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WESTERN AUSTRALIA.

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# REPORT

on the operations of

# The Forests Department

for the

YEAR ENDED 30th JUNE, 1940

by

S. L. KESSELL,  
CONSERVATOR OF FORESTS.

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## CONTENTS.

	Page
CHAPTER I.—THE FOREST AREA ... ..	4
CHAPTER II.—REVENUE ... ..	5
TIMBER PRODUCTION ... ..	5
SAWMILLING AND HEWING ... ..	6
TIMBER INSPECTION ... ..	6
SANDALWOOD ... ..	6
OTHER FOREST PRODUCE ... ..	7
FOREST OFFENCES ... ..	8
CHAPTER III.—(1) EXPENDITURE ... ..	8
(2) REFORESTATION OPERATIONS ... ..	9
(A) Forest Management ... ..	9
(B) Silviculture ... ..	10
(3) AFFORESTATION ... ..	11
(4) FIRE CONTROL ... ..	11
(5) RESEARCH AND INVESTIGATION ... ..	15
(6) ARBORICULTURE ... ..	16
CHAPTER IV.—(1) LEGISLATION ... ..	16
(2) ADMINISTRATION ... ..	16
LIST OF APPENDICES ... ..	17

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

Jarrah (*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 <del>Huntly</del> Wuraming Duncan's
IV.	Collie ... ..	Collie <del>Muja</del> Wellington
V.	Kirup ... ..	Kirup <del>Kulikup</del> Greenbushes Nannup
VI.	Manjimup ... ..	Manjimup Pemberton
VII.	Narrogin ... ..	Narrogin Dryandra
VIII.	Kelmscott ... ..	Kelmscott Jarrahdale Gleneagle Carinyah
IX.	Perth ... ..	Metropolitan Denmark
X.	Harvey ... ..	Harvey Willowdale Tallanalla

# Annual Report on the Operations of the Forests Department for the Year ended 30th June, 1940.

## INTRODUCTORY REMARKS.

War conditions have given rise to many new problems in the timber industry but to date production has not been seriously affected. Under War Time Security Regulations the publication of figures relating to exports and imports are prohibited and in consequence certain sections of the report and tables usually published as appendices are omitted.

The present position of the industry is that overseas and interstate orders in hand are satisfactory and as a result of co-operation by the British Ministry of Shipping and Shipping Control Boards established by the Commonwealth Government, deliveries during recent months have not been unduly delayed.

The falling off in local trade due to decreased activity in the building industry has been offset to a large extent by the considerable quantity of timber required for army hutments and other defence works. Reductions in softwood imports have not seriously affected this State which uses local hardwood for many purposes for which softwoods are considered essential in other parts of the Commonwealth, and difficulties in securing even limited softwood supplies is resulting in a still wider use of local timbers. It is anticipated that the experiences of 1914-1918 in this regard will be repeated and that after the war our timbers will retain the new markets now being gained.

For some years past the Eastern States of the Commonwealth have been purchasing Jarrah and Karri in increasing quantities. As stocks of softwood are exhausted it is expected that this trade will increase considerably and Western Australia as the only State with a considerable surplus of timber available for export will play an important part in the war-time production of this essential commodity. Close contact is being maintained with the Commonwealth Department of Supply and Development which has recently established a special branch to deal with problems of war-time timber supplies on a nation-wide basis.

Total production for the twelve months under review, exclusive of mining timber supplies obtained from forests in proximity to the various mining fields, was valued at £1,524,000, which was 8 per cent. below the value of production for the previous year. Further progress has been made in the reorganisation of the sawmilling industry in accordance with the provisions of Working Plans approved in 1928 and extended in 1938. With the exhaustion of supplies of mature log timber in certain districts where the number of mills operating prior to the establishment of Working Plan control was in excess of the capacity of the forest, it has been necessary for several mills to close down and production to the full extent of the permissible annual cut is being maintained by the erection of additional plants in virgin forest further south.

Reforestation activities have been continued on practically the same scale as the previous year, and all forest of good quality logged over during the year and in a satisfactory condition for treatment has been regenerated. Other areas with less advance growth are being fire protected pending the occurrence of good seed years when they will receive silvicultural treatment. Regeneration work was carried out on 17,035 acres of Jarrah forest during the year, bringing the total area regenerated to 425,890 acres. The area of Karri treated for natural regeneration was 1,908 acres, bringing the total for this species to 23,558 acres. Eight hundred and ninety acres of Mallet were sown, increasing the total area of Mallet plantations to 12,763 acres. The older stands of this species, established by sowing from 1927 onwards, are showing excellent development and the first thinning associated with bark stripping will be undertaken during the next two or three years when these forests will become a regular source of considerable revenue.

During the winter of 1939 a further 215 acres of *Pinus radiata* and 574 acres of *Pinus pinaster* were planted, bringing the total area planted with pines to 12,494 acres. Two small mills are utilising thinnings from the oldest of these plantations and last year cut 63,994 cubic feet of softwood timber. Numerous inquiries have been received during recent months for pine logs and it is unfortunate that the Department's plantations are not old enough to take advantage of this war-time demand which provides an exceptional opportunity to dispose of small dimension logs.

The past fire season was long drawn out and summer rainfall considerably below the average. The area of managed forest burnt, although not serious, was greater than in previous years and several compartments planted with pines were destroyed by fire. This latter loss was due to a string of incendiary fires set in difficult country in the middle of a hot summer day and very good work was done by employees of the Department and neighbouring farmers in bringing the fires under control within three hours. Severe damage to young regrowth on regenerated forest was limited to a few hundred acres and in one Division where a number of outbreaks occurred more or less simultaneously on a day of severe hazard the fire control organisation of the Department proved its efficiency and was greatly heartened by the ready response of sawmill companies and their employees to requests for assistance to cope with emergency conditions. An outstanding feature of fire control work in the forests of the South-West during the past few years has been the increasing support received from mill and bush workers and members of the farming community. Many of these have

been organised as subsidiary fire suppression gangs, given some training and provided with equipment. Other units of a similar nature are being organised under the aegis of Road Boards following the appointment by the Minister for Lands of a Rural Fire Prevention Advisory Committee with a full-time officer to advise and assist local authorities in country districts in the formation and training of Bush Fire Brigades. Although still in early stages of formation and training and in most cases deficient in satisfactory equipment, these volunteer organisations have demonstrated already their value in reducing losses from annually recurring summer fires and it is hoped that as the scheme develops increasing attention will be paid by Bush Fire Brigades in all districts to preventive measures, including spring and autumn burning of bad hazards and encouragement of fire-break ploughing, and a better observance generally of the provisions of the Bush Fires Act.

Owing to necessity for releasing as many officers as possible for military service, particularly men with previous army training, research activities in connection with silvicultural and fire control problems have been limited to projects which can be handled by the administrative staff. Despite such limitations a considerable amount of valuable work has been accomplished in connection particularly with silvicultural and growth studies of Jarrah and nutrition and establishment problems of pines.

On the utilisation side attention has been given to many routine investigations arising out of trade inquiries and in consultation with the Department of Industry a detailed examination has been made of a proposal having as its object the local manufacture of transparent paper. More recently work has been commenced on methods of burning, cracking and grading charcoal. Production of charcoal on a commercial scale has been undertaken at Dwellingup, using earth kilns and various types of retorts and a cracking and grading plant has been designed and installed. It is proposed, as soon as this work is sufficiently advanced, to issue a bulletin describing burning and grading methods best suited to the production of charcoal from local hardwoods for use in producer gas units fitted to tractors and motor vehicles.

One hundred and seventy-nine inspections were made of the 138 sawmilling plants registered under the Timber Industry Regulation Act. Five hundred and seventy-six notifiable accidents were investigated. One accident was fatal and in the remainder the average period of incapacity was 24 days. Despite ready co-operation by sawmilling companies in giving effect to all safeguards required by the regulations the number of accidents per 100 persons employed rose from 18 in the previous year to 19.9 last year.

## CHAPTER I.

### THE FOREST AREA.

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

No new State Forests were dedicated during the year but several minor additions were made to existing State Forests and 1703 acres were excised with the approval of Parliament and reverted to the Lands Department for settlement. The total area of State Forests shows a decrease of 283 acres compared with the previous year.

