

BULLETIN No. 46 (SECOND EDITION).

Western



Australia

FORESTS DEPARTMENT.

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THE HARDWOODS  
OF  
WESTERN AUSTRALIA  
AND THEIR  
USES.

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Conservator of Forests.

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Issued under the Authority of the Minister for Forests :  
THE HON. P. COLLIER, M.L.A.

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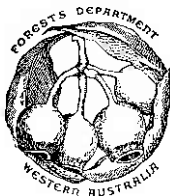
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# THE HARDWOODS OF WESTERN AUSTRALIA



THE FORESTS OF WESTERN AUSTRALIA are composed of hardwoods, which, with remarkably few exceptions, belong to the genus *Eucalyptus*. These *Eucalypts* vary from the towering giants of the Karri forest, where trees 250 feet in height yield 30,000 to 40,000 super. feet of sawn timber to the acre, to the mallee species in regions of lower rainfall, which develop as dense thickets only a few feet in height.

Of particular interest to the botanist are the savannah woodlands of the dry interior, where *Eucalypts* of forty to sixty feet in height flourish on an annual rainfall of eight to ten inches. The mining timber and firewood obtained from these forests have largely contributed to make gold mining on an extensive scale economically possible. Within the 10in. to 20in. rainfall belt the same species show a better development, and the hard, dense timbers are utilised to a limited extent for wheelwright work, but their excellence is not appreciated in a country of such abundant hardwood supplies, and the timber is being cleared to make way for the growing of wheat.

An interesting and valuable tree which has proved a source of revenue to Western Australia is Sandalwood (*Santalum spicatum*), once found in large quantities throughout the areas east of the Darling Range, now closely settled by wheat farmers. Almost a century of exploitation has resulted in its complete exhaustion in populated districts, and the wood at present pulled is hauled in 80 to 150 miles to the railway lines running to gold-mining centres of the interior.

The prime forest regions of the State are confined to the extreme South-West. 3,134,931 acres have been permanently dedicated as State Forests, and 1,757,085 acres gazetted as Timber Reserves. Extensive reforestation operations now in progress aim to provide a sustained output of saw-milling timber in perpetuity. The approximate positions of the main timber regions are shown on the map on the opposite page.

The timber export trade of the State is at present confined to Jarrah (*Eucalyptus marginata*) and Karri (*Eucalyptus diversicolor*). The extent of this trade may be gathered from the following figures :—

During the Year.	Timber Exported per annum.	Value.
	cubic feet.	£
1850	10,500	1,048
1860	54,800	4,932
1870	157,200	17,551
1880	662,550	66,252
1890	1,172,200	82,052
1900	5,725,400	458,461
1910	12,074,100	972,698
1920	5,065,300	487,666
1925	11,844,303	1,491,925
1930	6,579,743	812,112
1935	5,326,117	701,960

The total amount of timber so far exported is 317,107,750 cub. feet, valued at £31,142,317, the countries to which it is sent including the United Kingdom, South Africa, Ceylon, New Zealand, British Malaya, Sweden, Egypt, India, Mauritius, Belgium, Germany, Holland, France, China, Iraq, and Portuguese East Africa.

Other hardwoods having special qualities, which are available in small quantities, are dealt with seriatim at the end of this publication.

## JARRAH.

(*Eucalyptus marginata*).

Jarrah, which is the principal timber of the State, was originally known as mahogany on account of its resemblance to the Honduras timber of that name. Its extraordinary durability, under all conditions, however, resulted in the development of a large export trade in railway sleepers and paving blocks, to the serious prejudice, until the past few years, of the application of the timber to more valuable uses.

