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1941.

WESTERN AUSTRALIA.

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# REPORT

on the operations of

# THE FORESTS DEPARTMENT

for the

YEAR ENDED 30th JUNE, 1941,

by

T. N. STOATE,

DEPUTY CONSERVATOR OF FORESTS.

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### LIST OF BOTANICAL NAMES OF LOCAL SPECIES REFERRED TO IN THIS REPORT.

Jarraah (*Eucalyptus marginata*).

Karri (*Eucalyptus diversicolor*).

Wandoo (*Eucalyptus redunca*, var. *elata*).

Tuart (*Eucalyptus gomphocephala*).

Marri (*Eucalyptus calophylla*).

Blackbutt (*Eucalyptus patens*).

Sandalwood (*Santalum spicatum*).

Sheoak (*Casuarina Fraseriana*).

Bullich (*Eucalyptus megacarpa*).

River Banksia (*Banksia verticillata*).

Brown Mallet (*Eucalyptus astringens*).

Blackboy (*Xanthorrhoea Preissii*).

Red Tingle Tingle (*Eucalyptus Jacksoni*).

### KEY TO DIVISIONS AND DISTRICTS.

Division.	Headquarters.	Districts.
I.	Busselton ...	Busselton Margaret River
II.	Mundaring Weir ...	Mundaring
III.	Dwellingup ...	Dwellingup Huntly Wuraming Duncan's
IV.	Collie ...	Collie Muja Wellington
V.	Kirup ...	Kirup Kulikup Greenbushes Nannup
VI.	Manjimup ...	Manjimup
VII.	Narrogin ...	Narrogin Dryandra
VIII.	Kelmscott ...	Kelmscott Jarrahdale Gleneagle Carinyah
IX.	Perth ...	Metropolitan Denmark
X.	Harvey ...	Harvey Willowdale Tallanalla
XI.	Pemberton ...	Pemberton

# Annual Report on the Operations on the Forests Department for the Year ended 30th June, 1941.

## INTRODUCTION.

The second Annual Report during the war period shows an increase in production of more than eighteen million super feet of log timber over that produced during last year. A large proportion of this has gone into direct war use.

The urgent necessity to co-ordinate the ever increasing demands for Australian timbers with the complex problems associated with both interstate and international trade, has led to the appointment of the Conservator of Forests (Mr. S. L. Kessell) as Commonwealth Timber Controller. The State Government loaned his services for this purpose and he took up his duties in Melbourne at the beginning of May.

Consequent upon restrictions of imports, Western Australia has been asked to increase output to help the more populous States, and those less favoured with indigenous timbers. Production, however, is limited by the labour available. Already some sawmills have reported that serious embarrassment has been caused to the industry, and as further losses from the ranks of the timber workers would result in a grave curtailment of production, further steps have had to be taken to relieve the position.

Losses from the Department's field staff to various avenues of employment have also reached serious proportions. In addition, a number of forest workers have, from patriotic motives, in spite of the essential nature of their work, deemed it fitting to leave their employment in an attempt to join military units.

Reforestation operations were on a reduced scale compared with past years, the work being carried out by the staff necessary for fire control. Regeneration operations covered 15,000 acres of Jarrah forest, bringing the total to 441,000 acres. In the Karri forest, 1,840 acres were treated for regeneration. Mallet sowings were made on 1,560 acres; thinning was done in 6,000 acres of young Jarrah stands. 210 acres of *Pinus radiata* and 210 acres of *Pinus pinaster* were planted, this acreage being less than usual owing to the very dry season. The total area of plantations is now 12,700 acres. One million super feet of pine logs were sold from departmental plantations. One of the important departmental operations is the construction and maintenance of forest roads and firelines for access in connection with trade operations and fire control. The total length of such tracks now maintained is over 10,000 miles.

The past fire season was notable for the assistance given for the first time by the Department of the Army. Men were made available at call in all the forest districts of the South-West. On three occasions, large gangs of soldiers, under departmental direction, were responsible for a whole-hearted effort in preventing very serious damage being done to State Forest.

The season itself was long drawn out and more than usually dry. Only two points of rain were recorded at Dwellingup from December 17th to February 20th, and total rainfalls for the year were everywhere well below average. The occurrence of the largest number of fires known to be caused by lightning in this State is of interest. In the fully protected Zone A, one serious fire, caused by an incendiary, occurred, resulting in considerable local damage, but of the 73 fires that occurred on managed country, one-half were of less than 1 acre in extent. The total area burnt in this Zone amounted to less than one-half of one per cent. of the total.

Fires escaping from privately held land were again too numerous, and the problem of mutual enlightenment on the widely separated fire problems in forest and land development remains a matter of some considerable importance. The time of the most serious fire hazard for the growing crop cared for by the forester is the hottest and driest period of the year from January 15th to March 31st, while the agriculturist is more concerned with the protection of growing crops in early summer.

The total production of timber for the twelve months under review, exclusive of mining timber supplies, was valued at £1,470,000, which showed a rise of £146,000 on that of the previous year. Some alterations in the industry were rendered necessary by the closing of some of the old-established mills, following the cutting of the timber on the original permit areas, and the transfer of plant and equipment to more distant portions of State Forest in order to maintain the level of production and to meet the demand. This has been done in spite of the difficult conditions prevailing. The permissible cut is being maintained.

War-time activities have resulted in increased enquiries on utilisation problems, considerable attention having been given to questions of war-time timber supplies. Apart from this and general routine enquiries, investigations on charcoal and producer gas have been of major importance, the Department being represented on the W.A. Producer Gas Committee and taking an active interest in work of the Committee, particularly on questions of charcoal supplies and testing of producer gas units.

An additional Forestry Company, to serve abroad with the Australian Imperial Force, was formed during the year. Officers and men were recruited from the various State Forest Departments and from the timber industry.

Two hundred and sixty-four inspections of timber holdings were made during the year by District and Workmen's Inspectors appointed under the Timber Industry Regulation Act. The number of notifiable accidents investigated was 542, lowering the total per 100 employed from 20 to 18. Two accidents proved fatal, the remainder showing an average period of incapacity of 22.8 days.

## CHAPTER 1.

### THE FOREST AREA.

#### (1) State Forests (*Forests Act, 1918*).

During the year one new area, comprising 3,580 acres, was declared State Forest. Several minor additions, totalling 5,076 acres, were made to existing State Forests, and 2,583 acres were excised with the approval of Parliament and reverted to the Lands Department for selection. The total area of State Forest shows an increase of 6,073 acres compared with the previous year.

	June, 1940.	June, 1941.	Increase or Decrease.
	acres.	acres.	acres.
Jarrah ... ..	2,709,622	2,712,228	+ 2,606
Karri ... ..	151,845	151,811	— 34
Jarrah and Karri (mixed) ... ..	407,992	409,978	+ 1,986
Tuart ... ..	5,939	5,943	+ 4
Tingle Tingle ... ..	10,774	10,774	...
Karri and Tingle (mixed) ... ..	13,895	13,895	...
Sandalwood ... ..	1,930	1,930	...
Pine Planting ... ..	6,592	8,172	+ 1,580
Mallet ... ..	58,385	58,316	— 69
Total ... ..	3,366,974	3,373,047	+ 6,073

#### (2) Timber Reserves (*Forests Act, 1918*).

During the year one additional reserve comprising 2,738 acres was declared for the protection of timber in the vicinity of Merredin. Two minor excisions totalling 18 acres were made, and the total area shows an increase of 2,720 acres compared with the previous year.

	June, 1940.	June, 1941.	Increase or Decrease.
	acres.	acres.	acres.
Jarrah ... ..	39,210	39,210	...
Wandoo ... ..	9,669	9,669	...
Pine Planting ... ..	25,951	25,951	...
Sandalwood ... ..	27,105	27,105	...
Mallet ... ..	677	677	...
Mining Timber, Firewood, etc. ... ..	1,670,633	1,673,353	+ 2,720
Total ... ..	1,773,245	1,775,965	+ 2,720

## CHAPTER II.

### REVENUE.

The gross revenue of the Department for the financial year ended June 30th, 1941, amounted to £161,253, compared with £151,770 for the previous year. The increase in revenue is due mainly to added royalty from sandalwood, from sleeper mill production included under logs for sawmilling, and from the increased departmental supply of firewood to the Nos. 1 and 2 Pumping Stations. Some increase in revenue is due to the sale of pine logs from departmental plantations.