	June, 1939.	June, 1940.	Increase or Decrease.
	acres.	acres.	acres.
Jarrah ... ..	2,710,562	2,709,622	— 940
Karri ... ..	151,763	151,845	+ 82
Jarrah and Karri (mixed) ... ..	407,577	407,992	+ 415
Tuart ... ..	5,939	5,939	...
Tingle Tingle ... ..	10,774	10,774	...
Karri and Tingle (mixed) ... ..	13,895	13,895	...
Sandalwood ... ..	1,930	1,930	...
Pine Planting ... ..	6,592	6,592	...
Mallet ... ..	58,225	58,385	+ 160
<b>Total ... ..</b>	<b>3,367,257</b>	<b>3,366,974</b>	<b>— 283</b>

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

During the year one additional reserve comprising 142 acres was declared. Reserves of Jarrah timber were amended by the excision of 388 acres of land which was dedicated as State Forest. Other minor excisions were made and the total area shows a net decrease of 295 acres.

	June, 1939.	June, 1940.	Increase or Decrease.
	acres.	acres.	acres.
Jarrah ... ..	39,596	39,210	— 386
Wandoo ... ..	9,669	9,669	...
Sandalwood ... ..	27,105	27,105	...
Pine Planting ... ..	25,951	25,951	...
Mallet ... ..	677	677	...
Mining Timber, Firewood, etc. ... ..	1,670,542	1,670,633	+ 91
<b>Total ... ..</b>	<b>1,773,540</b>	<b>1,773,245</b>	<b>— 295</b>

## CHAPTER II.

## REVENUE.

The gross revenue of the Department for the financial year ended 30th June, 1940, amounted to £151,770, compared with £145,724 for the previous year. The increase was due to additional revenue from Sandalwood, which amounted to £13,703 compared with £1,813 for the previous years. Owing to increased tension in the international situation in the Far East, it is not anticipated that this improvement will be maintained during the coming year.

*Rebate of Royalty on Log Timber.*

The rebate on royalties payable on log timber was continued at the rate of 12 per cent. 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 .. .. .	11,163
On inspection fees .. .. .	1,849
Total .. .. .	£13,012

Log royalty for the year amounted to £100,792, a reduction of £5,644 on the previous year's figures.

## PRINCIPAL SOURCES OF REVENUE FOR THE PAST TWO YEARS.

Year.	Royalties.		Inspection Fees.	Sandalwood.	Firewood Piles and Poles, etc.	Miscellaneous.	Goldfields Revenue.	Total.
	Logs for Sawmilling.	Hewn Timber.						
1938-39 ... ..	£ 106,436	£ 5,391	£ 5,962	£ 1,813	£ 5,393	£ 8,887	£ 11,843	£ 145,724
1939-40 ... ..	100,792	5,081	5,273	13,703	4,959	10,858	11,104	151,770

## TIMBER PRODUCTION.

PRODUCTION OF TIMBER FOR YEAR ENDED 30TH JUNE, 1940 (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 Sawn Timber.			In Log.	In Square.		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)		
1	Crown Lands ...	cub. ft. 827,220	cub. ft. 3,488	cub. ft. 3,005	cub. ft. 833,713	cub. ft. 291,520	cub. ft. 108,069	cub. ft. 540,345	cub. ft. 108,069	cub. ft. 1,374,058	cub. ft. 399,589	
	Private Property	98,152	11,952	11,946	122,050	41,761	24,585	122,925	24,585	244,975	66,346	
2	Crown Lands ...	41,770	...	55,685	97,455	34,109	16,139	80,845	16,169	178,300	50,278	
	Private Property	...	...	2,254	2,254	789	339	4,195	339	6,449	1,628	
3	Crown Lands ...	4,871,900	...	70,791	4,742,691	1,659,942	51,333	3,982	301,575	60,315	5,044,266	
	Private Property	823,075	...	203,153	1,026,228	359,180	69,752	10,198	399,750	79,950	1,425,978	
4	Crown Lands ...	1,923,658	...	304,645	2,228,303	779,906	26,109	3,714	149,115	29,823	2,377,418	
	Private Property	399,120	...	216,051	615,171	215,310	46,253	23,227	347,400	69,480	809,729	
5	Crown Lands ...	4,033,093	372,777	28,495	4,434,365	1,522,206	71,165	6,497	388,310	77,662	4,822,675	
	Private Property	478,755	...	64,148	542,903	190,016	243,486	31,433	1,374,495	274,899	1,599,868	
6	Crown Lands ...	2,556,468	6,050,914	615	8,607,997	2,528,726	49,858	249,290	49,858	1,917,398	464,915	
	Private Property	12,141	49,496	...	61,637	17,613	157,811	7,773	827,920	8,857,387	2,578,584	
7	Crown Lands ...	...	...	84,048	84,048	29,417	377	22,797	165,584	889,557	183,197	
	Private Property	...	...	118,194	118,194	41,368	1,285	115,870	23,174	199,918	52,591	
8	Crown Lands ...	1,351,191	...	103,119	1,454,310	509,008	3,362	89,490	17,898	207,684	59,266	
	Private Property	96,195	...	96,195	96,195	33,668	5,314	16,810	3,362	1,471,120	512,370	
9	Crown Lands ...	111,420	19,829	15,814	147,063	49,886	24,709	26,570	5,314	122,765	38,982	
	Private Property	1,514,126	21,618	220,803	1,756,552	613,064	144,796	204,165	40,833	351,228	90,719	
10	Crown Lands ...	2,877,408	...	106,425	2,983,833	1,044,342	39,686	922,410	184,482	2,678,962	797,546	
	Private Property	630,222	...	4,984	635,206	222,322	9,506	...	...	2,983,833	1,044,342	
Totals	Crown Lands ...	18,394,128	6,447,008	772,642	25,613,778	8,449,062	351,121	58,144	2,046,325	27,660,103	8,558,327	
	Private Property	4,051,786	83,066	841,538	4,976,390	1,735,091	703,607	832,634	9,139,560	2,567,725		
Grand Totals	...	22,445,914	6,530,074	*1,614,180	30,590,168	10,184,153	1,054,728	187,171	6,209,495	1,241,899	36,799,663	
	...	...	...	...	...	...	...	...	...	...	11,426,052	

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

\* Comprises 1,075,036 cubic feet Wandoo; 197,471 cubic feet Sheoak; 149,944 cubic feet of Blackbutt; 124,153 cubic feet Pine; 63,086 cubic feet Tuart; 4,002 cubic feet Marri; 326 cubic feet Red Tingle Tingle; 162 cubic feet River Banksia.

## SAWMILLING AND HEWING.

The total cut of log timber during the past year, exclusive of mining timber, amounted to 36,800,000 cubic feet from which 11,426,000 cubic feet of sawn and hewn timber were produced, the value of which is estimated at £1,524,000. This production is 8 per cent. below the figures for the previous year.

At the close of the year 60 mills, which include most of the large mills in the State, were operating on Crown lands. Largely as a result of orders received from the United Kingdom and other Empire countries most of these mills have been working at full capacity. Owing to lack of orders in the early part of the year, two mills closed down temporarily but it is expected that one of these will be re-opening at an early date. Seventy-eight mills cutting mostly sleepers and fruit cases were working on private property.

Following the cutting out of Bunning Bros.' mill at Muja, this Company re-opened a mill of similar capacity at Yornup. This mill has been connected by tramway with the main line and is now in full operation. The same Company recently acquired a new permit area for Jarrah mill logs about 10 miles south-east of Manjimup and preliminary work in the construction of a tramway from the main line to the new mill site and the erection of the mill is now well in hand.

The total intake of Jarrah mill logs showed a 10.9 per cent. reduction on the previous year's logging operations. The intake of Karri increased from 5,705,903 cubic feet to 6,503,074 cubic feet (14.4 per cent.) and Wandoo from 669,729 cubic feet to 1,075,036 cubic feet (60.5 per cent.). Increases are also shown in the log intake of the following timbers:—

	1938-39.	1939-40.	Increase.
Sheoak ..	192,315 c.f.	197,471 c.f.	2.8%
Blackbutt ..	128,118 c.f.	149,944 c.f.	17.0%
Pine ..	54,475 c.f.	124,153 c.f.	127.9%

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.	
1938-39	cub. ft. 7,937,242	cub. ft. 1,092,666	cub. ft. 433,015	cub. ft. 1,869	cub. ft. 1,202,958	cub. ft. 537,366	cub. ft. 1,213,847	cub. ft. 2,740	£ 1,677,000
1939-40	7,437,007	1,012,055	408,161	1,104	1,273,815	461,276	832,634	.....	1,524,000

The production of hewn timber fell from 1,651,471 cubic feet in 1938-39 to 1,241,899 cubic feet in 1939-40, and of the latter quantity two-thirds were obtained from private property.

Throughout the year an average of 2,950 men have been employed in the sawmills of the South-West, and 460 in the hewing industry.