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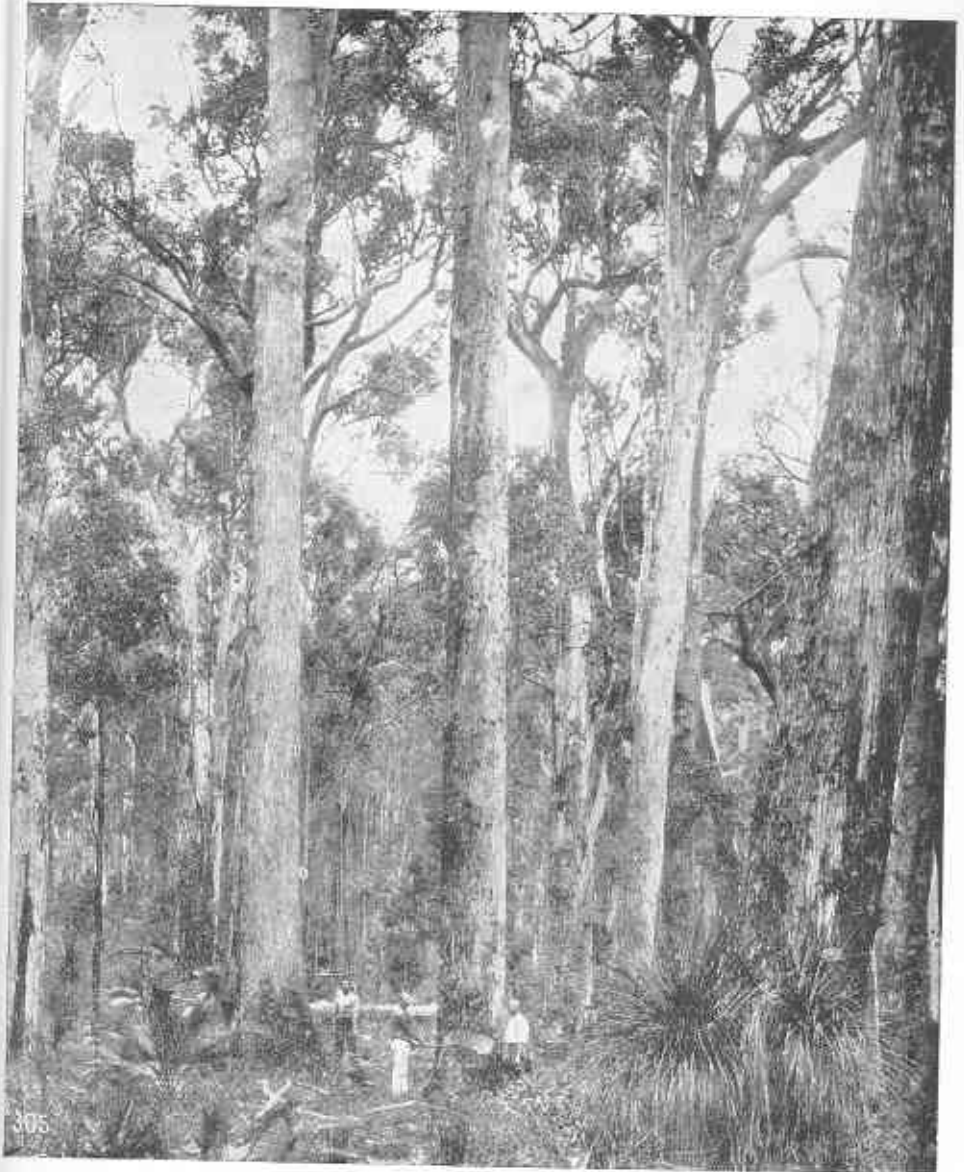
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Jarrah Forest (*Eucalyptus marginata*).



*Karri Forest (Eucalyptus diversicolor.)*

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## Extent of Forests.

Jarrah is a magnificent tree, 3 to 5 feet in diameter, with 40 to 50 feet of clear bole, and a total height of 100 to 150 feet. The species, which occurs in pure formation, attains its best development on the laterite-capped Darling Range. This better-quality forest extends over some 3,000,000 acres, practically the whole of which has been dedicated as State Forest. A less imposing, more stunted form of Jarrah is to be found predominating over some 13,000,000 acres in the South-West Division of the State (for location see map at page 2). The average rainfall of the prime Jarrah Belt along the Darling Ranges is between 30 and 40 inches, which falls almost entirely during the six winter months. The soil is unsuited for agriculture, being largely derived from the disintegration of granites, and a capping of laterite or laterite gravel is a prevailing feature. The best trees and heaviest forest are to be found on the "ironstone ridges."

The Jarrah forest is not as impressive from a scenic point of view as some other types of eucalypt forest, but, on account of the large compact area of good-quality forest of a single species, it is probably the most valuable forest region in Australia. Over a million and a quarter acres of the best and most accessible Jarrah forest has been cut over, and on much of this forest there is a considerable volume of mature and semi-mature timber remaining which will provide a second cut in the near future. During the past ten years 199,595 acres have been restocked with sapling growth by natural regeneration, as a result of the silvicultural work carried out by the Forests Department.