Royalty on logs for sawmilling, exclusive of sleeper mills, decreased by £1,000, all being attributed to a decrease in karri royalty.

The increase in inspection fees shown was due partly to inspections of seasoned structural timbers drawn from reserve stocks to meet orders for defence works.

#### *Rebate of royalty on log timber.*

A rebate of eight per cent. was allowed on royalties on log timber during the year 1940-41. The rebate of 25 per cent. on inspection fees on all sawn timber, including sleepers, and on hewn sleepers for export, was continued.

The amounts so rebated were as follows:—

	£
On log timber .. .. .	7,560
On inspection fees .. .. .	2,290
	9,850

Excluding fruit case and sleeper mill intake, royalty on log timber for the year amounted to £99,748, compared with £100,792 for the previous year.

PRINCIPAL SOURCES OF REVENUE FOR PAST TWO YEARS.

Year.	Royalties.		Inspection Fees.	Sandal-wood.	Firewood, Poles and Piles.	Miscellaneous.	Goldfields Revenue.	Total.
	Logs for Sawmilling.	Hewn Timber.						
1939-40* ...	£ 107,051	£ 5,081	£ 5,273	£ 13,703	£ 4,999	£ 4,559	£ 11,104	£ 151,770
1940-41 ...	108,670	5,557	6,145	16,279	8,628	5,690	10,284	161,253

\* These figures differ from those previously published due to a reallocation of Miscellaneous Revenue.

TIMBER PRODUCTION.

PRODUCTION OF TIMBER FOR YEAR ENDED 30TH JUNE, 1941 (EXCLUSIVE OF MINING TIMBER, FIREWOOD, AND PILES AND POLES).

Forest Division No.		MILL LOGS.					HEWN TIMBER.				Grand Totals.	
		Jarrah.	Karri.	Other.	Total.		Jarrah.	Wandoo.	Total.		In Log.	In Square.
					In Log.	Recovery of Sawm Timber.			In Log.	In Square.		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)		
		cub. ft.	cub. ft.	cub. ft.	cub. ft.	cub. ft.	cub. ft.	cub. ft.	cub. ft.	cub. ft.	cub. ft.	cub. ft.
1	Crown Lands	1,451,248	201	3,191	1,454,640	509,108	91,189	....	455,945	91,189	1,910,585	600,297
	Private Property	86,347	....	30,808	117,155	41,004	33,658	....	168,290	33,658	285,445	74,662
2	Crown Lands	40,157	....	63,278	103,435	36,202	11,477	....	57,385	11,477	160,320	47,679
	Private Property	....	....	....	....	....	....	648	3,240	....	3,240	648
3	Crown Lands	4,609,343	....	83,831	4,693,174	1,642,611	42,880	7,666	252,730	50,546	4,945,904	1,693,157
	Private Property	1,013,591	....	155,046	1,168,637	409,023	86,230	5,137	456,835	91,367	1,625,472	500,390
4	Crown Lands	1,806,259	....	122,510	1,928,769	675,069	27,067	2,521	147,940	29,588	2,076,709	704,657
	Private Property	610,782	....	183,087	793,869	277,854	49,223	23,000	361,115	72,223	1,154,984	350,077
5	Crown Lands	3,657,923	549,192	10,284	4,217,399	1,432,154	70,339	785	355,870	71,174	4,573,269	1,503,323
	Private Property	151,596	....	41,824	193,420	67,937	352,096	13,221	1,826,585	365,317	2,020,005	433,014
6	Crown Lands	3,428,396	5,576,988	2,443	9,007,827	2,706,580	91,738	....	458,690	91,738	5,466,517	2,798,318
	Private Property	49,581	210,190	131	259,902	74,151	162,967	1,735	30,060	173,480	1,127,302	247,631
7	Crown Lands	....	....	80,628	115,436	40,403	2,615	21,822	122,185	24,437	237,621	64,840
	Private Property	34,808	....	....	....	....	619	....	3,095	619	1,648,947	576,667
8	Crown Lands	1,359,841	....	286,011	1,645,852	576,048	....	....	....	....	72,102	25,236
	Private Property	71,078	....	1,024	72,102	25,236	....	....	....	....	337,192	81,034
9	Crown Lands	64,240	26,460	14,047	104,747	34,545	26,479	20,010	232,445	46,489	2,991,084	992,085
	Private Property	2,514,806	2,265	109,928	2,626,999	919,268	46,746	26,071	364,085	72,817	2,810,251	982,074
10	Crown Lands	2,684,501	....	115,655	2,800,156	980,055	2,019	....	10,095	2,019	2,810,251	982,074
	Private Property	645,269	....	....	645,269	225,844	25,298	....	126,490	25,298	771,759	251,142
Totals	Crown Lands	19,101,908	6,152,841	701,250	25,955,999	8,592,372	365,592	61,042	2,133,170	426,634	28,089,169	9,019,006
	Private Property	5,177,858	212,455	602,476	5,992,789	2,090,480	758,833	100,412	4,296,225	859,245	10,289,014	2,939,725
Grand Totals		24,279,766	6,365,296	*1,303,726	31,948,788	10,672,852	1,124,425	161,454	6,429,395	1,285,879	38,378,183	11,958,731

Figures in columns (1), (2), (3), (4), (8), and (10) are in the round based on full volume measures. Figures in columns (5), (6), (7), (9), and (11) are the volumes of sawn or hewn timber measured in the square.

\* Comprises 706,908 cubic feet Wandoo; 307,348 cubic feet Sheoak; 128,666 cubic feet Pine; 77,598 cubic feet Blackbutt; 77,312 cubic feet Tuart; 4,959 cubic feet Marri; 935 cubic feet Other.

SAWMILLING AND HEWING.

The total cut of log timber during the past year, exclusive of mining timber, amounted to 38,378,000 cubic feet, from which 11,959,000 cubic feet of sawn and hewn timber were produced, the value of which is estimated at £1,650,000. This production is approximately 4½ per cent. above the figure for the previous year, but still some 15 per cent. below that of the pre-war year, 1937-38. Production which had fallen steadily since 1937-38 has now shown an increase.

The number of mills registered for the year was 140, of which 61 operating on Crown land included the largest mills in the State, and were responsible for the greater part of the output. Seventy-nine mills, mostly sleeper and fruit case mills, cut on private property.

The total intake of jarrah mill logs (24,280,000 cubic feet) was 8.2 per cent. above that logged for the previous year, but the karri intake fell from 6,530,074 cubic feet to 6,365,296 cubic feet. Log intake of wandoo also fell from 1,075,036 cubic feet to 706,908 cubic feet.

Variation in the log intake of the following timbers is also recorded:—

	1939-40.	1940-41.	
	cub. ft.	cub. ft.	
Sheoak ... ..	197,471	307,348	56% increase
Blackbutt ... ..	149,944	77,598	48% decrease
Tuart ... ..	63,086	77,312	22% increase
Pine ... ..	124,153	128,666	3.6% increase

The total mill log intake of 31,948,788 cubic feet is, however, an increase of 1,358,620 cubic feet over that for the past year.

Production of hewn timber also showed an increase (3½ per cent.) on the 1,241,899 cubic feet produced for 1939-40.

The respective quantities of sawn and hewn timber, measured in the square, produced from Crown lands and private property for the past two years are given in the following statement:—

Year.	From Crown Lands.				From Private Property.				Estimated Value of Timber obtained.
	Sawn Timber other than Sleepers.	Sawn Sleepers.	Hewn Sleepers.	Other Hewn Timber.	Sawn Timber other than Sleepers.	Sawn Sleepers.	Hewn Sleepers.	Other Hewn Timber.	
1939-40	cub. ft. 7,437,007	cub. ft. 1,012,055	cub. ft. 408,161	cub. ft. 1,104	cub. ft. 1,273,815	cub. ft. 461,276	cub. ft. 832,634	cub. ft. ....	£ 1,524,000
1940-41	6,827,080	1,765,292	426,634	....	1,512,088	568,392	859,245	....	1,670,000

Sawn timber, other than sleepers, produced from Crown land has decreased, but an increase is registered for production from private property.

