THE DEVELOPMENT OF FORESTRY IN WESTERN AUSTRALIA.

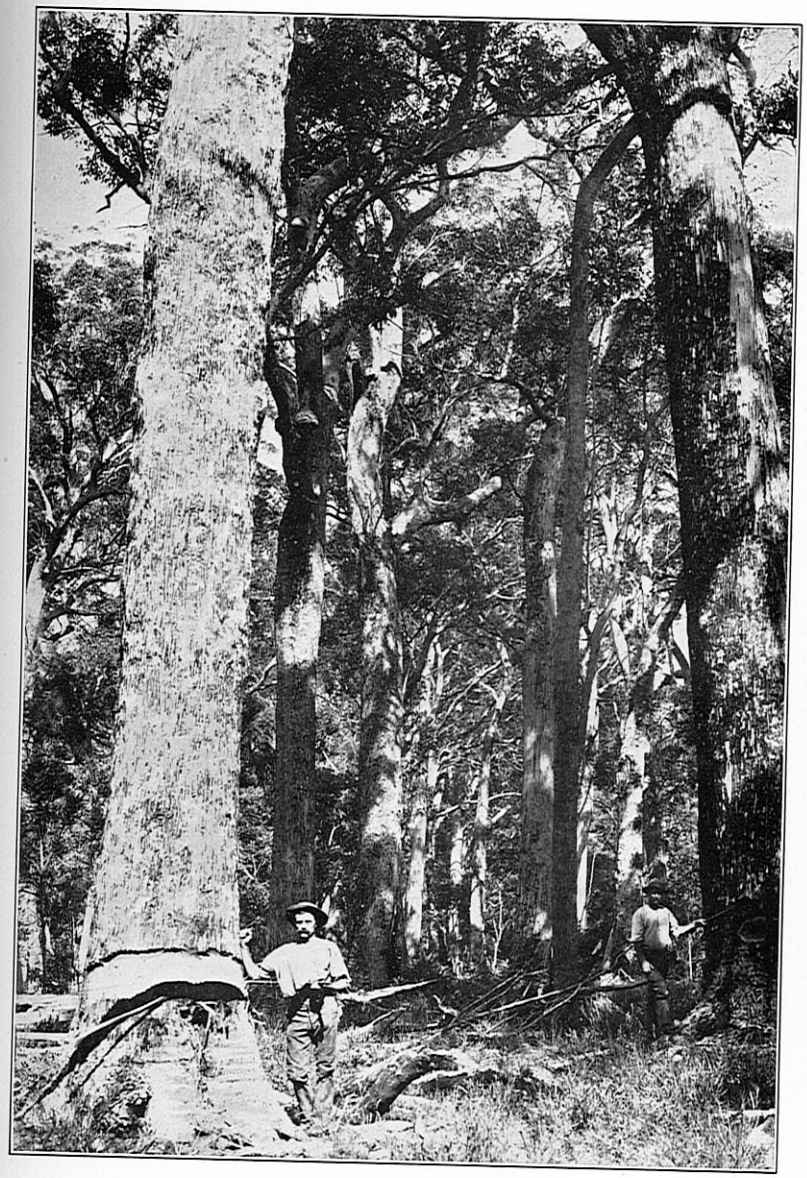
By S. L. KESSELL,

Conservator of Forests, Perth, W. A.

THE exploitation of the forest wealth of the south-western portion of the Australian continent has played an important part in establishing a flourishing Anglo-Saxon community. The regeneration and protection of devastated forests will ultimately play a much larger part in populating this corner of the Empire.

Jarrah and karri, which are found only in Western Australia. are two of the best known hardwoods on the world's markets, The value of these timbers exported since the first shipment left for England in 1844 amounts to £22,000,000. German scientists realized the value of mallet bark as a tanning agent in 1903, and £1,050,000 worth of bark has since left the country. For many years nearly the whole of the incense burnt in Chinese temples was obtained from those portions of Western Australia which are now waving fields of wheat. The declared Customs value of the sandalwood exported, ungraded and only partly cleaned, amounts to £4,000,000. Lest such figures conjure up a vision of endless forests in a State extending over 624,589,000 acres, it is necessary that the narrow limits of the prime forest region be explained in some detail. Hardwood forests carrying timber in merchantable quantities are limited to the extreme south-west corner of the State, and do not extend further north than the capital city, Perth, nor further east than the port of Albany.

The prime jarrah (*Eucalyptus marginata*) forest is confined to an area of 2,500,000 acres extending along a low range of ironstone hills some 20 miles distant from the coastline, and parallel to it. Further south, where the western and southern coastlines of the continent meet, are magnificent forests of prime karri (*Eucalyptus diversicolor*), but limited to little more than 200,000 acres. These figures refer to prime forest country, practically the whole of which has been cut over by sawmillers and sleeper-hewers, and it is



FOREST OF JARRAH (*Eucalyptus marginata*), the principal tree of the State of Western Australia.

only during the past few years that this exploitation has been associated with any reafforestation measures.