## Method of Exploitation.

Practically the whole of the sawn Jarrah timber exported is cut from Crown lands over which sawmilling companies hold cutting rights under various forms of tenure. A uniform regulation for the preservation of young timber, applied for many years to all Crown lands, prohibiting the cutting of any Jarrah tree of less than ninety inches in circumference at a height of four feet three inches above the ground. In lieu of this arbitrary selection system, the trees to be removed are now being marked by trained foresters, so that the removal of the mature stand of virgin forest is treated as the first step in the natural regeneration of the valuable Jarrah crop.

In the past large sawmills have operated their own railway lines hauling timber into central mills from 20 to 30 miles distant, but, with improved road and rail facilities in the timber districts, the modern tendency is to smaller mills using motor transport.

The large export of railway sleepers led to a considerable amount of wasteful exploitation by sleeper hewers in past years. Since the passing of the Forests Act, 1918, the number of hewers working on Crown Lands has been limited, and their operations have been confined to forest carrying too sparse a crop of timber to be economically worked by sawmills. This policy has resulted in a good deal of the slow-grown timber on the fringes of the prime belt being hewn into sleepers. This class of Jarrah is more interlocked in the grain and consequently the hewn sleepers obtained, although denser and more durable, are much rougher in appearance than sleepers cut from faster grown timber in the prime forest.

## Properties and Uses of Jarrah.

Jarrah is reddish-brown in colour, and for a hardwood remarkably easily worked. Its properties are such as to commend it for all constructional work for civil engineering and building purposes.

### *Density :*

Green—68lbs. per cubic ft.

Dry (at 12 per cent. moisture)—55 lbs. per cubic ft.

*Transverse Strength* (Beams 20 sq. in. cross section at 12 per cent. moisture) :

Modulus of Rupture—15,000 lbs. per sq. in.

Modulus of Elasticity—2,080,000 lbs. per sq. in.

In this State, which is practically without indigenous softwoods, Jarrah is used with considerable satisfaction for every purpose. The large size of the average Jarrah tree makes it possible to obtain the timber in large sizes free from heart, for all kinds of bridges, wharf and jetty work. In the form of piles, stringers and decking, it has been employed so largely that there is scarcely a wharf, pier or jetty in Western Australia into the construction of which Jarrah has not extensively entered. As a building timber it is eminently satisfactory, being used in the sawn state for stumps, joists, weatherboards, flooring boards, wall plates, studs, rafters, laths and shingles. Its utility for railway sleepers and paving blocks, for which uses it is required to withstand combined ravages of fungi, white ants, and other destructive insects, is sufficiently well known to need no special emphasis.

The prejudice which at one time existed against the use of Jarrah for high grade purposes has disappeared, and the timber is recognised as being eminently suited for this class of work, and makes excellent dadoes, panelling, partitioning, stair-railing, counters, and similar furnishings.

The timber is comparatively easy to work with machine tools and takes a good finish whether polished or waxed.

Jarrah, when used for cabinet work and general joinery purposes, requires to be properly seasoned. Although by careful seasoning practice satisfactory results may be obtained by air seasoning over a period of years, sawmilling companies are now installing kiln drying plants. Standard practice in Western Australia is a combination of pre-air drying for a period of months, following which the timber is kiln dried for a few days to complete the seasoning process and to relieve all internal stresses which may have been set up in the early stages of air drying. It is not usual to kiln dry sizes larger than 3 inches in thickness, although this method has been used in exceptional circumstances for timber up to 4½ inches in thickness.

Jarrah floors are becoming increasingly popular overseas. Several English firms are now importing Jarrah exclusively for flooring and decorative work, and they have supplied contracts for flooring buildings in London and other towns throughout the length and breadth of England. These buildings include schools, churches, hospitals, factories, aerodromes, public offices, and various other erections. His Grace, the Duke of Abercorn, has expressed himself as particularly pleased