Production of sleepers for the year has increased considerably, particularly in the case of sawn sleepers from Crown lands, where the increase registered was 75 per cent. Sawn production from private property increased 23 per cent., but increase in production from Crown land and private property was approximately the same at four per cent.

The most marked increase in sawn sleeper production was that of the trade mills operating on Crown land, where the increase was 95 per cent. Sleeper mills operating on Crown land increased their output by 50 per cent. From private property the respective percentage increases were 36½ per cent. and 21½ per cent.

The number of men employed in the sawmilling industry of the South-West throughout the year averaged 2,946, but skilled men have been increasingly difficult to obtain, and though the numbers have been maintained, this has been at the expense of other rural industries, and to some extent by the transfer of forest workmen to the mills. The number of hewers in the industry averaged 370 for the year.

Owing to war precaution measures, it has not been possible to publish figures relating to the export and import trade in timber.

#### TIMBER INSPECTION.

During the year 3,825,169 cubic feet of sawn and hewn timber were submitted to the Department for inspection, an increase of 20 per cent. on the previous year's figures. This included 3,360,555 cubic feet of sawn and hewn sleepers, and 464,614 cubic feet of sawn timber other than sleepers.

In addition, 2,299 poles and piles, containing 67,716 cubic feet, were also inspected. This is an increase of 54 per cent. on last year's figures.

#### SANDALWOOD.

In the pre-war years the annual export of sandalwood to China amounted to several thousand tons, but as a result of the Sino-Japanese War and present transport difficulties the quantity has been considerably reduced. During the past year only 1,470 tons of wood were pulled in this State, including 292 tons of roots and butts purchased by local distillers for the production of sandalwood oil.

In view of the limited demand it has been necessary to confine the distribution of orders to persons who for many years have engaged in the industry. The price to the pullers for sandalwood of fair average quality has been maintained at £17 per ton. In a few cases the wood supplied was below f.a.q., mainly on account of bad cleaning, and resulted in reductions in price being authorised to cover the cost of further cleaning at Fremantle. After allowing for these reductions the average price paid for sandalwood logs was £16 15s. 0d. per ton.

## OTHER FOREST PRODUCE.

*Firewood and Mining Timber.*

The production of mining timber was 29,452 tons, which is a drop of over 12,000 tons from last year's figures, all of which is reflected in supply to the goldfields. The reason for this is the much reduced amount of development work on the mines as a result of war conditions. The supply of mining timber to the Collie coal mines has remained constant, being only 150 tons below figures for the previous year.

During the past year a total of 358,000 tons of firewood was produced in the goldfields areas, but difficulties of supply, caused directly or indirectly by war circumstances, are not reflected in this figure, which does not differ greatly from previous years.

Firewood supply to mines of the Golden Mile was some 9,000 tons below last year's total, and with consumption remaining the same, the deficiency had to be built up from reserve stocks. The Power Corporation, which is by far the largest individual consumer, received 4,000 tons more wood than during the previous year.

Approximately 75,000 tons of firewood were obtained from Crown lands for supply to the metropolitan area. Difficulties in maintaining supplies to this market, which, including outer metropolitan areas, is estimated to consume over 200,000 tons of industrial and household wood annually, are also attributed to the shortage of labour, and to the restrictions on the use of petrol.

The quantity of firewood consumed at No. 1 and No. 2 Pumping Stations, Mundaring Weir, was 15,226 tons. Firewood for pumping stations Nos. 3 to 8 amounted to 25,254 tons, and was obtained principally from Crown lands and reserves in proximity to the pumping stations, under licenses issued by the Department.

*Piles and Poles.*

Eighteen thousand two hundred and forty poles, of a total length of 437,201 feet, were reported for the year as having been obtained from Crown land and private property. This increase of over 100,000 lineal feet on last year's figures, is accounted for mainly by the demand of the Australian Wheat Board for use in the bulk storage of wheat. Somewhat over half the total production for the year was obtained from Crown lands under licenses issued by the Department. Wandoo is much in demand for this purpose, and, as supplies from accessible private property are nearing depletion, contractors are looking to Crown lands to supply their requirements.

It is expected that an extended use will be made in the near future of preservative treated karri poles for certain purposes, to relieve the position brought about by the increasing difficulty in obtaining poles in jarrah of suitable length.

*Tanning Barks and Extracts.*

The manufacture of tanning extract at the factories of Industrial Extracts, Ltd., at Belmont and Boddington, resulted in the utilisation of 49,885 tons of wandoo timber obtained from Crown land and private property. The increase of 14,312 tons on the output for the previous year is due to the extensions to the Boddington plant.

The quantity of mallet bark stripped from Crown lands and private property was 1,214 tons compared with 2,645 tons for the previous year.

Particulars of minor forest produce obtained during the year are given in the following statement:—

## FOREST PRODUCE NOT ELSEWHERE INCLUDED IN PRODUCTION TABLES; OBTAINED DURING YEAR ENDED 30TH JUNE, 1941, AND REPORTED TO THE DEPARTMENT.

Description of Forest Produce.	SOUTH-WEST DIVISION AND AGRICULTURAL AREAS.										Northern, Central, and Eastern Goldfields.	Total.	
	Forest Division No.												
	1	2	3	4	5	6	7	8	9	10			
Mining Timber* .....	tons	....	....	....	12,182	....	....	....	....	....	....	17,270	29,452 tons
Sleepers for Goldfields	....	....	....	....	....	....	....	....	....	....	....	16,246	16,246 cub. ft.
Wood Lines	cub. ft.	....	....	....	....	....	....	....	....	....	....	63,236	153,281 tons
Firewood	tons	132	21,366	64	616	179	48	5	58,238	8,833	564	294,470	295,507
Mining Firewood	"	....	....	....	....	1,037	....	....	....	....	....	....	1,337
Charcoal	"	....	57	347	....	28	....	....	26	68	41	770	419
Blackboy	"	....	....	....	....	....	....	....	....	419	....	....	....
Piles and Poles*	lin. ft.	1,494	28,488	27,082	14,889	62,902	8,088	7,177	116,777	29,521	39,824	3,426	437,201 lin. ft.
Fencing Posts and Rails	No.	400	3,450	902	946	5,834	216	....	7,001	5,531	2,534	4,025	30,839 No.
Mallet Bark*	tons	....	....	....	....	....	....	1,214	....	....	....	....	1,214 tons
Wattle Bark†	"	....	....	....	....	5	....	....	....	....	....	....	5
Stone	cub. yds.	....	2,911	....	....	....	....	....	3,856	....	....	32,269	39,036 cub. yds.
Wandoo Timber for Tanning Extract*	tons	....	....	....	....	....	....	....	....	....	....	....	49,885 tons

\* From Crown lands and private property. † From private property. (a) Includes 97,533 lin. ft. from private property not allocated to the various Divisions.

NOTE.—Except where otherwise stated, this statement includes only forest produce obtained from Crown lands under permit or license.

## FOREST OFFENCES.

Sixty-two offences were reported to head office during the year, and in eight cases proceedings were taken against the offenders.

Convictions were recorded in all cases, and fines and costs amounting to £24 were imposed.

Warnings were issued in seven cases, and the remainder were dealt with by the collection of royalty, damages, or the confiscation and sale of the timber illegally cut. The amount received by the Department in this way totalled £233.

Sandalwood to the value of £186 was confiscated and sold for breach of the regulations, compassionate payments of £100 being made to the pullers to cover their out-of-pocket expenses.

## CHAPTER III.

## (1)—EXPENDITURE.

The expenditure from Consolidated Revenue Fund, covering cost of general administration of the Forests Act and Regulations, amounted to £29,146 as compared with £28,696 for the previous year.

An amount of £36,470 was expended from General Loan Funds on "A" Class Relief Works and £12,000 from the Federal Aid Roads Grant.

