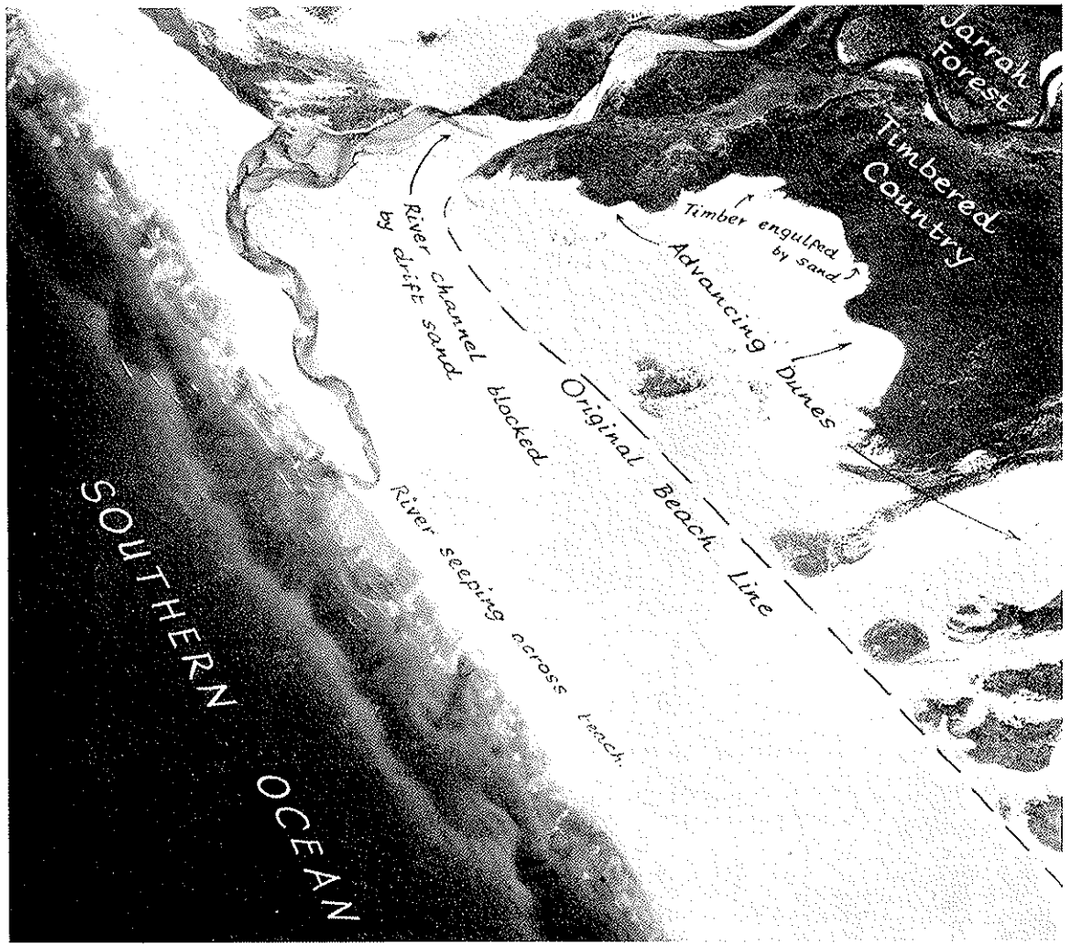


Plate 14.—First planting of Marram Grass south of Geraldton.

Plate 15.—Sea sand successfully arrested south of Margaret River.