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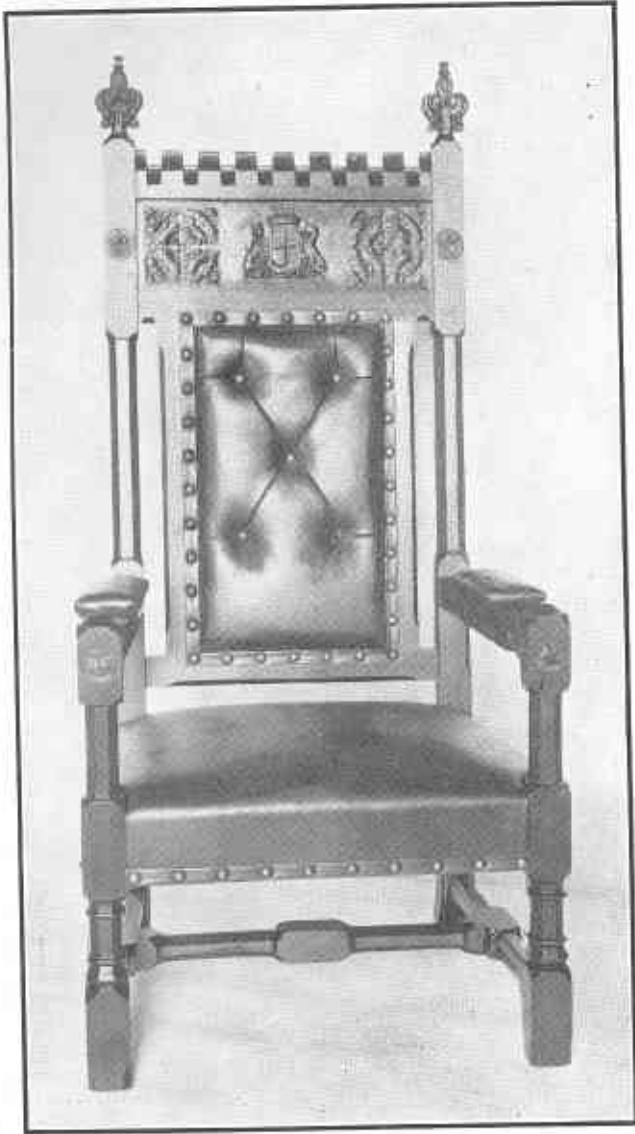
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*Jarrah Saplings following regeneration operations, Dwellingup District.*



### JARRAH CHAIR

*(presented to the Empire Parliamentary Association by the Government of Western Australia, for use in the House of Commons).*

*This chair shows the suitability of Jarrah for high-grade cabinet and carving work.*

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with the Jarrah floor laid some years ago in the dining room of Barons' Court, his residence in County Tyrone, Ireland, and highly recommends Jarrah as an excellent material for the flooring of large rooms. His Grace states that the flooring has given the utmost satisfaction, the wood has bound well together, giving an extremely smooth and hard-wearing surface and when polished, the floor, which is stained a dark mahogany colour, reflects like glass.

On account of its exceptional fire-resisting properties, the use of Jarrah, both for strength members and interior furnishings, undoubtedly tends greatly to reduce the inflammability of a building and its contents. In beam and column work it has already been amply demonstrated that Jarrah is far superior to unprotected steel, on account of its ability to continue its work under conditions where steel would long before have buckled as a result of the intensity of the heat. Perhaps there is no more remarkable tribute to the fire-resisting properties of Jarrah than its use throughout the Jarrah belt for fireplaces and chimneys. A stone or clay wall about 1ft. or 1ft. 6in. high at the base of the chimney, often is the only protection for the woodwork in a fireplace which in winter houses many a roaring logwood fire.

An extract which illustrates the special qualities of the timber in this respect, taken from a report by Mr. George Hughes, M.Inst. C.E., on the attempt to fit a section of the Lancashire and Yorkshire Railway with all-metal cars and all metal appliances, is given hereunder:—

**TROLLY-CABLE.**—Naturally the designer was extremely anxious that it should be an "all-metal" car in every sense of the term, therefore the question of housing the trolley-cable gave rise to considerable investigation, and every endeavour was made to find a substitute for Jarrah timber, which had been used for some years quite successfully on the Liverpool-Southport 600-volt Section of the Lancashire and Yorkshire Railway. Exhaustive tests had been made in 1909 upon prepared samples of kauri-wood, jarrah, oak (untreated as well as treated with alum and copper sulphate), iron pipes, fireproof cables, concrete, Canadian redwood, uralite-asbestos and wych elm, with a view of approximating to working conditions and breaking down the material experimented upon with current up to 1,000 amperes at 600 volts; the object being to ascertain, the arc once started, which design and which material resisted and damped the arc in the most successful way, and with the least damage to the surrounding structure.

It was found that jarrah fulfilled all the conditions most successfully; nevertheless, when the all-metal car was being designed, further considerable investigations were undertaken to find a substitute for jarrah, but without success; therefore jarrah was used. It is an additional insulation, it will not burn with a flame, and it smothers an arc when formed.