An amount of £15,482 was provided from loan for the employment of "C" class relief workers on the lighter classes of forest work.

An average number of 310 wages employees, inclusive of relief workers, were in employment during the year.

Three-fifths of the net revenue of the Department amounted to £53,230 for the year, and this amount was transferred to the Reforestation Fund, in accordance with the provisions of Section 41 of the Forests Act, 1918.

The following tables set out the position of the Reforestation Fund as at 30th June, 1941:—

	£	s.	d.	£	s.	d.	£	s.	d.
Revenue for Year 1940-41	...	...	...	...	...	...	161,252	12	10
Consolidated Revenue Fund Expenditure	...	...	...	29,146	3	3			
Less Timber Industry Regulation Salaries	...	...	...	712	15	7			
„ Timber Industry Regulation Incidentals	...	...	...	455	5	0			
				1,168	0	7			
				27,978	2	8			
Interest on Loans	...	...	...	41,179	8	1			
Sinking Fund	...	...	...	2,058	19	0			
Special Acts	...	...	...	1,219	12	6			
Audit Fees	...	...	...	100	0	0			
							72,536	2	3
Net Revenue	...	...	...				£88,716	10	7
<i>Reforestation Fund.</i>									
Balance at 30th June, 1940	...	...	...	...	...	...	97,859	10	2
Three-fifths Revenue transferred	...	...	...	53,229	18	1			
Direct Credits	...	...	...	2,869	14	6			
							56,099	12	7
Expenditure for Year 1940-41	...	...	...				153,959	2	9
							57,583	14	4
Balance as as 1st July, 1941	...	...	...				£96,375	8	5
<i>Forests Department Motor Vehicle Depreciation Account.</i>									
By Balance, 30th June, 1940	...	...	...	...	...	...	2,304	19	7
By transfer annual depreciation on vehicles	...	...	...	...	...	...	2,178	14	7
							4,483	14	2
To Purchase of new vehicles	...	...	...	...	...	...	3,005	17	2
By Balance as as 30th June, 1941	...	...	...	...	...	...	£1,477	17	0

*Note.*—Treasury Department Accounts combine the Reforestation Fund and Motor Vehicle Depreciation Account and show a gross balance of £97,853 5s. 5d. as at 30th June, 1941.



## (2) REFORESTATION OPERATIONS.

## (A) FOREST MANAGEMENT.

## SUMMARY OF PERMANENT ESTABLISHMENT AND NEW WORKS CARRIED OUT DURING THE YEAR.

No.	Headquarters.	District.	ROADS.		FIRELINES.		TELEPHONE LINES.		HOUSES.		OFFICES.	STAFF HUTS.	FIRE LOOK-OUTS.		Topo- graphical Survey.
			Cleared, 1940- 1941.	Total miles cleared & main- tained.	Miles cleared, 1940- 1941.	Total miles cleared & main- tained.	Miles erected, 1940- 1941.	Total miles erected.	Built, 1940- 1941.	Total No. built.	Total No. built.	Total No. built.	Erected 1940- 1941.	Total No. erected.	
1	Busselton	Busselton	15	30	15	18	35	12	3	5	3	5	2	2	62
2	Mundaring Weir	Mundaring	38	199	13	205	50	17	1	18	1	18	2	2	62
3	Dwellingup	Dwellingup	15	123	6	300	15	13	2	2	2	2	2	2	126
		Wuraming	5	111	21	333	110	7	1	5	1	5	2	2	126
		Duncans	5	107	6	293	6	1	1	1	1	1	1	1	126
		Huntly	4	101	18	233	7	1	1	1	1	1	1	1	126
4	Collie	Collie	4	119	81	863	8	10	1	2	1	2	2	2	91
		Wellington	6	81	37	372	113	6	1	1	1	1	1	1	91
5	Kirup	Kirup	7	343	19	1,011	7	16	2	8	2	8	3	3	91
		Nannup	9	122	15	255	226	3	2	2	2	2	2	2	91
		Greenbushes	26	467	133	592	308	11	2	2	2	2	1	1	91
6	Manjimup	Manjimup	21	103	31	187	32	8	1	2	1	2	1	1	18
		Pemberton	5	163	6	439	67	11	1	1	1	1	1	1	18
7	Narrogin	Narrogin	5	163	6	439	67	11	1	1	1	1	1	1	18
8	Kelmscott	Carinyah	63	266	5	586	125	6	1	1	1	1	1	1	70
		Gleneagle	1	125	4	422	9	4	1	2	1	2	1	1	70
		Jarrahdale	9	125	4	422	9	4	1	2	1	2	1	1	70
9	Perth	Metropolitan	9	125	4	422	9	4	1	2	1	2	1	1	70
		Albany	3	136	20	273	130	1	2	1	1	1	1	1	74
10	Harvey	Harvey	5	136	20	273	130	1	2	1	1	1	1	1	74
		Willowdale	1	245	45	540	2	10	1	1	1	1	1	1	74
		Tallanalla	1	245	45	540	2	7	1	1	1	1	1	1	74
11	Kalgoorlie	Kalgoorlie	1	245	45	540	2	7	1	1	1	1	1	1	74
		Totals	232	2,967	462	7,329	73	1,173	2	177	25	53	1	27	441

## TOPOGRAPHICAL SURVEY.

Survey work was carried out as required, by the Divisional staffs, using the forester's compass and five chain band for the survey of the more important roads and trafficable firelines, and the prismatic compass and pacing for minor tracks and non-trafficable firelines. This necessitated the running of 441 miles of traverses.

Two new lithographs were compiled and published during the year.

## PERMANENT ESTABLISHMENT.

An extensive programme of forest roads and fireline construction was carried out to further provide for an effective system of arterial roads and subsidiary means of access to all parts of the forest. During the year 232 miles of roads and 462 miles of ploughed or graded firelines were constructed.

The system of forest roads and firelines which traverses and subdivides the forest now includes 2,967 miles of graded forest roads and 7,329 miles of graded or ploughed firelines.

The continuance of this work was greatly facilitated by continued assistance from the Commonwealth in the form of an allocation under the Federal Road Grant.

To improve communication between the Divisional and district offices, lookout towers, and resident staff, the departmental telephone system was extended by the construction of a further 73 miles of line during the year. The system now embraces 1,173 miles of lines and more than 500 telephones.

The policy of the construction of lines from departmental offices and houses to the homes of settlers living in the vicinity of State Forest was continued. These settlers have again shown a willingness to co-operate with the Department in the detection of fires and in general fire control organisation.

In order to overcome the difficulty experienced by the staff at Kalgoorlie in obtaining suitable living accommodation, two new houses with outbuildings were erected.

Some regrouping of employees' houses was carried out during the year, including the removal of two houses from Banksiadale to Yornup, which makes a total of four houses at this settlement.

A house was removed from Clinton to Boddington to provide accommodation for a forester in connection with the supervision of the cutting of Wandoo timber for the extraction of tannins by the plant controlled by Industrial Extracts, Ltd.

A house was moved from Inglehope to Duncans Settlement.

One new hut was erected at Willow Springs for use as an inspection hut and office, and a further hut was erected for accommodation for an assistant forester.

To improve fire detection in the Manjimup Division, a lookout was established by erecting a 20 feet tower with cabin on a tall Karri tree situated at the junction of the Nornalup and Pemberton roads.

## ASSESSMENT SURVEYS.

A small area of about 20 acres was covered by a detailed soil survey in the Ludlow Plantation and approximately 2,450 acres by reconnaissance soil survey in the Mundaring Division.

Other timber assessments were carried out in various Divisions to check tree marking standards and to obtain information required for any future revision of the Jarrah Working Plan.

## (B) SILVICULTURE.

(a) Jarrah.