Owing to war precaution measures it is regretted that it is not possible to publish figures relating to the export and import trade in timber.

## TIMBER INSPECTION.

During the year 3,187,849 cubic feet of sawn and hewn timber were submitted for inspection by officers of the Department. This quantity included 2,258,954 cubic feet of railway sleepers and 928,895 cubic feet of sawn timber. Owing to the lack of overseas sleeper orders at the beginning of the year, the quantity inspected was 29 per cent. lower than the previous year. There was, however, an increase of 68 per cent. in the quantity of sawn timber inspected; this is due to a large extent to the increasing use that is being made by the trade generally of the standard grading rules published by the Department.

In addition to sawn and hewn timber, 1,471 piles and poles containing 43,925 lineal feet were also inspected.

## SANDALWOOD.

The replacement of stocks sold in China and the Far East resulted in a decided increase in the production of sandalwood during the past year, and orders were placed with a total of 59 pullers on three occasions during the year for the pulling of new wood from Crown lands and licenses were issued for the supply of 70 tons from private property. Unfortunately the prospects of the business being maintained at the same level is very remote, owing to the unsatisfactory war position in China.

Most of the logs were of fair average quality and returned to the getter the full price of £17 per ton. Reductions in price were authorised by the Department in respect of 313 tons, principally on account of the wood not being cleaned free of sapwood. However, after allowing for these reductions, the average price paid to the getter for logs was £16 15s. 10d. per ton.

*Sandalwood for Oil Distillation.*

Two hundred and twelve tons of sandalwood roots and butts sawn from export logs were supplied to local distillers.

**OTHER FOREST PRODUCE.**

*Firewood and Mining Timber.*

Apart from a substantial reduction in the firewood used on the Northern Goldfields on account of the closing down of the Lochinvar, Riverina and Lancefield Mines, the consumption of firewood in other Goldfields centres has remained substantially the same as last year.

A large percentage of the Mulga in the Murchison district has died as a result of the drought conditions of the past four or five years, and steps have been taken to confine the operations of firewood cutters as far as possible to dead timber only. During the past year 372,000 tons of firewood and 29,600 tons of mining timber were consumed on the Goldfields, and 12,337 tons of mining timber in the coal mines at Collie. There has been a marked increase in the use of sawn Salmon Gum in the Kalgoorlie District, due to the use of local timber in lieu of Jarrah for certain mining requirements.

Approximately 80,000 tons of firewood were obtained during the year from Crown lands for supply to the Metropolitan area.

The quantity of firewood consumed at No. 1 and No. 2 Pumping Stations at Mundaring Weir during the past year amounted to 12,412 tons. Firewood for Pumping Stations Nos. 3 to 8 amounted to 24,820 tons and was obtained from Crown lands and reserves in proximity to the pumping stations under licenses issued by the Department.

*Piles and Poles.*

Sixteen thousand five hundred and forty poles having a total length of 332,554 lineal feet, were reported to the Department as having been obtained from Crown lands and private property during the year. Approximately two-thirds of these were obtained from Crown lands under licenses issued by the Department.

Wandoo timber is being used in increasing quantities for this purpose, and for the past twelve months over 7,000 Wandoo poles and piles were supplied to the Public Works Department, Postmaster General's Department and the Electricity and Gas Department. Accessible private property has been practically cut out of Wandoo poles, piles and stringers, and contractors are now looking to this Department to supply their requirements from Crown lands. This will necessitate an assessment of the available timber and the construction of roads for its extraction and protection.

*Tanning Barks and Extracts.*

The manufacture of a tanning extract from Wandoo timber at factories established at Belmont and Boddington resulted in the utilisation of 35,573 tons of Wandoo timber during the year, a large proportion of which was obtained from private property. The works at Boddington are now being extended and on completion will be capable of treating approximately 200 tons of Wandoo per day.

The quantity of mallet bark stripped from Crown lands and private property during the year amounted to 2,645 tons.

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, 1940, 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	....	....	....	12,337	....	....	....	....	....	....	29,600	41,937 tons.
Sleepers for Goldfields Wood Lines cub. ft.	....	....	....	....	....	....	....	....	....	....	63,025	63,025 cub. ft.
Firewood .. tons	300	21,091	....	72	181	106	....	59,427	7,809	1,705	70,600	161,291 tons.
Mining Firewood .. "	....	22	....	....	1,223	....	....	....	....	....	301,400	302,623 "
Charcoal .. "	....	....	5	....	....	....	....	79	10	....	700	816 "
Piles and Poles* .. lin. ft.	3,977	33,457	16,793	3,393	73,297	9,284	37,975	47,976	48,377	53,025	....	332,554 lin. ft.
Fencing Posts and Rails .. No.	1,000	....	2,600	....	6,777	1,890	....	1,859	2,060	....	....	16,186
Blackboy .. tons	....	....	....	....	....	....	....	8	330	....	....	338 tons.
Mallet Bark* .. "	....	....	....	....	....	....	2,645	....	....	....	....	2,645 "
Kingia Fibre .. "	....	....	....	....	....	....	....	9	....	....	....	9 "
Stone .. cub. yds.	....	8,408	....	....	....	....	....	2,320	....	....	....	10,728 cub. yds.
Boronia Megastigma* .. lbs.	....	....	....	....	....	....	....	....	2,964	....	....	2,964 lbs.
Wandoo Timber for Tanning Extract* .. tons	....	....	....	....	....	....	....	....	....	....	....	35,573 tons.

\* From Crown lands and private property.

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

## FOREST OFFENCES.

Ninety offences against the Forests Act and Bush Fires Act were reported during the year, and in twelve cases proceedings were taken against the offenders. Convictions were recorded in all cases, and fines amounting to £88 10s. and costs and damages totalling £34 11s. 8d. were imposed. Four cases related to the illegal lighting of fires, seven to cutting and removing timber without authority, and one to the removal of timber from private property without first branding it with the registered brand of the owner.

Warnings were issued in twelve cases, fifty-three offenders were charged royalty and damages amounting to £314, and in a number of cases forest produce illegally obtained was seized by the Department and sold, realising £30.

Sandalwood to the value of £69 was confiscated and sold for breaches of the regulations, compassionate payments amounting to £32 being made to the pullers to cover out of pocket expenses where the breach was considered unintentional.

## CHAPTER III.

## (1)—EXPENDITURE.

The expenditure from Consolidated Revenue Fund covering cost of general administration of the Forests Act and Regulations and the Timber Industry Regulation Act amounted to £28,696, compared with £28,474 for the previous year. Reforestation work was carried out partly by the regular employees of the Department and partly by relief workers, and funds for this work were provided from the following sources:—Reforestation Fund, £40,144; Loan Fund, £51,526; Federal Aid Roads Grant, £12,000. In addition, an amount of £19,554 was provided from Loan Funds for the employment of "C" Class relief workers. The average number of employees throughout the year, including relief workers, was 334.

Three-fifths of the net revenue of the Department amounted to £49,234 for the year, and this amount was credited 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, 1940:—

	£	s.	d.	£	s.	d.	£	s.	d.
Revenue for year 1939-40	...	...	...	...	...	...	151,770	0	7
Plus adjustment Sandalwood Revenue, 1938-39	...	...	...	...	...	...	1,812	14	9
							<u>153,582</u>	<u>15</u>	<u>4</u>
Consolidated Revenue Fund Expenditure	...	...	...	28,696	0	10			
Plus Adjustment Sandalwood Expenditure, 1938-39	...	...	...	1,617	4	4			
				<u>30,313</u>	<u>5</u>	<u>2</u>			
Less Timber Industry Regulation—									
Salaries	...	...	...	696	11	6			
Incidentals	...	...	...	424	16	11			
				<u>1,121</u>	<u>8</u>	<u>5</u>			
							29,191	16	9
Interest on Loans	...	...	...	38,999	7	1			
Sinking Fund	...	...	...	1,949	18	10			
Special Acts	...	...	...	1,300	0	0			
Audit Fees	...	...	...	85	0	0			
							<u>71,526</u>	<u>2</u>	<u>8</u>
Net Revenue	...	...	...				<u>£82,056</u>	<u>12</u>	<u>8</u>

## REFORESTATION FUND.

Balance as at 30th June, 1939	...	...	...	...	...	...	85,584	16	1
Three fifths Revenue transferred	...	...	...	49,234	0	0			
Direct Credits	...	...	...	3,184	18	5			
							<u>52,418</u>	<u>18</u>	<u>5</u>
							138,003	14	6
Expenditure for Year 1939-40	...	...	...	...	...	...	40,144	4	4
Balance as at 1st July, 1940	...	...	...	...	...	...	<u>£97,859</u>	<u>10</u>	<u>2</u>

## FORESTS DEPARTMENT MOTOR VEHICLE DEPRECIATION ACCOUNT.

By Balance as at 30th June, 1939	...	...	...	...	...	...	£3,229	10	8
„ Transfer annual depreciation on vehicles	...	...	...	...	...	...	1,618	19	5
							<u>£4,848</u>	<u>10</u>	<u>1</u>
„ Purchase of New Vehicles	...	...	...	...	...	...	2,543	10	6
By Balance as at 1st July, 1940	...	...	...	...	...	...	<u>£2,304</u>	<u>19</u>	<u>7</u>

Note.—Treasury Department Accounts combine the Reforestation Fund and Motor Vehicle Depreciation Account and show a gross balance of £100,164 9s. 9d. as at 1st July, 1940.