Following extensive reforestation operations now proceeding in the Jarrah forests, a large volume of thinnings will be available each year, which may profitably be used for the manufacture of paper pulp, wall-board, etc. At the present time, through lack of a market, Jarrah and Marri thinnings are being left to rot in the bush. The Forests Department plan to treat an increasingly large area every year, and,

in ten years' time, it is estimated that 30,000 acres will be regenerated and thinned annually, which will mean that approximately 300,000 tons of round wood suitable for pulping will be available from this source alone. Very large quantities of thinnings will be available from other sources both before and after this acreage is reached, and, in view of the permanency of supplies and the low estimated cost of raw material, it is confidently anticipated that a useful industry will be established. Recent tests have shown that a very strong paper is obtainable from immature Jarrah.

### Trade Practice and Ruling Prices.

The unit of measure for sawn and hewn timber in Western Australia is the "load," which is a volume measure equal to 50 cubic feet or 600 super. or board feet. Timber is cut according to buyers' requirements both in respect to size and specification. The Forests Department has a well-organised inspection branch which inspects and brands large quantities of timber each year on behalf of both local and overseas buyers. In many contracts entered into between overseas buyers and local sawmilling firms Forests Department inspection is accepted as final by both parties.

The need for standard grading rules has been recognised for many years past. In 1933 a comprehensive grading study was undertaken jointly by the Forests Products Division of the Commonwealth Council for Scientific and Industrial Research and the Utilisation Branch of the Forests Department of Western Australia. The result was published as a Bulletin of the Council for Scientific and Industrial Research. This field investigation, which extended over six months, resulted in the preparation of draft specifications for various classes of timber commonly produced in Western Australian sawmills. These draft specifications have now been superseded by standard specifications issued by the Forests Department in the form of a Bulletin (No. 49), copies of which may be obtained on application. This contains standard specifications for all classes of structural timber, railway sleepers, railway crossing timbers, telegraph arms, mine guides, split and wood block flooring, and wagon scantling. The work of preparing standard specifications for other classes of timber commonly produced is now in hand, and this should be ready for publication during 1936. If, for any reason, standard specifications are found unsuitable for the special requirements of any buyer, the Department is prepared to advise on modifications considered necessary to meet such special requirements and to inspect accordingly.

Prices fluctuate considerably, particularly for sleepers. Local firms will quote rates f.o.b. Australian ports or c.i.f. overseas ports as desired by purchasers. Lists of reliable timber-exporting firms will be supplied by the Forests Department on application.

### Forest Regeneration.

Natural regeneration develops freely on most Jarrah forest types following sawmilling operations, but in the past much of this second growth forest has been badly damaged by bush fires. With the extension of reforestation measures during recent years, a large portion of the cut-over Jarrah forest has been restocked with a vigorous sapling crop, and this work is being rapidly extended as a result of special grants made by the State and Commonwealth Governments to provide unemployment relief work.