## SUMMARY OF OPERATIONS FOR THE YEAR AND TOTAL AREA REGENERATED.

Division.		District.	Area regenerated 1940-41.	Total area regenerated at 30th June, 1941.	Thinning, 1940-41.	Coppice Thinning, 1940-41.	Tree-marking.		Top Disposal.
No.	Head-quarters.						Saw-milling.	Hewing.	
			acres.	acres.	acres.	acres.	acres.	acres.	acres.
2	Mundaring Weir	Mundaring ...	48	6,538	233	...	1,188	344	1,404
3	Dwellingup	Dwellingup...	579	40,891	...	1,532	2,176	...	*269
		Wuraming ...	4,213	45,411	...	76	3,073	...	*3,247
		Duncans ...	3,577	42,722	...	1,750	2,691	2,191	*3,255
		Huntly ...	1,417	24,855	...	814	687	...	*1,260
4	Collie ...	Collie ...	1,238	46,893	...	...	4,638	520	7,479
		Wellington ...	...	15,175	...	...	...	...	825
		Muja ...	...	...	...	...	...	...	...
5	Kirup ...	Kirup ...	174	46,588	...	...	2,577	...	3,285
		Nannup ...	...	7,895	...	...	2,144	...	1,548
		Greenbushes ...	...	3,674	...	...	...	...	...
6	Manjimup	Manjimup ...	2,188	12,281	...	...	13,203	...	8,438
		Pemberton ...	...	...	...	...	...	...	...
8	Kelmscott	Carinyah ...	549	19,705	...	193	1,386	...	3,540
		Gleneagle ...	379	41,595	20	874	6,803	...	8,025
		Jarrahdale ...	...	33,714	68	1,355	...	...	...
10	Harvey	Willowdale ...	...	30,034	...	...	7,128	...	4,534
		Tallanalla ...	...	22,331	...	...	965	...	1,995
Totals ...			14,412	440,302	321	6,594	48,659	3,055	49,104

\* These figures include 5,411 acres treated for regeneration simultaneously with "Top Disposal."

During the past year regeneration operations were carried out over an area of 14,412 acres of cut over Jarrah forest.

The total area which has been silviculturally treated for regeneration now amounts to 440,302 acres.

In the Dwellingup Division some 5,411 acres were treated for regeneration simultaneously with top disposal work following falling for the mills.

A first thinning of sapling stands, resulting from previous regeneration treatment, was carried out over 6,594 acres.

The total volume of Jarrah log timber removed from State Forest during the year was within the limits of permissible cut laid down under the Jarrah Working Plan.

(b) Karri.

## SUMMARY OF OPERATIONS FOR THE YEAR AND TOTAL AREA REGENERATED.

Division.		District.	Area regenerated 1940-41.	Total area regenerated at 30th June, 1941.	Thinning, 1940-41.	Tree-marking, Sawmilling.	Top Disposal.
No.	Headquarters.						
			acres.	acres.	acres.	acres.	acres.
1	Busselton ...	Boranup ...	...	2,357	...	...	...
5	Kirup ...	Nannup ...	...	...	...	538	266
6	Manjimup ...	Manjimup ...	1,098	7,206	110	1,188	2,277
		Pemberton ...	749	15,842	...	1,908	1,699
Totals ...			1,847	25,405	110	3,634	4,242

During the year 1,847 acres of cut over Karri forest in the Manjimup Division were treated for natural regeneration.

This area had been recently cut over for sawmilling, and regeneration consisted principally of the disposal by burning of the lops and tops resulting from logging operations. The total of regenerated Karri forest is now 25,405 acres.

Following falling for the mill a further 950 acres in the Pemberton district have been treated for top disposal, the first stage in the work of regeneration treatment. This area will be burnt when the remaining green trees are carrying a sufficiently heavy crop of seed to ensure a complete stocking of seedlings.

In the Manjimup Division 211 miles of roads and firelines were cleared, and 32 miles of telephone lines erected.

(c) *Mallet.*

In the Narrogin Division sowing operations were carried out over an area of 1,568 acres, which is considerably in excess of the area planted in the previous year. The increase is due to the change in technique, providing for more satisfactory distribution of work throughout the year. Certain areas, already felled, were held over for 18 months before the clearing fire was put through in November.

These operations have to date succeeded in converting a total of 14,331 acres of otherwise useless country into established plantations.

For the management and protection of these plantations a further 11 miles of roads and firelines were constructed and the telephone system extended by two miles.

In this Division the total of graded roads and ploughed or graded firelines is now 602 miles, and 67 miles of telephone lines have been erected.

(3)—AFFORESTATION.

AREAS OF CONIFERS PLANTED, 1940, AND TOTAL AREAS ESTABLISHED.

Division.	Plantation.	Area established, 1940.				Total Area established.			
		<i>Pinus radiata.</i>	<i>Pinus pinaster.</i>	Other conifers.	Total.	<i>Pinus radiata.</i>	<i>Pinus pinaster.</i>	Other conifers.	Total.
		acres.	acres.	acres.	acres.	acres.	acres.	acres.	acres.
No. 1— Busselton ... ..	Coolilup ... ..	...	...	1.5	11.5	23.5	733	13	824.5
	Stirling ... ..	...	10	...	4*	112	805.5	8.5	926
	Keenan ... ..	10	24	...	34	583.5	205	12	800.5
	Boranup ... ..	...	...	...	...	39	93	...	132
No. 2— Mundaring Weir	Helena ... ..	...	...	...	...	496.5	210.5	38	745
	Greystones ... ..	...	...	...	...	371.5	174.5	46.5	†592.5
	Beraking ... ..	...	...	...	...	177.5	65.5	91	334
	Mudros ... ..	...	...	...	...	179	129	16	324
	Darkan ... ..	...	...	...	...	108	157	3	268
	Portagabra ... ..	16.5	20.5	...	37	26	54	...	80
No. 4— Collie ... ..	Proprietary ... ..	...	...	...	...	...	362	2	364
	Mungalup ... ..	...	...	...	...	52	12	2.5	66.5
	Bowelling ... ..	...	...	...	...	9.5	28.5	28	66
No. 5— Kirup ... ..	East Kirup ... ..	82	12.5	...	94.5	541	133	4	678
	Nannup ... ..	...	...	...	...	14	31.5	21.5	67
No. 6— Manjimup ... ..	Big Brook ... ..	...	...	...	...	267	2	41	310
No. 9— Metropolitan ... ..	Applecross ... ..	...	76	...	76	...	1,415.5	2	1,417.5
	Gnangara ... ..	...	63.5	...	63.5	...	1,716	7	1,723
	Collier ... ..	...	...	...	...	...	884.5	...	884.5
	Scaddan ... ..	...	...	...	...	...	210	...	210
Albany ... ..	Pardelup ... ..	...	...	...	...	279.5	215	1.5	496
	Albany ... ..	...	...	...	...	1	4.5	9	14.5
No. 10— Harvey ... ..	Myalup ... ..	...	1.5	...	1.5	11.5	813	23.5	848
	Harvey Weir ... ..	5.5	...	...	5.5	459.5	68.5	25	553
	Hamel ... ..	*100.5	*7.5	*10	*118	...	46.5	5	64
Totals ... ..	...	†114	†208	†1.5	†323.5	3,769	8,619.5	400	12,788.5

\* Replanting.

† 26½ acres clear felled.

‡ Excluding replanting.

During the winter months of 1940 pine planting was carried out over an area of 323.5 acres, and the total area of established pine plantations now amounts to 12,788 acres.

Except for small experimental areas, *Pinus radiata* and *Pinus pinaster* were the only species planted.

The total volume of pine logs sold from departmental plantations during the past year amounted to 82,633 cubic feet, the bulk of this timber, 59,867 cubic feet, was produced in the Mundaring Division. The balance was made up from the Harvey Division, where a small case mill took 21,738 cubic feet, and from the Busselton Division, which produced 1,028 cubic feet.

In addition, 46,033 cubic feet of pine logs were obtained from private property in the Denmark, Metropolitan, Dwellingup and Collie Divisions.

#### (4)—FIRE CONTROL.

##### *The Fire Season.*

The fire season extended from 2nd November to 21st April for the Jarrah and Karri forest region, during which period extreme hazards rated as severe summer and dangerous summer were recorded on nine days by Dwellingup for the Jarrah region (compared with 18 days for last fire season), and on three days by the Manjimup station for that region (compared with four days for the previous season).