## (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.	Huts.	Fire Towers.		Topographical Survey.
			Cleared 1939-40.	Total miles cleared & maintained.	Miles cleared 1939-40.	Total miles cleared & maintained.	Miles erected. 1939-40.	Total mileage erected.	Built, 1939-40.	Total No. built.	Total No. built.	Total No. built.	Erected, 1939-40.	Total No. erected.	
1	Busselton	Busselton	miles.	miles.	miles.	miles.	miles.	miles.	No.	No.	No.	No.	No.	No.	Miles.
2	Mundaring Weir	Mundaring	1	15	19	18	3	35	12	2	5	18	2	19	19
3	Dwellingup	Dwellingup	5	123	26	294	3	50	17	1	2	2	2	2	19
		Wuraming	2	96	8	312		95	15	1	1	5		2	3
		Duncan's	4	102	25	287			6	1	1	1		2	3
		Huntly		101	29	215			7	1	1	1		2	3
4	Collie	Collie		115	90	782			10			2		2	36
		Wellington		75	25	335		105	6			2		2	36
5	Kirup	Kirup	9	336	24	992			16			8		2	65
		Nannup	16	113	43	240	16	219*	3		1	1		2	65
		Greenbushes		5		74									
6	Manjimup	Manjimup	35	441	128	459			9		2	2		3	425
		Pemberton	9	82	7	156	19	276†	8		1	2		1	3
7	Narrogin	Narrogin	2	158	2	433	3	65	11		1	1		1	
8	Keimscott	Carinyah		121	11	327			6		1	1		1	
		Gleneagle	5	203	14	581		125	10		1	2		3	65
		Jarrahdale		125	8	422			5		1	2		3	65
9	Perth	Metropolitan						8	4						
		Albany							1						
10	Harvey	Harvey	7						6		2	1			
		Willowdale	6	131	20	253		127	10		1	1		4	30
		Tallanalla		244	58	495			7		1			4	30
		Totals	101	2,752	537	6,867	44	1,105	2	175	23	52	1	19	643

\* Three miles taken down.

† Two miles taken down.

## TOPOGRAPHICAL SURVEY.

For the most part survey of new roads, tracks and fire-lines has been carried out by members of the field staff attached to Divisions, and mimeographed notes have been issued for the guidance of officers doing this work.

## PERMANENT ESTABLISHMENT.

With the general use of motor transport for fire gangs some regrouping of employees' houses has become desirable, and during the year a new Divisional office and staff cottage were built at Manjimup from two houses removed from Ellis Creek and one house from Hovea.

A new office and two houses were erected to provide headquarters at Pemberton, one house being transferred from Hovea and one from Noggerup.

A small office and house were erected at Yornup, and it is proposed to increase this settlement to four houses in all.

Two houses were moved into a new settlement being formed at Pimelea in the Pemberton district, and one house was shifted from Marrinup to Dwellingup.

A fire tower, 135 feet in height to the observation platform, was erected at Grevillea in the Yornup District.

During the year an additional 101 miles of forest roads and 537 miles of ploughed and graded firelines were established. The Department now maintains 2,752 miles of forest roads and 6,867 miles of graded or ploughed firelines.

The Departmental telephone system has been extended by the erection of 44 miles of line during the year. The system now embraces 1,105 miles of line and approximately 500 telephones which are used for general administrative purposes connecting Divisional and District offices and the houses of resident staff and in summer constitute an essential feature of the fire control organisation, enabling lookout men to notify working parties and surrounding settlers of outbreaks of fire. A considerable number of farmers living on the boundaries of the forest are now connected with this telephone system, and render valuable assistance in the location and early suppression of fires threatening forest areas.

## ASSESSMENT SURVEYS.

Detailed soil surveys were carried out over some 486 acres in Andrew Block, Kirup Division, and 250 acres in Metropolitan plantations.

## (B)—SILVICULTURE.

Jarrah.

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

No.	Division. Headquarters.	District.	Area Regenerated, 1939-40.	Total Area Regenerated at 30th June, 1940.	Thinning, 1939-40.	Coppice Thinning, 1939-40.	Treemarking.		Top Disposal.
							Sawmilling.	Hewing.	
			acres	acres	acres	acres	acres	acres	acres
2	Mundaring Weir	Mundaring	879	6,490	210	...	535	...	1,588
3	Dwellingup	Dwellingup	238	40,312	...	135	1,611	...	...
		Wuraming	4,192	41,198	...	...	4,057	...	3,837*
		Duncan's	4,012	39,145	...	1,346	3,284	2,820	3,482*
		Huntly	1,360	23,438	...	...	396	...	1,517*
4	Collie	Collie	2,437	45,605	...	13	7,629	840	2,642
		Wellington	729	15,175	...	...	844	...	3,164
		Muja	...	...	...	...	...	...	9,368
5	Kirup	Kirup	987	46,414	...	...	1,575	...	1,365
		Nannup	...	7,895	...	...	1,803	...	...
		Greenbushes	...	3,674	...	...	...	...	...
6	Manjimup	Manjimup	1,752	10,093	...	...	5,397	1,670	6,044
		Pemberton	...	...	...	...	...	...	445
8	Kelmscott	Carinyah	248	19,156	...	...	1,255	...	1,305
		Gleneagle	261	41,216	...	130	840	...	565
		Jarrahdale	140	33,714	...	4	4,660	...	4,610
10	Harvey	Willowdale	...	30,034	10	...	4,856	...	4,375
		Tallanalla	...	22,331	...	...	332	...	1,648
		Totals	17,035	425,890	220	1,623	39,124	5,330	53,406

\* These figures include 6,547 acres treated for regeneration simultaneously with "top disposal" work.

## JARRAH.

Regeneration operations were carried out over 17,035 acres of Jarrah forest logged over during recent years. In the Dwellingup Division and on selected areas of forest in other divisions, owing to the presence of plentiful advance growth, regeneration work is carried out immediately after logging operations and top disposal work done at the same time. On other areas the top disposal work is done first and a period allowed for the development of advance growth before regeneration treatment is undertaken. Total area of cut over Jarrah forest which has been regenerated now amounts to 425,890 acres.

A first thinning of saplings resulting from earlier treatment was made over 220 acres, and experimental plots have been established in a number of divisions to test the economy of various degrees of thinning at different ages. Before large scale thinning operations become necessary it is hoped that some market may be found for the very large volume of good quality cord wood which will be available as a result of this work.

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

## KARRI.

Following the development of a good seed year in the Pemberton District, 1,908 acres of cut over Karri forest were treated for natural regeneration. A quantity of seed has been collected for sowing on small areas which are not carrying a sufficient stocking of seed trees. The total area of regenerated Karri forest is 23,558 acres. Thinning and cleaning operations have been commenced along a number of tracks and firelines in regenerated Karri forest as a fire control measure.

Excellent co-operation between sawmilling companies, bush workers and officers of the Department has continued and resulted in the preservation of a considerable volume of immature Karri timber growing on cut over areas of a class which, in past years, was smashed down in the course of falling operations.

## MALLET.

During the year the conversion of poor quality unproductive Wandoo forest into plantations of Brown Mallet was continued, and 890 acres were sown with Mallet in the Narrogin Division. A change in technique to secure a more satisfactory distribution of work throughout the year has given satisfactory results, and chopped down areas are now burnt in the spring months to enable the sowing of seed to proceed throughout the whole of the summer instead of being treated as a rush job in late autumn.

The total area of Mallet plantations is now 12,763 acres, all of which are located within 30 miles of Narrogin. Thinning of groups of natural Mallet regrowth has been carried out on a number of reserves partly on a day work and partly on a royalty basis. In addition to the value of bark produced and improvement of these immature stands, this work is providing valuable information which will serve as a basis for thinning operations which will have to be undertaken during the next few years on the older plantations which were established in 1926 and 1927.