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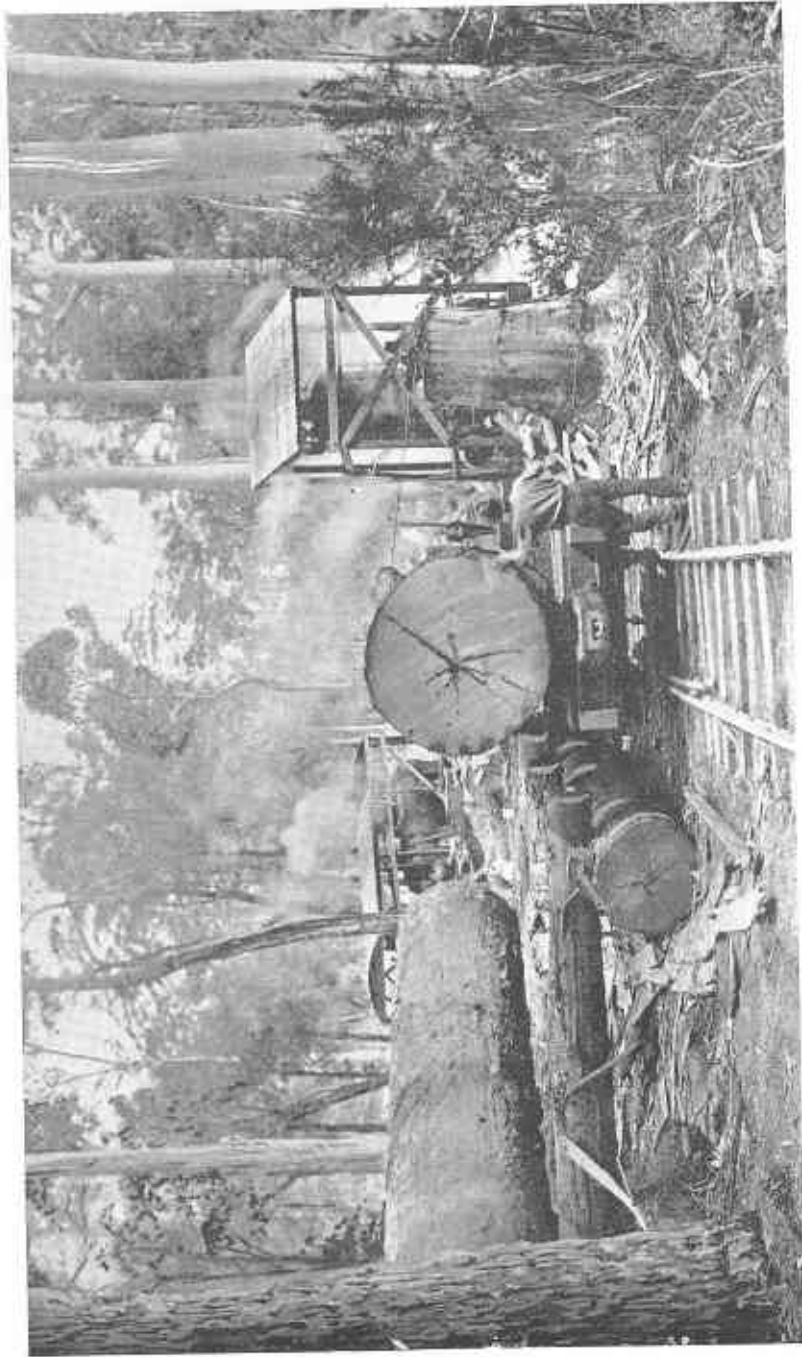
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*No. 1 State Mill at Manjimup.*



*Steam Winch Loading Karri Log. Log Hauler in background.*

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Sawmilling and hewing operations throughout the whole of the Jarrah forests of the State have been brought under Working Plan control, and log supplies for the sawmilling industry are now regulated on a sustained yield basis.

As a basis for the preparation of Working Plans, a detailed assessment of standing timber has been carried out over 3,500,000 acres. Topographical survey to locate roads, firelines, etc., has been carried out over 1,725,000 acres. One hundred and seventy-five houses have been erected for the accommodation of resident workmen in Forests Settlements distributed throughout the cut-over forest where regeneration operations are in progress. Three thousand miles of roads and tracks have been opened up and made suitable for vehicular traffic. Twelve lookout towers have been erected, which are constantly manned for the early detection of fires during the summer months. Four hundred and fifty miles of telephone line have been constructed to provide communication between fire towers, district offices, and resident workmen, for the purposes of fire control and general administration. With this organisation as a basis, efficient fire control methods have been evolved and the area now treated for regeneration and brought under intensive fire control measures is 225,000 acres.

## KARRI.

(*Eucalyptus diversicolor*.)

Karri is a timber which greatly resembles Jarrah in appearance, and those without considerable experience in the handling of the two timbers are unable to distinguish between them. Karri is somewhat stronger than Jarrah, and consequently superior for superstructural work. A simple method of distinguishing between Jarrah and Karri is the burning of a splinter of each timber in a sheltered position. The Jarrah splinter will char, leaving a blackened mass of charcoal, whereas the Karri splinter will burn away, leaving a fine white ash.

### Extent of Forest.

Karri is one of the most magnificent of Australian forest trees. It ranks among the tallest of the Eucalypts, and trees up to 270 feet in height have been measured. Many trees are to be found in the forest with clean boles up to 150 feet in height, and basal diameters of 8 to 10 feet are common. Karri is restricted in its habitat to the extreme South-West of the State, where the average rainfall is from 40 to 50 inches. The soil is of a loamy nature, but, in the pure Karri forest, disappointing from an agricultural point of view. The pure Karri forest is limited to 75,000 acres, but mixed with other species, particularly Marri (*Eucalyptus calophylla*), the timber grows in commercial quantities over a very much greater area. Although much of the mixed Karri and Marri from which the Karri has been removed by sawmillers, has been converted into dairy farms, the remaining forest, amounting to nearly half a million acres, is now dedicated as State Forest, on which regeneration measures have been undertaken on a considerable scale during the past few years. Owing to the enormous height and volume of Karri trees, the yield of timber per acre is very high, amounting at times to over 90,000 super. feet of log timber.