Relative humidities were below 20 per cent. for ten days (15 in previous season) in the Jarrah forest region, five of these in January being on consecutive days. The season was not a severe one, but important features tending to severity of hazard were the extreme dryness of the large litter (logs, branches, etc.) in early summer, following upon the previous dry winter, and the long dry spell, December 17th to February 20th, with only two points of rain.

Rainfall generally was light, 197 points (192 in previous season) having been registered at Dwellingup from 1st December to 31st March. At Manjimup the total of 846 points, November to April inclusive, was above the average (758 points) for the 15 seasons to date, though the months of January and February were drier than usual.

The season was remarkable for the number of dry thunderstorms, which were responsible for the largest number of lightning-caused fires on record.

A good spring burning season was experienced generally as a result of the previous mild winter, and many Divisions had the bulk of their burning programme completed in this period. The autumn, 1941, burning season, however, was somewhat curtailed, due to the early and recurring intermittent rains.

##### *The Protected Area.*

Division.	Zone A. acres.	Zone B. acres.	Zone C. acres.
Busselton	8,400	3,000	....
Mundaring	21,000	16,000	200,000
Dwellingup	260,000	60,000	20,000
Collie	85,000	132,000	300,000
Kirup	172,000	181,000	112,000
Manjimup	88,200	372,000	52,000
Narrogin	15,000	60,000	....
Kelmscott	299,000	91,000	101,000
Metropolitan	6,000	....	....
Harvey	104,000	109,000	67,000
Denmark	7,800	....	....
Totals	1,066,400	1,024,000	852,000

The increase in Zone A (146,000 acres) is accounted for by additions in the Dwellingup, Kirup, Manjimup and Kelmscott Divisions, and a net increase in the B Zone (85,000 acres) is due to additions in the Kirup and Manjimup Divisions, with a decrease in the Kelmscott Division. The C Zone in the Manjimup Division will be increased beyond the figure given in the table by much country east of the Warren and Perup rivers.

##### *Fire Losses.*

Two hundred and five fires were attended in Zone A, 73 of which burnt over managed forest, and the area of managed forest in this zone suffering damage in varying degree was 4,074 acres, an increase of 1,548 acres over the area burnt last year. One fire lit by travellers in March in very severe weather conditions was responsible for nearly half this acreage burnt.

The following table shows the distribution of fires in managed forest in acre classes burnt:—

Area Burnt.	No. of Fires.	Percentage of Total Fires.
Less than 1 acre	34	48
1— 5 acres	8	9
6— 10 "	2	3
11— 20 "	7	10
21— 50 "	9	12
51—100 "	7	10
101—200 "	3	4
Over 200 "	3	4
	73	100

In addition 1,042 acres of unmanaged forest, firebreaks, flats, etc., were burnt by uncontrolled fires in the A Zone.

The actual losses amounted to 289 acres of seedlings or regrowth below 10 feet, and 1,213 acres of saplings over 10 feet, which were burnt back and received some damage to the crowns. The balance of the area burned sustained negligible damage.

Large areas were burnt in Zones B and C and have provided valuable protective burns. Fires in these areas are not attended to immediately, but are suppressed where they threaten managed forest, or where it is necessary to minimise smoke haze to ensure good visibility from the lookouts.

Four hundred and forty fires were attended in all zones, which is 54 above the number for last season. Except for the one large fire carelessly lit in bad weather conditions, in particularly vulnerable country at Samson's Brook, the area of managed forest burnt over was not proportionately increased. The total area burnt in the A Zone was .5 per cent. of the total area under protection in that zone.

One hundred and thirty-six fires were attended in the B. Zone and burnt over an area of 18,000 + acres, and in the C Zone 99 fires were attended with a burnt over area of 54,000 + acres.

#### Causes of Fire.

Still in the lead as the cause of the highest number of fires are bush locomotives. The area burnt by them, however, is correspondingly small, due to the periodic controlled burning by the Department of the firebreaks adjacent to the lines.

Fires caused by bush workers and by escapes from controlled burning are less in number, and those due to escape from private property also show a slight decrease.

Fires due to hunters, travellers, and those classed as deliberately lit are more than for the previous season. Lightning-caused fires (26) are a considerable increase over last season's figure of three, and resulted from the many dry thunderstorms experienced.

Causes of fires are listed as occurring in the different zones. Zone A fires have been further subdivided to show:—

X those occurring on managed forest;

Y those occurring on unmanaged forest;  
within the zone.

	No. of Fires.				
	A.		B.	C.	Total.
	X.	Y.			
W.A.G.R. locos.	...	9	7	23	39
Bush locos.	5	36	26	7	74
Bush workers	6	14	4	1	25
Navvies	1	4	1	2	8
Mill employees	1	...	...	...	1
Sawdust heap escapes	...	1	3	1	5
Mine employees	1	2	5	1	9
Controlled burn escapes	7	2	1	...	10
Escapes from previous fires	4	6	3	4	17
Departmental employees	1	...	7	...	8
Other Government employees	...	1	...	1	2
Hunters and fishers	5	2	17	13	37
Travellers	7	12	14	6	39
Private property escapes	2	15	26	14	57
Deliberately lit	4	17	7	3	31
Children	3	1	1	2	7
Lightning	22	2	2	...	26
Miscellaneous	1	...	1	2	4
Unknown	3	8	11	19	41
Causes unstated	...	...	...	...	...
	73	132	136	99	440

*Prevention Measures.*

Controlled burning:—Costs of this work are given in the following table:—

	£
Busselton .. .. .	147
Mundaring Weir .. .. .	257
Dwellingup .. .. .	1,353
Collie .. .. .	488
Kirup .. .. .	1,007
Manjimup .. .. .	962
Narrogin .. .. .	147
Kelmscott .. .. .	653
Metropolitan .. .. .	130
Harvey .. .. .	551
Denmark .. .. .	5
	£5,700

Extensive controlled burning of firebreak belts, flats, and dangerous hazards and protective burning of virgin forest was undertaken during the year, during autumn and spring. Settlers adjoining State Forest and young men resident in the various forest districts were picked up occasionally to assist in this work, when the most was to be made of suitable burning weather. Such men were thereby given instruction in fire-fighting methods, and would thus become a more valuable source of manpower in an emergency. Under war conditions, however, it has become impossible to rely on having these men available, due to their enlistment and migration to other centres. To a lesser extent the same applies to our own trained employees.

The work of extending the road and fireline system has been continued to provide access and lines from which to carry out controlled burning, and also of defence in fire fighting. There are now throughout the forest belt 2,967 miles of forest roads and 7,329 miles of fireline, an increase of 694 miles during the year.

The burning of tops from trees felled in the course of sawmilling and hewing operations has been carried out over 50,189 acres of jarrah and 4,555 acres of karri forest during the past year.

The length of telephone line in service is now 1,173 miles, an increase of 73 miles for the year.

*Suppression Measures.*

In some divisions the headquarters fire gang was equipped with a heavier, 20 cwt., truck. These trucks were a great improvement on the previous lighter models and enabled a greater fire load in equipment and men to be transported to a fire with speed and greater comfort.

Methods of suppression were essentially the same as in past years, reliance being placed on knapsack sprays and rakes for direct attack. In some instances, especially in ringbarked country, counter-firing from established tracks or those made by raking, was found necessary.

The cost of fire fighting and patrol in each division was as follows:—

	£
Busselton .. .. .	22
Mundaring .. .. .	29
Dwellingup .. .. .	256
Collie .. .. .	364
Kirup .. .. .	230
Manjimup .. .. .	301
Narrogin .. .. .	78
Kelmscott .. .. .	165
Metropolitan .. .. .	43
Harvey .. .. .	485
Denmark .. .. .	13
	£1,986

Practically the whole of the jarrah, karri and mallet areas are now under observation from lookouts connected by telephones to divisional and district headquarters. There are 27 of such lookouts now in use.

One additional fire lookout (Diamond Tree) was constructed in the Manjimup division, by the erection of a 20 feet braced tower in the lopped crown of a tall karri tree.