## (3)—AFFORESTATION.

## AREAS OF CONIFERS PLANTED 1939, AND TOTAL AREA ESTABLISHED.

Division.	Plantation.	Area established, 1939.				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.
No. 1— Busselton	Coolilup	...	10	...	10	28.5	783	13	824.5
	Stirling	...	56	...	56	112	795.5	7	914.5
	Keenan	42.5	7.5	...	50	573.5	181	12	766.5
	Boranup	...	18	...	18	39	93	...	132
No. 2— Mundaring	Helena	...	*2	...	*2	496.5	210.5	38	745
	Greystones	...	*3.5	...	*3.5	396	176.5	46.5	619
	Beraking	30.5	8.5	...	39	177.5	65.5	91	334
	Mudros	*2	*10	...	*10	...	...	...	...
	Darkin	.5	7.5	...	8	179	129	16	324
	Portagabra	9.5	33.5	...	43	108	157	3	268
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	96.5	...	...	96.5	459	120.5	4	583.5
	Nannup	...	...	...	...	14	31.5	21.5	67
No. 6— Manjimup	Big Brook	...	...	...	...	267	2	41	310
No. 9— Metropolitan	Applecross	...	103	...	103	...	1,339.5	2	1,341.5
	Gnangara	...	276.5	...	276.5	...	1,652.5	7	1,659
	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	2.5	53.5	...	56	11.5	811.5	23.5	846.5
	Harvey Weir	33	...	...	33	449	86	15	550
	Hamel	...	...	...	...	12.5	46.5	5	64
Totals	...	215	574	...	789†	3,674.5	8,431	388.5	12,494

\* Replanting.

† Excludes 15.5 acres replanting.

Pine planting was carried out during the winter months of 1939 over an area of 789 acres consisting of 215 acres of *Pinus radiata* and 574 acres of *Pinus pinaster*. The total area of established pine plantations now amounts to 12,494 acres.

The total volume of pine logs sold from Departmental plantations during the past year amounted to 63,994 cubic feet. The bulk of this timber, 53,000 cubic feet, was produced in the Mundaring Division, where a small mill utilises the thinnings from the surrounding plantations. The balance was made up from the Harvey Division, where a small case mill took 10,221 cubic feet, and from Busselton Division which produced 773 cubic feet from early thinnings.

In addition, 60,159 cubic feet of pine logs obtained from private property in the Collie, Harvey, Kirup, Metropolitan and Dwellingup Divisions were milled in country sawmills and city case factories.

## (4)—FIRE CONTROL.

*The Fire Season.*

The fire season extended from 28th November to 26th April for the Jarrah and Karri Forest regions, during which time extreme hazards rated as severe summer and dangerous summer were recorded on 18 days for the Jarrah region and four days for the Karri region.

Relative humidities were below 20 per cent. for 15 days in the Jarrah Forest region.

Rainfall was generally light, only 192 points having been registered at Dwellingup from 1st December to 26th April, and the season was remarkable in that no thunderstorm was recorded for the whole season until 27th April, when 102 points of rain fell. Rainfall generally was light with the maximum fall of 40 points on February 15th.

Despite the exceptionally wet winter of 1939 a fair controlled burning season was experienced during the spring, but owing to the dry April, autumn burning in 1940 was rendered more hazardous and has required very careful watching.

*The Area Protected.*

Division.	Zone A. acres.	Zone B. acres.	Zone C. acres.
Busselton ... ..	8,400	3,000	...
Mundaring ... ..	21,000	16,000	200,000
Dwellingup ... ..	253,000	60,000	10,000
Collie ... ..	85,000	132,000	300,000
Kirup ... ..	124,000	141,000	112,000
Manjimup ... ..	56,600	303,400	76,500
Narrogin ... ..	15,000	60,000	...
Kelmscott ... ..	240,000	104,000	60,000
Metropolitan ... ..	5,900	...	...
Harvey ... ..	104,000	120,000	56,000
Denmark ... ..	7,400	...	...
Totals ... ..	920,300	939,400	814,500

The area of Zone A shows an increase of about 50,000 acres over last year's figures and the area in Zone B has been correspondingly reduced. The area in Zone C was increased by some 125,000 acres, mainly by bringing extra areas in the Kirup and Manjimup Divisions under control.

#### FIRE LOSSES.

Of the 162 fires attended in Zone A, only 48 occurred on areas of managed forest causing damage in varying degrees, the remainder burning over firebreaks, flats or otherwise waste land. About 50 per cent. of the fires burnt areas of less than 1 acre, 18 per cent. from 1 to 5 acres, 23 per cent. from 6 to 100 acres and 9 per cent. over 100 acres. The managed forest suffering damage in this zone amounted to 2,526 acres, most of which was only slightly damaged, while 870 acres of firebreaks, flats, etc., were also burnt by uncontrolled fires.

The actual losses amounted to 712 acres of regrowth below 10 feet or seedlings, and 483 acres of saplings which were burnt back and received such damage to their crowns that a large proportion of the crop must be cut back to ground level and started again.

Fairly large areas in Zones B and C were burnt towards the end of the fire season when milder weather conditions prevailed, and these fires can in many instances be considered as useful control burns. Such outbreaks are not immediately attended to, but are suppressed if threatening managed forest or to minimise the smoke haze when the gangs can be released from more urgent fire fighting activities.

#### CAUSES OF FIRE.

The number of fires attended in Zones A, B and C by Departmental employees shows a decrease of 22 on the number for last year. There are still a great number of fires caused by locomotives, bush workers and users of the forest generally, but the number arising from the burning off of private property, shows a considerable reduction. This may be due to the large area of country burnt in the previous fire season or more likely to the good work done by the officer of the Bush Fires Advisory Committee in explaining the provisions of the Bush Fires Act to country Road Boards and Municipalities and assisting by advice in organising the formation of Bush Fire Brigades and the selection of Bush Fire Control Officers.

The increase in number of fires escaping from controlled burning by Departmental employees can be attributed to the lengthy dry autumn when controlled burning was more hazardous than usual. Sawdust heaps of the bush sawmills although not considered a menace in past years, caused serious fires on days of severe summer and dangerous hazard. Sawmillers have co-operated in reducing the danger from this source and it is expected that no further trouble will be experienced in the future.

Consideration is being given to measures for reducing the danger from bush locomotives especially on days when the hazard is severe summer or higher.

Licenses to carry firearms on State Forest have been limited to the period from 1st April to 15th December and may account for the greatly reduced number of fires attributed to hunters and fishers. With the stocking of the South-Western streams with trout, it may be necessary to prevent fishing on State Forest during the prohibited period.

## Causes of Fires, 1939-40.

	No. of Fires.		
	A.	B and C.	Total.
W.A.G.B. Locomotives ... ..	6	13	19
Bush Locomotives ... ..	48	23	71
Bush Workers ... ..	10	21	31
Navvies ... ..	1	1	2
Mill Employees ... ..	3	3	6
Hunters and Fishers ... ..	8	13	21
Travellers ... ..	15	14	29
Private Property Escapes ... ..	23	38	61
Deliberately Lit ... ..	5	7	12
Children ... ..	5	2	7
Controlled Burning Escapes ... ..	15	24	39
Other Government Employees ... ..	2	4	6
Mill Management ... ..	1	...	1
Lightning ... ..	3	...	3
Beekeepers ... ..	1	...	1
Sawdust Heap Escapes ... ..	7	...	7
Unknown ... ..	9	50	59
Burning Rubbish ... ..	...	5	5
Campers ... ..	...	3	3
Mine Employees ... ..	...	3	3
Totals ... ..	162	224	386

## PREVENTION MEASURES.

*Controlled Burning.*—Costs of this work are given in the following table:—

	£
Busselton ... ..	106
Mundaring ... ..	253
Dwellingup ... ..	910
Collie ... ..	953
Kirup ... ..	1,109
Manjimup ... ..	641
Narrogin ... ..	258
Kelmscott ... ..	883
Metropolitan ... ..	74
Harvey ... ..	1,004
Denmark ... ..	4
Total ... ..	£6,195

Extensive controlled burning of firebreak belts, flats and dangerous hazards and protective burning of virgin forest, was undertaken during the autumn and spring months. In order to take advantage of suitable weather, adjoining settlers are sometimes picked up to assist with this work. They are given training in fire control methods at the same time and they represent a valuable addition to the fire fighting strength in case of emergency during the height of the fire season.