## Method of Exploitation.

There are at present only three large mills cutting Karri. These have an average intake capacity of 16,000 cubic feet per day. Each sawmilling company holds exclusive cutting rights over a section of forest under permit issued by the Forests Department, and the procedure generally is the same as that applying in the Jarrah forest. The falling of timber is on a piecework basis, rates varying according to the class of forest. For hauling logs to the bush landing steam haulers are favoured in the heavy loadage Karri forest with big logs. Karri is not hewn by hand.

## Properties and Uses of Timber.

Karri, as already indicated, is reddish brown in colour.

### *Density :*

Green, 72 lbs. per cubic foot.

Dry (at 12 per cent. moisture), 58 lbs. per cubic foot.

*Transverse Strength* (Beams 20 sq. in. cross section at 12 per cent. moisture) :

Modulus of Rupture, 17,300 lbs. per square inch.

Modulus of Elasticity, 2,680,000 lbs. per square inch.

The uses of Karri are numerous. The strength and stiffness of the timber, combined with the extraordinarily long, clean lengths which may be obtained, render it unsurpassable for superstructural work, and it is not surprising to learn that, of recent years, the name "Karri, the Beam Timber," has been applied to this wood. In beams, rafters, columns, warehouse floor joists, and other members, where strength is the essential factor, Karri gives every satisfaction. It may be mentioned that, in one of the mills in the Karri forest, the roof is carried by two trusses with a common tie beam consisting of a piece of 12in. by 12in. Karri 80 feet in length. Karri makes very satisfactory transmission line cross arms, and it is also used to a considerable extent for coach, wagon, motor vehicle and wheelwright work. For the manufacture of wooden pipes it has been found eminently satisfactory, and, after a number of years' use, pipes of Karri are still giving efficient service in a water-power system, although the water pressure is considerably greater than that usually considered advisable for wood stave piping. With suitable machinery, Karri can be rotary cut or sliced into first-class veneer or plywood. As a flooring, Karri gives excellent service, and, at the State Sawmills, Pemberton, large air-seasoning stacks of this are held. At this mill also there is a case mill turning out pieces for fruit cases, the Karri case with the dressed edges of its face boards being of outstanding quality.

Karri appears to offer a considerable field for the development of a valuable paper pulp-making industry. Experiments made by the Commonwealth Council for Scientific and Industrial Research have proved that Karri, both young and mature, is a suitable raw material for the manufacture of paper pulp.

It is estimated that thinnings from the existing crop of Karri re-growth on one small forest of 5,000 acres will supply the requirements of a small mill for 20 years, after which time further thinnings from other Karri forests in the neighbourhood, and pines to be planted on adjoining country, should enable supplies to be maintained indefinitely.



## Trade Practice and Ruling Prices.

The same firms deal in Karri as in Jarrah, and consequently the method of sale is the same. Karri may usually be obtained at a slightly lower rate than Jarrah.

## Forest Regeneration.

Karri regenerates prolifically from seed in a good seed year, which occurs approximately every three years. As many as 20,000 plants per acre may be established under these conditions.

The cut-over Karri forest is being restocked by natural regeneration immediately following trade cutting operations. Regeneration work is being carried out by the Forests Department on the same lines as in the Jarrah forests, the forest being divided into blocks of some 10,000 acres, which, again, are subdivided by old tramway formations, roads, water-courses, etc., into compartments of a few hundred acres, to facilitate forest management and fire-control operations. On 16,100 acres a new crop of vigorously growing young Karri has been established and is being tended and protected. Topographical survey has been carried out over 50,000 acres, 125 miles of roads and tracks have been made, 45 miles of telephone line established, and 8 houses built for the housing of forest workmen.

## TUART.

(*Eucalyptus gomphocephala*).

The prime Tuart forest is limited to some 6,000 acres on the coastal limestone formation between Bunbury and Busselton. Practically the whole area is State Forest.

*Density :*

Green—78 lbs. per cubic ft.

Dry (at 12 per cent. moisture)—68 lbs. per cubic ft.

*Transverse Strength* (Beams 20 sq. inch in cross section at 12 per cent. moisture):

Modulus of Rupture—17,900 lbs. per sq. inch.