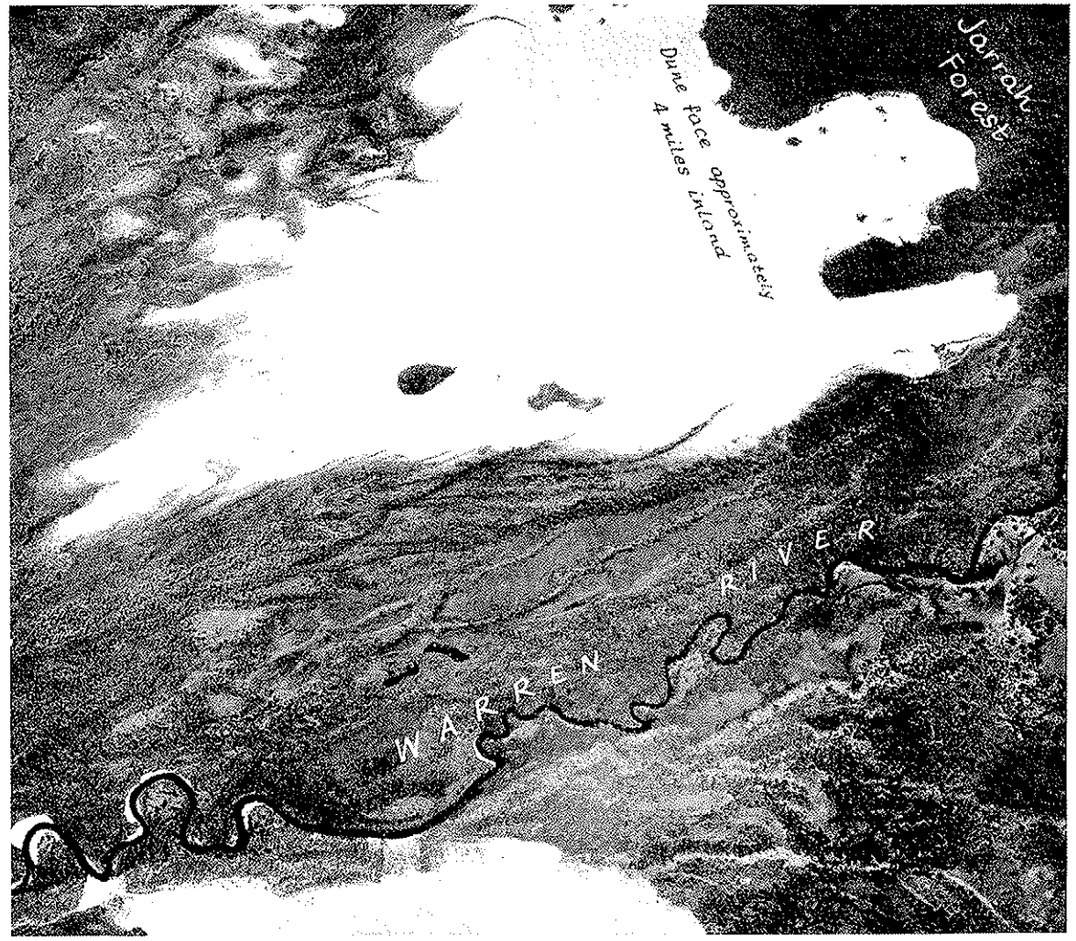


Plate 16 and 17.—The invasion of the Warren River by sea sand—typical of the south coast of Western Australia.

In 1948 and 1949 the Forests Department was asked to investigate the possibility of stabilising the dunes at the Greenough River and Mahomet Flat near Geraldton. About this time, the Director of the Soil Conservation Service arranged for one of his officers to be allowed to work with forest officers on this problem to gain experience in this phase of conservation. For the past five years a considerable amount of experimental work has been done on these dunes in an endeavour to find plants which will grow on them. These sands of shell origin like those at Rottnest are almost 100 per cent. calcium carbonate, and this combined with the dry climate poses a very difficult problem. A number of plants including two from South Africa, Cereal Rye and Marram Grass, and a number of local species have been tried, so far with little success. Marram Grass gives best survival and most promise, but is very difficult to establish under these conditions. A great number of fertiliser treatments have been tried with no response to any treatment.

Marram Grass has been the outstanding medium with which the State has been successful in stabilising coastal sand dunes in this State. It is easy to establish and extremely hardy within the 20 in. isohyet, and on any sand not containing more than 60 per cent. to 70 per cent. of calcium carbonate in the form of shell particles.

The whole of the State's coastline from Shark Bay to Eucla is unstable, and any factors such as overgrazing or fire, which are likely to upset the balance of nature will start the sand moving. There is no doubt that as time goes on and pressure of population requires the utmost use of our land the State will be very concerned with the stabilisation of the whole of our coastline. Many huge inroads of " sea sand " are already on the march ; gaining impetus year by year, and the time to attack this Goliath of land destruction is now. A plan is needed setting out annual objectives, and funds are needed, beyond the small amounts which have been available in the past from the Lands Department and Local Authorities, for the forests themselves must have first call on the limited funds available to the Forests Department.

Details of technique and method of establishment of Marram Grass on coastal dunes have been explained in several papers prepared by officers of the Department.

A number of factors govern the cost of the operations, but the following figures may be regarded as an indication of expenditure to be incurred on average sites.

		£	s.	d.	
Basic wage		12	6	0	per 40 hour week.
Espacement 3 ft. x 3 ft.	Cost	22	0	0	per acre.
Espacement 6 ft. x 6 ft.	Cost	5	4	0	per acre.
Espacement 30 ft x 5 ft.	Cost	1	6	7	per acre.

These costs all refer to hand planting.

It is considered that with modern developments in tractor design and planting machines, a great deal of the work could be done by mechanical equipment and costs thereby reduced.

Along our South coast, the sand dunes are for the most part held in check by natural vegetation, ranging from low wind swept Eucalypts and various hardy shrubs down to certain creepers and ground hugging Spinifex hirsutus.

Sporadic sand drifts occur when circumstances combine to damage the vegetation, such as bushfires, rabbits, overstocking, etc., followed by strong winds. Sand drifts large and small have then to be counter-attacked to save our pasture lands and forests.

There are a few restricted areas, such as near the sea at Gnarabup, where marram has not given entire satisfaction.

In some of these areas Ehrharta villosa (pip grass) ably seconded the efforts of the marram, particularly very near the sea and amongst the scrub ahead of the drift.

Incidentally, this grass provides a useful rough fodder for cattle in country which otherwise carries very little else that is palatable.

This can be seen particularly at Ellensbrook.

A list of publications and references available is as follows :—

(1) Page 242 or Bulletin No. 2, 1921. " Notes on the Forests and Forest Products and Industries of Western Australia ".

(2) Some notes on Coastal Sand Drift Fixation in Western Australia by D.H . Perry. (Reprint from Vol. 1, No. 2, Australian Forestry 1936.)

(3) Sand Dune Fixation in Western Australia by D. H. Perry, March 1942. (Typed report unpublished with illustrations, Library No. P362E.)

(4) Some notes on Coastal Sand Drift Fixation in Western Australia by D. H. Perry and L. N. Weston. (Paper prepared for the Australian Forestry Conference, 1949.)

8018/8/57—510

By Authority : WILLIAM H. WYATT, Government Printer, Perth