Some 200 men are employed on controlled burning when weather conditions permit and on an average they are employed for about seven weeks in the year on this work.

Some firebreaks, *e.g.*, those along bush railway lines, around mills and settlements, have to be burnt annually, but the burning of most breaks is undertaken every third year. Plans are being prepared for each Division to show the firebreaks to be burnt on a three-year plan which not only ensures more systematic burning on a definite plan but is a guide to road and fireline construction and maintenance.

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. In order to obviate the necessity of raking, a revolving broom capable of being drawn behind a motor runabout, has been designed and tried out with success. This broom will remove leaves and debris from tracks for a width of three or four feet at the rate of about five or six miles per hour and should result in a considerable saving of labour and time.

There are now throughout the forest belt 2,745 miles of trafficable roads and 6,867 miles of firelines, an increase of 631 miles during the past year.

The burning of tops from trees felled in the course of sawmilling and hewing operations, has been carried out over 53,406 acres during the past year.

Locomotives operating on forest areas, although inspected regularly by forest officers, continue to set fires on days of high hazard in spite of the ash pans and spark arresters being apparently in good order. Consideration is now being given to reducing the danger from this source by burning up debris on the firebreak along steep grades and preventing the running of locos. on days when the relative humidity falls below a certain point.

### FIRE WEATHER RESEARCH.

The fire weather research stations at Dwellingup in the Jarrah forest region and at Manjimup in the Karri forest region, have continued to record weather observations throughout the fire season, and forecasts have been made by the Divisional Meteorologist and given out over the National Broadcasting Stations.

Further investigation during the season involving the use of Duff hygrometers and Piche evaporimeters gave no better indication of the measure of fire hazard than the variation in moisture content of wood cylinders, which have been used for the past few years to estimate the current fire hazard.

The standard terms and the 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 of 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.

As it has not been possible to provide for the measurement of wood cylinders at every Divisional office, a method of measuring the current fire hazard has been devised based on the 8 a.m. wood cylinder moisture content readings from the two research stations, together with readings of temperature and relative humidity taken locally at any time of the day.

Check forecasts continue to be made at Dwellingup and, where necessary, are phoned through to all other Divisions. This year the forecasts from Dwellingup for the fire season show an absolute accuracy of 80% with 18½% correct to one degree of hazard and only 1½% definitely inaccurate. These figures are not as good as usual owing to the non-publication of the weather map in the daily papers during early December.

The following table sets out the number of days of the various degrees of hazard for the past six summers as recorded at Dwellingup, and for the past three seasons at Manjimup:—

DISTRIBUTION OF HAZARD.

Station.	Fire Season.	Nil.	Low.	Moderate.	Average Summer.	High Summer.	Severe.	Dangerous.	Average Hazard.	No. of Days.	Days above Moderate.
Dwellingup	1934-35	5	26	47	20	...	6	9	5.07	113	31.0
Do.	1935-36	2	20	43	40	...	18	4	5.95	127	48.8
Do.	1936-37	2	11	40	47	...	29	7	6.45	136	61.0
Do.	1937-38	10	15	35	33	33	12	2	5.87	140	57.2
Do.	1938-39	5	8	51	36	29	8	1	6.06	138	53.6
Do.	1939-40	6	9	46	42	27	13	5	6.01	143	58.9
Manjimup	1937-38	8	29	41	22	9	3	...	4.68	112	30.3
Do.	1938-39	12	23	36	12	6	1	...	4.30	90	20.0
Do.	1939-40	7	25	55	19	7	4	...	4.90	117	25.7

### SUPPRESSION MEASURES.

Methods of suppression were essentially the same as in previous years, reliance being placed on the use of knapsack spray pumps and rakes in direct attack. In some cases, especially where fires occurred in ringbarked country, counter-firing from established tracks or those made by raking had to be resorted to. To prevent breakaways when counterfiring the number of men at the fire must be increased in order to deepen the defence line.

A trial was made with the use of a siren when calling the gang from work to the runabout.

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

Busselton	...	...	...	...	...	£
Mundaring	...	...	...	...	...	37
Dwellingup	...	...	...	...	...	9
Collie	...	...	...	...	...	255
Kirup	...	...	...	...	...	227
Manjimup	...	...	...	...	...	401
Narrogin	...	...	...	...	...	509
Kelmscott	...	...	...	...	...	53
Metropolitan	...	...	...	...	...	97
Harvey	...	...	...	...	...	14
						298

£1,900

Practically the whole of the Jarrah, Karri and Mallet areas are now under observation from 25 towers connected by telephones to Divisional and District Headquarters. The practice of allowing one tower man to co-ordinate the information obtained by other tower men in the Division has been extended.

## (5)—RESEARCH AND INVESTIGATION.

(a) *Management and Silviculture.**Reforestation.*

1. Progress was made with the preparation of cleaning and thinning schedules in stands of Jarrah coppice resulting from regeneration treatment, and a report on this project was published during the year under the heading "Thinning Experiments in Jarrah Coppice (*Eucalyptus marginata*)."

In this progress report of a project commenced in 1935 the degree of thinning, in the form of a reduction in the number of stems per stump, has been studied together with its effect on the growth, development and form of the residual shoots.

2. Investigations were continued into the character and composition of Jarrah stands. As a preliminary, stem distribution studies were instituted and a report on the project of stem distributions in relation to crown ratio was published. Although the problem of determining the normal distribution of size or age classes in an irregular forest such as Jarrah has not been solved, the available evidence points to the improbability that equal areas are occupied by the various size classes, and tends to show that greater areas are occupied by the middle girth classes than by the classes at the extreme ends of the range of girths.

3. Tables for use in the estimation of the volume of standing timber have been completed and will be issued shortly. A report of the study of taper for volume measurement of standing Jarrah trees has been published.

4. In connection with the determination of site quality in the Jarrah forest preliminary investigation included a study of girth in relation to height as one of the fundamental relationships which underly the growth and development of Jarrah stands. A progress report on this project is about to be published.

*Afforestation.*

1. In common with most afforestation projects the planting of *Pinus pinaster* on coastal sand-plain in Western Australia gives rise to certain establishment problems which relate principally to deaths occurring between the time of planting and the next winter rains. Successive seasons have shown fluctuating percentages of failures in this period and intermittently these have been sufficiently high to warrant a careful investigation of the causes of such failures.

Experiments were carried out in the widely separated plantations at Busselton and the Metropolitan area, both situated on the coastal plain which will be used for the main softwood planting in this State.

A report of results of the first 7 years (June 1932—May 1939) investigations into the establishment technique for *Pinus pinaster* in Western Australia was published as Departmental Bulletin No. 53 "Pine Establishment."

2. Investigations have shown that remedial treatments for sick pines in established plantations of *Pinus radiata* and *Pinus pinaster* in the South West of Western Australia can now largely be standardised as zinc and superphosphate applications.

Further investigations are being made concerning the optimum concentration, quantities and periodicity of application of the fertilisers necessary to maintain vigorous growth of the pines.

3. Nursery practice has received further attention both in regard to the technique of sowing, and the nutrition of the seedlings by continuing the experiments with mineral and organic manures and composts.

The services of Mr. T. N. Stoaie, Senior Assistant Conservator and Officer in Charge of Silvicultural Research, were made available on loan to the South Australian Government in connection with their study of nutritional disorders of *Pinus radiata*.

The Research Branch is hampered by lack of staff owing to loss of two officers by enlistment, and the loan of one officer to the Australian Forestry School, and field operations have recently had to be confined to problems which can be investigated by the administrative staff.

(b) *Utilisation.*

The war has had a considerable effect on external trade in timber both with regard to imports to Australia generally and overseas exports from this State. With restricted imports and an apparent timber shortage imminent in the Eastern States on the one hand, and ability to increase production in this State to assist in meeting the shortage, combined with loss of certain overseas markets and shipping difficulties on the other hand, the possibility of substantially increased export to the Eastern States has received considerable attention. To date, however, any increased exports to the Eastern States have not balanced loss in overseas trade and some reduction in total production has occurred. Collection and correlation of data on war-time timber supplies and associated problems, has been an important activity of the Utilisation section.

During the year the Utilisation Officer spent nearly two months on loan to the South Australian Forests Department reporting on proposals for establishment of a second large sawmill on pine plantations in that State. Information and experience gained in this period has already proved of value in investigations on pine milling activities in this State.

The opportunity was taken while as far as South Australia to renew personal contact with officers of the Division of Forest Products, Melbourne. A fortnight was spent at the Division and a number of outstanding points on projects of interest to this State were cleared up in discussion.