**(5)—RESEARCH AND INVESTIGATION.***(a) Management and Silviculture.*

The fire weather research stations at Dwellingup in the jarrah forest, and at Pemberton in the karri forest region, have continued to record weather observations throughout the fire season.

Forecasts by the Divisional Meteorologist and transmitted over the national broadcasting stations were continued throughout the fire season.

Wood cylinders still continued to be the most satisfactory means of estimating the current fire hazard.

The standard terms and empirical scale adopted are:—

Nil	.. .. .	Under 1
Low	.. .. .	1 to 4
Moderate	.. .. .	4+ to 6
Average Summer	.. .. .	6+ to 7
High Summer	.. .. .	7+ to 8
Severe Summer	.. .. .	8+ to 9
Dangerous Summer	.. .. .	9+

The field officers in each division are required to submit each morning their personal estimate of the maximum degree of danger for the previous day, based on the above empirical scale 0 — 10. This serves to train all members of the field staff in a proper appreciation of the importance of variations of fire weather conditions, and the necessity for the alteration in organisation required for different degrees of fire danger. Use is made of these figures by the Research Station as a check on the fire weather standards arrived at by meteorological means.

Current fire hazard at divisional offices not provided with wood cylinders is obtained by a method using the 8 a.m. wood cylinder moisture content as transmitted by phone from the Research Station, together with local readings for temperature and relative humidity taken at any time of the day.

The following table sets out the number of days of the various degrees of hazard for past summers, as recorded at Dwellingup and Manjimup, and commencing 1940-41 for Pemberton:—

DISTRIBUTION OF FIRE HAZARD.

Station.	Fire Season.	Nil.	Low.	Moderate.	Average Summer.	High Summer.	Severe.	Dangerous.	Average Hazard.	No. of Days.	Days above Moderate as % of total.
Dwellingup...	1934-35	5	26	47	20	...	6	9	5.07	113	%
Do. ...	1935-36	2	20	43	40	...	18	4	5.95	127	31.0
Do. ...	1936-37	2	11	40	47	...	29	7	6.45	136	48.8
Do. ...	1937-38	10	15	35	33	33	12	2	5.87	140	61.0
Do. ...	1938-39	5	8	51	36	29	8	1	6.06	138	57.2
Do. ...	1939-40	6	9	46	42	27	13	5	6.01	148	53.6
Do. ...	1940-41	12	24	38	31	44	7	2	5.70	158	58.9
Manjimup ...	1937-38	8	29	41	22	9	3	...	4.68	112	53.2
Do. ...	1938-39	12	23	36	12	6	1	...	4.30	90	30.3
Do. ...	1939-40	7	25	55	19	7	4	...	4.90	117	20.0
Pemberton ...	1940-41	7	22	49	11	6	1	...	4.55	96	25.7

Weather data from the Dwellingup Forest Station were investigated to find the degree of accuracy with which fire hazard could be estimated from the various weather elements. Using temperature, relative humidity and evaporation, it was found that early morning moisture content of the wood cylinder had to be brought in to reduce the variation. The results were published in a report during the year. Multiple Regression methods with statistical tests were used. As interpolation is difficult with more than two variables, tables were not practicable and fire hazard has to be estimated from the equation. To simplify this work a line chart was constructed.

Soil surveys in the hills region were confined to an examination of areas proposed for the establishment of *Pinus radiata* and *Pinus pinaster* at Mundaring Weir. On the coastal sandplain surveys were continued at Ludlow, Applecross and Gnangara, where the plantations of *Pinus pinaster* are being extended.

Analytical investigation of 258 samples collected from these areas has been carried out by arrangement with the Government Analyst and Mineralogist.

A soil survey of the Myalup plantation was the subject of a published report. The plantation lies on the coast of Western Australia 4.5 miles from the ocean, and 80 miles from Perth. The area consists essentially of a series of more or less regular ridges up to 150 feet in height and separated by narrow depressions or valleys frequently occupied by swamps and semi-swamps. The soils are sands and the contour of the country suggests aeolian formation. Three main groups of soils were distinguished. Analytical data of Nitrogen, Phosphorus, Potash and Calcium were included.

A report was published on a study of girth in relation to height in the virgin Jarrah forest. It was found that a linear relationship obtained in the small girth classes followed by a deceleration of height increment producing a curve of the familiar type until final height of the codominant members of the stand was reached. Beyond this no appreciable increase in height is made although girth increment is continued. The final height is exceeded by odd trees which have been termed dominants.

In the study of the thinning requirements of second growth Jarrah, repeat measurements have been made of the early experiments, laid down in 1935 which still show no response to reduction in the number of shoots per stump. Further experiments to determine the effect of similar treatment at a later age of coppice growth have been set down during the year.

The results of a study of stem distribution in the virgin Jarrah forest were published. Three types as representative of the range of Jarrah forest types were selected in the Harvey Division. The curve representing the stem distribution is of a complex type and could not be resolved into a straight line either by using logarithmic values for either variable or for both. The graph of crown areas against girth classes was, however, a curve of the normal type. By using then, for the Jarrah stands, the calculated crown area of a girth class as the frequency of the class such a curve was fitted. The calculated values for crown area occupied were then converted to give calculated stem distribution.

In pine planting the lead given by agriculture in the use of superphosphate has been followed up and yielded good results. One of the trace elements, zinc, has been found to give remarkable responses. While experimental work must always be continued to determine the optimum treatment under any given set of conditions, a practical stage has been reached in the new treatment of plantations of pines in Western Australia. On the coastal sands at Gnangara, near Perth, nearly 2,000 acres are now growing with superphosphate on soils which are incapable otherwise of supporting growth of the pine. Zinc, sprayed on the tree in the form of zinc sulphate in  $1\frac{1}{4}$  and  $2\frac{1}{2}$  per cent. solutions, has corrected disorders in the young stages of *Pinus radiata* and *Pinus pinaster*, and restored these pines to vigorous normal development on some soil types.

In the field of pine establishment experimentation factors affecting the successful transplanting of the nursery stock into the field have been further investigated.

The deterioration of the black sand pine nurseries has caused considerable inconvenience. The nutritional disorders appearing may not be unconnected with depletion of the organic content with the working associated with the raising of the planting stock. With this possibility in view, various composts have been tried, in addition to a number of fertiliser mixtures.

Some notes on the results of germination trials in Western Australia with *Acacia pycnantha* and *Acacia acuminata* seed were published in a report. Speaking generally the reaction of the two species to treatment was the same. Boiling in water accelerates germination considerably, but is detrimental after a period of five seconds. Soaking in water was of no importance with either species. Storage for considerable periods after treatment is not harmful, and for any extensive sowing programme, therefore, the seed can be treated in advance and sown dry as required.

Studies of the growth and development of *Pinus pinaster* in Western Australia have revealed that there are certain marked differences of growth and form between various stands which may not be attributed to soil change. A report embodying some notes on the varieties and geographical races of *Pinus pinaster* established in Western Australia was published during the year. Careful records have been kept of the firms supplying the seed used in this State, but only in rare instances was the source of supply known. The four types recognised as established here are Landes, Portuguese, Corsican and Esterel.

In continuation of an arrangement made, the Statistical Branch of the Forests Department has carried out the statistical reduction of experimental data for the Department of Agriculture.

#### (b) *Utilisation.*

With increasing attention to producer gas as a substitute fuel, particularly since the introduction of more severe petrol rationing, the question of ensuring adequate charcoal supplies has caused grave concern, and the position is by no means well in hand. To ensure adequate supplies for Government requirements, and with a view to developing the technique of burning, cracking and grading, a programme of departmental production was inaugurated in June, 1940. A scale of production of 1,000 tons per annum was aimed at, and this was reached by October, but difficulty was experienced in disposing of surplus production on the open market at a price to cover cost, and, with rapidly mounting stocks, production was curtailed from December onwards. An extremely rapid increase in demand took place in May and June, 1941, accumulated stocks being rapidly cleared out. Steps since taken to again increase production have not been successful in meeting the demand.

In June, 1941, the State Government was invited by the Federal Government to accept full responsibility for ensuring adequate supplies of charcoal of good quality on a State-wide basis.