Modulus of Elasticity—2,560,000 lbs. per sq. inch.

The timber is light in colour and of a hard, dense, interlocked nature. Its main use is for railway wagon and truck construction, and it has the valuable characteristic of having no corrosive effect on iron with which it is in contact.

## WANDOO.

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

Wandoo occurs only in open savannah forests on the fringes of the Jarrah forest. The timber is very similar to Tuart, and is used for the same purposes, including railway wagon construction. It is very durable in the ground and has remarkably long life as a railway sleeper, some Wandoo sleepers which have been over 40 years in the line being still in fair condition, and others which have been in 32 years being in good condition. The local railway authorities estimate the average life of Wandoo sleepers as 30 years, one outstanding advantage being the great holding power against the pull of the dogspikes.

*Density :*

Green—79 lbs. per cubic ft.

Dry (at 12 per cent. moisture)—71 lbs. per cubic ft.

*Transverse Strength* (Beams 20 sq. inch in cross section at 12 per cent. moisture) :

Modulus of Rupture—16,100 lbs. per sq. inch.

Modulus of Elasticity—2,190,000 lbs. per sq. inch.

The manufacture of tannin extract from Wandoo bark and timber is now being undertaken on a fairly large scale. This product is sold under the trade name of "Myrtan."

## SALMON GUM.

(*Eucalyptus salmonophloia*).

Salmon Gum is a typical tree of the savannah woodlands of the dry interior. Thousands of tons of this and similar timbers are burnt annually in clearing land for wheat-growing.

*Density :*

Green—70 lbs. per cubic ft.

Dry (at 12 per cent. moisture)—66 lbs. per cubic ft.

*Transverse Strength* (Beams 20 sq. inch in cross section at 12 per cent. moisture) :

Modulus of Rupture—20,100 lbs. per sq. inch.

Modulus of Elasticity—2,500,000 lbs. per sq. inch.

It is an exceedingly dense wood, and is classed as the second strongest in Australia.

## MALLET.

(*Eucalyptus spp.*).

There are several species of Eucalypts commonly referred to as Mallet, the most important being Brown Mallet (*Eucalyptus astringens*), which grows to a height of 30 to 50 feet and has a smooth brownish or greyish bark, the bole being straight, and sometimes reaching 30 feet in length and up to 7ft. 6in. in girth.

It occurs as pure forest in small patches or colonies over a large tract of country lying to the East and West of the Great Southern Railway from Brookton to Tambellup within the 15-30 inch rainfall belt.

Brown Mallet bark has a tannin content of 40-57 per cent., and the value of bark exported during the last thirty years amounts to over £1,000,000.

On unproductive country infested with poison plants within the Mallet habitat the reforestation of this species is being rapidly extended. Over 6,500 acres of plantations have been established, and 1,000 acres of natural regeneration thinned and fire-protected.

Brown Mallet timber is light brown in colour, hard, and remarkably tough, and may prove suitable for axe and other tool handles.

## SANDALWOOD.

(*Santalum spicatum*).

Sandalwood is a small tree, attaining a height of only twelve to sixteen feet, and a diameter of six to eight inches. In the early days of the colony, much larger specimens were found in districts which are now closely settled wheat-farming areas. The wood is a light, brownish-yellow colour, and the heartwood is strongly aromatic.

An interesting feature of Sandalwood is that the tree does not grow independently but is a root parasite, the haustoria on the young roots attaching themselves to the roots of adjacent host plants and obtaining their water and mineral requirements from this source.

There are two principal markets for Sandalwood. The first is in China, where the fragrant properties of the wood have led to its extensive use in the manufacture of "Joss sticks," a form of incense for burning in religious ceremonies. The bulk of the Sandalwood sent to China is used for this purpose, but the wood is also a popular medium for carved woodwork, the making of trinket boxes and a host of other small articles. The value of Sandalwood exported from Western Australia to date is £5,090,483.

For some years past the control of the whole of the Sandalwood export from Australia has been in the hands of a Sandalwood Export Committee, composed of one Government representative of each of the exporting States and one representative of the companies handling the export business. The result has been the stabilisation of the industry, so that cutters receive regular orders, and the shipment of wood from Australia is regulated by actual sales in China.

The other important market for the wood is in the distillation by local firms of a Sandalwood Oil of high quality, which is now recognised by the British Pharmacopœia and the French Codex. The value of oil so far exported from the State is £592,334.