Continued attention has been paid to possible avenues for the chemical utilisation of wood, the most important project examined, in co-operation with the Department of Industries, being that for establishment of a cellophane factory in this State with later expansion to artificial silk. Following considerable correspondence and local investigations by technical officers, a Swiss cellophane expert spent some weeks in the State. There is no doubt that the Australian market is sufficient to justify early production of these commodities and investigations indicated that these could be economically established in Western Australia. World conditions at the present time are far from favourable, however, but some time must elapse before preliminary activities in connection with proposals are concluded, by which time conditions may be a good deal clearer.

The rapid increase in number of producer gas units operating in the State has resulted in an apparent lag in charcoal production and a programme of experimental burning has been inaugurated by the Department, aiming at determination of the most satisfactory technique in burning, cracking and grading of charcoal. This experimental work is on a commercial scale designed in the first instance to supply Government requirements and secure necessary data for the considerable expansion of the industry which is anticipated.

#### (6)—ABORICULTURE.

Sales of trees from the Department's nursery at Hamel during the distributing season which closed on the 31st August, 1939, were about 5,300 below the average for the last five years and 13,500 less than for the previous year. In all 194,290 trees were distributed. Of these 40,081 were sold, 532 were supplied free to public bodies and charitable institutions and 153,677 were supplied to other Departmental centres.

*Eucalyptus cladocalyx* (Sugar Gums) were again in most demand and the season's sales of 10,080 were again the highest on record. This tree is undoubtedly the most popular for planting in dry areas and is followed by *Schinus molle* (Pepper Tree), *Eucalyptus Lehmanni* (Bald Island Marlock), *Melia azedarach* (White Cedar), *Sterculia diversifolia* (Kurrajong) and *Eucalyptus gomphocephala* (Tuart). It is interesting to note that Tuart, a native of our wetter coastal areas, is proving very adaptable and has been successfully established in several places in the wheat belt with an annual rainfall as low as thirteen inches. There was also a good demand for *Eucalyptus salmonophloia* (Salmon Gum) and *Eucalyptus salubris* (Gimlet).

For planting in the south-western portion of the State pines, *Pinus radiata* and *Pinus pinaster* are the most popular trees and are followed by *Acacias*, *Tristania conferta* (Brush Box), *Leptospermum laevigatum* (Victorian Ti-tree), *Eucalyptus ficifolia* (Red Flowering Gum), *Agonis flexuosa* (Native Peppermint), *Jacaranda mimosaeifolia* (Jacaranda), *Araucaria excelsa* (Norfolk Island Pine) and *Grevillea robusta* (Silky Oak).

### CHAPTER IV.

#### (1)—LEGISLATION.

##### *Forest Regulations.*

Regulations governing the appointment and promotion of officers to the General Division of the Department and regulations prescribing the rate of remuneration payable to persons rendering assistance in extinguishing bush fires were gazetted on the 6th March, 1940.

#### (2)—ADMINISTRATION.

The staff of the Department was affected by the following changes during the year under review:—

##### (a) *Professional Division.*

Messrs. G. W. Nunn, Divisional Forest Officer, and W. G. Chandler and W. G. Sharpe, Assistant Divisional Forest Officers, were granted extended leave of absence on enlistment with the A.I.F.

##### (b) *General Division.*

Two "C" Grade Assistant Foresters were granted extended leave of absence on enlistment with the A.I.F.

Five "D" Grade Assistant Foresters were promoted to "C" Grade. Three "D" Grade Assistant Foresters were appointed, one resigned and one retired.

##### (c) *Clerical Division.*

The number of clerks employed in Head Office was not altered by minor adjustments effected during the year.

In conclusion, I desire to express my appreciation of the loyal and efficient service of all members of the staff during the year.

S. L. KESSELL,  
Conservator of Forests.

Perth, 19th September, 1940.



## LIST OF APPENDICES.

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No.		Page
1a.	Consolidated Revenue Fund, Statement of Receipts and Expenditure for the year ended 30th June, 1940 ...	18
1b.	Statement of Reforestation and Afforestation Expenditure for the year ended 30th June, 1940 ...	18
2.	Summary of Exports of Forest Produce since 1836 ... ..	19
3.	Timber Industry Regulation Act, 1926—Annual Report, 1939 ... ..	20

## APPENDIX 1a.

## CONSOLIDATED REVENUE FUND.

General Statement of Revenue and Expenditure for Year ended 30th June, 1940.

DR.				CR.	
		£	s. d.	£	s. d.
To Log Royalty ... ..	100,791 17 4	By Salaries ... ..	23,666 8 0		
„ Hewn Timber Royalty ... ..	5,080 15 4	„ Add Cash Orders outstanding 30th June, 1939 ... ..	29 18 9		
„ Sandalwood Royalty ... ..	13,703 8 3		23,696 6 9		
„ Miscellaneous Royalty ... ..	12,044 3 10	„ Less Cash Orders outstanding 30th June, 1940 ... ..	36 12 3	23,659 14 6	
„ Goldfields Revenue ... ..	11,103 15 11	„ Postages and Telephones ... ..	201 19 8		
„ Rents ... ..	861 1 5	„ Stationery and Printing ... ..	248 8 8		
„ Inspection Fees ... ..	5,273 11 2	„ Travelling Allowances ... ..	263 0 11		
„ Sales ... ..	1,911 8 6	„ Freights and Fares ... ..	82 15 6		
„ Miscellaneous Revenue ... ..	999 18 10	„ Material ... ..	175 10 0		
		„ Mileage Allowances ... ..	1,655 5 0		
		„ Miscellaneous ... ..	361 1 1		
		„ Sandalwood Expenditure ... ..	433 18 10		
		„ Maintaining State Nursery ... ..	156 17 10		
		„ Workers' Compensation Premiums ... ..	65 14 6		
		„ Refunds from Revenue ... ..	27 0 10		
		„ Purchase of Tents ... ..	280 7 0	3,951 19 10	
		„ Timber Industry Regulations ... ..	424 16 11	424 16 11	
		„ Pine Conversion Costs ... ..	659 9 7	659 9 7	
		Total Expenditure ... ..	£28,696 0 10		
		„ Excess Revenue Over Expenditure ... ..	123,073 19 9		
	£151,770 0 7			£151,770 0 7	

## APPENDIX 1b.

Statement of Afforestation and Reforestation Expenditure for Year ended 30th June, 1940.

DR.				CR.	
		£	s. d.	£	s. d.
Division No. 1 ... ..	3,512 7 5	By General Loan Fund ... ..	51,526 17 11		
Division No. 2 ... ..	4,182 5 11	„ Grant, Federal Aid Roads Fund ... ..	12,000 0 0		
Division No. 3 ... ..	12,417 6 6	„ Reforestation Fund ... ..	40,144 4 4		
Division No. 4 ... ..	8,179 15 1	„ Motor Vehicle Depreciation Account ... ..	2,543 10 6		
Division No. 5 ... ..	11,689 4 1	„ Pine Conversion Costs ... ..	659 9 7		
Division No. 6 ... ..	16,784 9 2				
Division No. 7 ... ..	8,678 19 8				
Division No. 8 ... ..	10,239 7 9				
Division No. 9 ... ..	3,687 19 8				
Division No. 10 ... ..	9,820 15 0				
Total Divisional Expenditure ... ..	£89,192 10 3				
To Training of Staff ... ..	166 5 3				
„ Research and Investigation ... ..	2,930 7 5				
„ Preparation of Working Plans and Topo. Survey ... ..	1,906 11 8				
„ Salaries and Allowances ... ..	5,557 15 6				
„ General Equipment and Incidentals ... ..	1,590 15 3				
„ General Silviculture and Arboriculture ... ..	132 6 6				
„ Depreciation on Motor Vehicles ... ..	1,618 19 5				
„ Purchase of Motor Vehicles ... ..	2,543 10 6				
	16,446 11 6				
	£105,639 1 9				
„ Cash Orders not allocated at 30th June, 1940 ... ..	1,235 0 7				
	£106,874 2 4			£106,874 2 4	

## APPENDIX 2.

Summary of Exports of Forest Produce since 1836.