A serious difficulty in planning supplies is found in estimating probable future requirements, this depending entirely on the number of producer gas units installed, which again depends on the availability of petrol supplies. The Departmental estimate of consumption within the State at June, 1941, is at the rate of 12,000-15,000 tons per annum, and this is expected to rise to about 37,000 tons by June, 1942. At a recent conference convened by the Department of Supply and Development, a programme calling for 84,000 tons by June, 1942, was outlined.

Departmental proposals only aim at production of about 3,000 tons per annum, or less than 10 per cent. of estimated requirements, so that production by private enterprise must be stepped up very greatly if estimated demands even on the more moderate scale are to be met.

Private enterprise is being encouraged by endeavouring to stabilise prices at a reasonable figure, and by technical advice on production methods. In addition, in co-operation with the Department of Industries, proposals by a private concern for production of charcoal briquettes from sawdust have been investigated, and recommendations made for financial assistance in getting to the production stage.

Considerable progress can be anticipated in the next twelve months, development of new production methods being expected with an assured market.



## (6) ARBORICULTURE.

During the season ended 31st August, 1940, 38,871 trees were distributed from the Department's nursery at Hamel, which is a considerable drop from the figure of 194,290 for the previous year.

Of the total 33,151 were sold, 285 were supplied free to public bodies and charitable institutions, and 5,405 to other departmental centres. Though all figures show a drop, by far the greatest, and that accounting for most of the disparity in the two years' distribution figures, is the supply to other departmental centres, which was 153,677 for year ending August, 1939.

The decline in sales was spread fairly evenly over all varieties. *Eucalyptus cladocalyx* (Sugar Gum), 6,553 plants, was again in most demand, and others of the same genus in order of popularity were:—

*Eucalyptus maculata* (Spotted Gum).  
*Eucalyptus citriodora* (Lemon Scented Gum).  
*Eucalyptus ficifolia* (Red Flowering Gum).  
*Eucalyptus Lehmanni* (Bald Island Marlock).  
*Eucalyptus gomphocephala* (Tuart).

Other trees maintaining their popularity were:—

*Pinus radiata* (Monterey Pine).  
*Pinus pinaster* (Maritime Pine).  
*Tristania conferta* (Brush Box).  
*Leptospermum laevigatum* (Victorian Ti-tree).  
*Schinus molle* (Pepper Tree).  
*Agonis flexuosa* (Native Peppermint).  
*Jacaranda mimosifolia* (Jacaranda).  
*Melia azedarach* (White Cedar).

In less demand but still popular were:—

*Eucalyptus rudis* (Flooded Gum).  
*Araucaria excelsa* (Norfolk Island Pine).  
*Callitris robusta* (Native Pine).  
*Sterculia diversifolia* (Kurrajong)

## CHAPTER IV.

## (1) LEGISLATION.

*Forest Regulations.*

Two minor amendments to the Forest Regulations were gazetted during the year. One dealt with the brands in use by the Department in connection with timber inspection, and the other related to timber for settlers' requirements.

## (2) ADMINISTRATION.

The following changes in staff took place during the year:—

*(a) Professional Division.*

Mr. S. L. Kessell, Conservator of Forests, left Perth on the 8th of May, 1941, on being seconded to the Commonwealth Department of Munitions, for the duration of the war, as Timber Controller, with headquarters in Melbourne.

Mr. A. D. Helms, Research Officer, resigned on the 12th of September, 1940, on being appointed Research Officer, Hobart, Tasmania, under the Commonwealth Department of the Interior.

Mr. C. D. Hamilton commenced duty as a probationer on the 14th of October, 1940, after completion of the Diploma Course of the Australian Forestry School, Canberra.

Mr. J. H. Harding was appointed Assistant Biometrician on the 1st of October, 1940. On the 14th of May, 1941, he rejoined the Navy.

Mr. J. H. Jones was appointed Chief Draftsman on the transfer of Mr. P. Stanley to a similar position in the Lands Department.

*(b) General Division.*

Three "C" Grade Assistant Foresters were promoted to "C" Grade Foresters. One "B" Grade and one "C" Grade Foresters and one "D" Grade Assistant Forester resigned.

Six "D" Grade Assistant Foresters and two Forest Assistants were appointed.

*(c) Clerical Division.*

Two officers of the Records Branch were granted leave of absence on enlistment with the R.A.A.F.

The calling up of several officers for military training for Home Defence caused a certain amount of inconvenience.

In conclusion, I wish to record my appreciation of the loyalty and keen interest of all ranks of the service in the work and progress of the Department.

Perth, 22nd September, 1941.

T. N. STOATE,  
 Deputy Conservator of Forests.

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## APPENDIX 1a.

## CONSOLIDATED REVENUE FUND.

General Statement of Revenue and Expenditure for Year ended 30th June, 1941.

Dr.				Cr.			
				£	s. d.	£	s. d.
To Log Royalties ... ..		99,748	7 9	By Salaries ... ..	23,801	2 8	
„ Hewn Timber Royalties ... ..		5,556	19 11	„ Add Cash Orders outstanding			
„ Sleeper Mill Royalties ... ..		8,635	5 2	30th June, 1940 ... ..	36	12 3	
„ Sandalwood Royalties ... ..		16,279	5 11				
„ Miscellaneous Royalties ... ..		9,459	13 5		23,837	14 11	
„ Goldfields Revenue ... ..		10,284	7 5	„ Less Cash Orders outstanding			
„ Rents ... ..		1,115	5 1	30th June, 1941 ... ..	10	11 9	
„ Inspection Fees ... ..		6,145	5 3				23,827 3 2
„ Sales ... ..		3,105	13 11	„ Contingencies ... ..			3,884 5 9
„ Miscellaneous Revenue ... ..		922	9 0	„ Timber Industry Regulations ... ..			455 5 0
				„ Pine Conversion Costs ... ..			979 9 4
				Total C.R.F. Expenditure ... ..			29,146 3 3
				„ Excess Revenue over Expend- iture ... ..			132,106 9 7
							£161,252 12 10
							£161,252 12 10

## APPENDIX 1b.

Statement of Afforestation and Reforestation Expenditure for Year ended 30th June, 1941.

Dr.				Cr.			
				£	s. d.	£	s. d.
To Division No. 1 ... ..		3,738	16 10	By Reforestation Fund ... ..	57,583	14 4	
„ Division No. 2 ... ..		3,802	9 7	„ Add Cash Orders not cleared,			
„ Division No. 3 ... ..		12,383	1 6	30th June, 1941 ... ..	20	19 0	
„ Division No. 4 ... ..		8,888	16 6				57,604 13 4
„ Division No. 5 ... ..		12,662	19 0	„ General Loan Fund ... ..	36,470	6 2	
„ Division No. 6 ... ..		20,710	7 2	„ Add Cash Orders not cleared,			
„ Division No. 7 ... ..		7,240	4 3	30th June, 1941 ... ..	107	16 7	
„ Division No. 8 ... ..		10,808	1 5				36,578 2 9
„ Division No. 9 ... ..		4,271	10 11	„ Less Transfers, Administration			
„ Division No. 10 ... ..		8,699	4 5	Costs ... ..	198	1 11	
Total, Divisional Expenditure ... ..		£93,205	11 7				36,380 0 10
„ Training of Staff ... ..	151	12 3		„ Federal Aid Roads Grant ... ..			12,000 0 0
„ Research and Investigation	2,650	16 0		„ Motor Vehicle Depreciation Account ... ..			3,005 17 2
„ Preparation of Working Plans and Topographical Surveys ... ..	1,599	0 5		„ Pine Conversion Costs ... ..			976 12 4
„ Salaries and Allowances ... ..	5,111	14 4					
„ General Equipment and In- cidentals ... ..	1,689	19 8					
„ General Silviculture, Arbori- culture and Forest Manage- ment ... ..	373	17 8					
„ Depreciation of Motor Ve- hicles ... ..	2,178	14 7					
„ Purchase of Motor Vehicles	3,005	17 2					
			16,761 12 1				
			£109,967 3 8				£109,967 3 8