Year.	Timber.		Sandalwood.		Year.	Timber.		Wood	Sandalwood.		Tanning	Essential
	Cub. ft.	Value.	Tons.	Value.		Cub. ft.	Value.	Manu- factures.	Tons.	Value.	Bark.	Oils.*
		£		£			£	£		£	£	£
1836 <sup>a</sup>	10,000	2,500			1888	525,750	42,060					
1837					1889	788,500	63,080		4,470	33,525		
1838					1890	1,172,200	82,052		6,385	57,465		
1839									5,136	51,355		
1840					1891	1,273,950	89,179		3,760	37,600		
1841					1892	1,082,650	78,419		5,716	42,870		
1842					1893	512,950	33,888		3,893	32,160		
1843					1894	1,063,700	74,504		2,784	23,430		
1844					1895	1,255,230	88,146		3,851	30,863		
1845	7	163			1896	1,545,600	116,420		6,848	65,800		
1846					1897	2,393,300	192,451		5,852	49,480		
1847	2,550	255	32	320	1898	4,086,150	263,195		4,349	31,812		
1848	12,200	1,120	370	4,444	1899	6,913,550	553,198		4,084	29,719		
1849	3,350	333	1,335	13,353	1900	5,725,400	458,461		5,095	39,088		
1850					1901	7,150,600	572,354		8,864	73,931		
1851	10,500	1,048			1902	6,256,750	500,533		7,995	61,771		
1852			219	1,593	1903	7,748,450	619,705		4,406	37,913	859	
1853	1,250	268			1904	8,072,300	654,949		4,510	25,417		
1854	7,050	806			1905	8,709,500	689,943		5,521	38,817	154,087	
1855	52,200	5,220			1906	c 8,830,700	708,993		8,848	70,958	140,720	
1856	38,500	7,023			1907	c 6,409,550	511,923		9,212	65,999	98,773	
1857	76,900	12,076			1908	c 9,869,500	813,591		9,564	76,668	79,934	
1858	70,500	9,671			1909	c 10,830,450	867,419		8,228	37,456	59,633	
1859	69,200	9,449	280	2,524	1910	c 12,074,100	972,698			70,775	93,733	
1860	29,250	2,340	745	7,455	1911	c 12,449,500	986,341		6,907	65,506	83,470	
1861	67,250	6,051	1,278	17,259	1912	c 11,297,100	903,396		3,154	27,533	49,094	
1862	54,800	4,932	1,687	16,360	1913	c 13,619,850	1,089,481		6,260	47,589	47,377	
1863	27,750	2,497	2,558	24,945	1914 <sup>d</sup>	c 6,279,750	502,153		4,702	39,800	18,197	
1864	68,800	7,151	2,393	21,541	1915 <sup>e</sup>	c 9,968,500	808,392		8,375	78,926	6,127	5
1865	32,900	2,963	2,807	25,265	1916 <sup>e</sup>	5,432,100	441,991		6,271	61,381	10,208	381
1866	58,300	5,508	2,724	24,520	1917 <sup>e</sup>	3,890,650	310,893		7,230	72,609	18,959	1,102
1867	182,950	15,693	1,686	13,490	1918 <sup>e</sup>	3,436,250	274,141		6,504	51,834	16,886	2,060
1868	85,650	6,849	2,965	23,722	1919 <sup>e</sup>	4,135,750	332,584	11,535	8,998	117,072	18,875	3,987
1869	56,750	4,541	2,305	18,442	1920 <sup>e</sup>	5,065,300	465,731	-21,935	14,355	240,579	22,121	3,704
1870	8,000	638	3,256	26,045	1921 <sup>e</sup>	9,816,250	1,137,819	24,916	10,839	181,801	23,073	10,107
1871	179,900	14,273	4,124	32,998	1922 <sup>e</sup>	8,309,750	1,041,047	22,428	3,900	54,769	13,328	6,878
1872	157,200	17,551	6,112	48,890	1923 <sup>e</sup>	7,911,310	997,454	12,377	7,623	102,912	21,161	20,075
1873	218,500	15,304	3,366	26,926	1924 <sup>e</sup>	11,126,861	1,367,517	12,377	11,505	348,713	29,606	39,877
1874	37,000	2,590	3,942	31,536	1925 <sup>e</sup>	11,844,303	1,477,997	13,928	6,243	186,775	40,136	42,067
1875	68,150	4,771	6,292	62,916	1926 <sup>e</sup>	12,001,384	1,522,958	10,072	7,771	238,203	15,056	47,819
1876	342,350	24,192	7,057	70,572	1927 <sup>e</sup>	12,580,262	1,661,149	8,727	6,821	199,734	15,818	26,454
1877	219,050	23,965	6,646	66,465	1928 <sup>e</sup>	10,384,784	1,265,383	7,783	4,829	147,426	27,662	39,131
1878	336,150	36,979	6,577	65,772	1929 <sup>e</sup>	7,685,237	960,435	6,603	7,582	225,208	35,850	63,307
1879	580,900	63,902	4,675	35,064	1930 <sup>e</sup>	6,579,743	807,425	4,687	943	22,228	40,628	77,510
1880	627,250	69,742	4,667	35,001	1931 <sup>e</sup>	4,127,856	507,382	26,615	1,606	43,790	25,333	56,170
1881	662,550	66,252	5,197	51,970	1932 <sup>e</sup>	3,062,673	361,700	85,488	1,386	40,546	42,016	59,301
1882	792,750	79,277	7,716	77,165	1933 <sup>e</sup>	2,235,540	262,617	80,332	3,068	88,846	33,352	26,331
1883	936,500	93,650	9,605	96,050	1934 <sup>e</sup>	4,060,830	487,248	76,107	2,508	75,424	20,904	26,720
1884	997,000	79,760	7,081	56,250	1935 <sup>e</sup>	5,326,117	636,466	65,494	2,223	66,474	15,284	35,368
1885	861,700	68,936	2,620	20,960	1936 <sup>e</sup>	5,598,180	679,522	50,665	1,592	44,916	12,227	27,526
1886	848,150	67,850	4,527	36,216	1937 <sup>e</sup>	5,673,903	699,684	52,338	2,513	75,670	14,491	38,153
1887	626,150	50,092	3,431	27,450	1938 <sup>e</sup>	7,545,744	932,420	47,934	747	22,884	13,865	35,128
	354,800	28,384	4,317	34,533	1939 <sup>e</sup>	5,704,250	722,310	43,518	1,106	34,571	17,842	25,550
					1940 <sup>f</sup>							
Total	341,629,827	33,684,405	684,987	423,196	5,268,524	1,419,571	718,723					

<sup>a</sup> The exports up to the year 1834 consisted only of supplies to shipping, of which no record is kept.  
<sup>b</sup> Not available.  
<sup>c</sup> Approximate figures only.  
<sup>d</sup> Six months ended 30th June.  
<sup>e</sup> Year ended 30th June.  
<sup>f</sup> Figures not available for publication.

\* Principally Sandalwood Oil.

## APPENDIX 3.

## TIMBER INDUSTRY REGULATION ACT, 1926.

*Annual Report for the year ended 31st December, 1939.*

At the close of the year there were 138 mills subject to the provisions of the Act and receiving periodic inspections from the District and Workmen's Inspectors. In all 179 inspections of timber holdings were made, and 576 notifiable accidents were investigated and reported upon by the Inspectors.

The average number of persons employed on timber holdings throughout the year was 2,940, or 240 less than for the previous year. The number of accidents that occurred to every 100 persons employed rose from 18 in 1938 to 19.9 last year. The total period of incapacity as a result of accidents was 13,823 days or an average of 24 days per injured person.

Of the accidents reported only one proved fatal when an employee who was preparing the skids in front of a log from which the first cut had been taken by the twin saws, jumped over a beam guard into the main belt race and was killed. At the inquiry it was thought that his action was due to the fact that the log rolled over towards him when the grab hooks holding it on the traveller were released.

Returns as listed hereunder have been prepared, but owing to high cost of printing have not been included in this report:—

1. Number of notifiable accidents reported in accordance with Section 14 of the Timber Industry Regulation Act, according to months, and indicating the nationality and age of the person injured, the period of incapacity, the number of occasions on which the first-aid outfit was used and the monthly fatigue symbol during the year ended 31st December, 1939.
2. The number of notifiable accidents reported during the year 1939, according to months and days of the week on which the accidents happened.
3. By months, the time at which the notifiable accidents occurred.
4. The number of hours worked on the day and up to the time of sustaining the accident by persons injured.
5. The number of accidents reported during the year 1939, classified according to the cause of accident and location of injury.
6. The number of accidents reported during the year 1939, classified according to the cause of accident and nature of injury.
7. The number of accidents reported during the year 1939, classified according to the location and nature of injury.
8. The personal cause of the accidents reported during the year ended 31st December, 1939, as determined by the District Inspector.

S. L. KESSELL,  
Controlling Officer.

Perth, 19th September, 1940.