The only timber of economic importance found on the sandy, coastal plain is tuart (*Eucalyptus gomphocephala*), and the prime forest region consists of a compact area of some 7,000 acres, which is now being worked for Government requirements on the principle of a sustained yield.

Further inland, on the eastern edge of the prime forest belt, are extensive areas of open, park-like forests of wandoo (*Eucalyptus redunca* var. *elata*). In a few favoured localities mallet (*Eucalyptus astringens*) and other species of eucalypts carrying a high tannin content in their bark are found.

To the north and east of the wandoo belt, the open savannah forests of salmon gum (*Eucalyptus salmonophloia*), morrell (*Eucalyptus longicornis*), York gum (*Eucalyptus foecunda* var. *loxophleba*), and many other eucalypts have been cleared from several million acres to make way for the growing of cereals. All these eucalypts are timber trees which would be highly prized in a country less bountifully endowed with hardwoods. To the pioneer their destruction has been a long and arduous task, and the only forest produce convertible into money has been an occasional tree of sandalwood, which, as a root parasite, occurs scattered among many different species of host plants.

The manner in which these forests extend into the dry interior is a source of wonder to the botanist and forester. Trees 60 and 70 feet in height and capable of yielding 5,600 tons of firewood to the square mile are found growing and regenerating on country where the subsoil water is excessively brackish and the average annual rainfall, which does not exceed eight inches, falls in heavy showers at long intervals. These forests have served to render deep mining on the "Golden Mile" at Kalgoorlie possible. Water to support a population of 12,000 is pumped in pipes 350 miles, from a reservoir on the coastal ranges, but timber and fuel hauled from virgin forests within a radius of less than 100 miles has supplied all requirements for thirty years. Fifteen million tons of wood—used in the early days for the condensing of water, and domestic fuel, and, later, for underground mining and firewood in huge power plants—have served to win £80,000,000 worth of gold.

In this country, marked on so many maps as "desert," natural regeneration is prolific in certain years, but growth is slow, as may be expected. It is only during the past few years that attempts have been made to protect the young regrowth around large mining towns. Sandalwood (*Santalum*

cygnorum) is found right through into the interior, and the sandalwood-getter with his camel team is to-day blazing the trail for the mining prospector. Recent experiments have shown that, on certain soils, with a proper appreciation of the parasitic habits of the tree, the regeneration of sandalwood on an annual rainfall of 8 to 12 inches is by no means impracticable, and the rate of growth to be expected, more rapid than had been thought possible. Although such undertakings as the regeneration of sandalwood and mallet and the growth of fence posts and firewood for the farming community in agricultural districts are becoming increasingly important activities of the Forests Department, forestry practice as understood in Europe is confined to the extreme south-western portion of the State.

During the early years of the Colony, the supplies of all classes of forest produce seemed inexhaustible, and exploitation went on unchecked. In 1904 a few men in responsible positions began to realize that the forests could not support the rapidly growing timber trade indefinitely. It was not until 1916 that a definite move in the direction of forest conservation was made, when Mr. C. E. Lane-Poole—now Forestry Adviser to the Commonwealth Government—was appointed Conservator of Forests. During his tenure of office, from 1916 to 1921, he laid the foundation of a sound and constructive forest policy. In 1919 a modern Forestry Act was placed on the Statute Book. A comprehensive survey and stocktaking of all prime forest country was completed. An indifferent public was made to realize that forestry is a necessary and proper function of the Government.

On such a foundation it has been possible, during the past four years, to develop a department actively engaged in reafforestation work on a considerable scale in all classes of indigenous forest, and rapidly developing pine plantations which will render the State independent of outside sources for supplies of softwood. The inauguration of reafforestation and afforestation work has not meant a drain on the resources of the Treasury, but, on the contrary, the control of exploitation has resulted in the forestry revenue, which was £53,000 in the record year of the export trade, ending June, 1914, reaching the sum of £178,000 during the year ending 30th June, 1925. Under the provisions of the Forests Act, 1918, three-fifths of the net revenue of the Department is available for "reafforestation of State forests and the development of forestry." Progress during the years 1921 and 1922 was slow. Trained staff was unobtainable, and no silvicultural

TYPICAL KARRI FOREST (*Eucalyptus diversicolor*) showing all stages of growth.

work, even of an experimental nature, had been undertaken previously in indigenous forests.

Five summer months practically without rain each year render all problems of natural regeneration, planting and fire control extremely difficult, and also limit the number of exotic species which may be introduced with reasonable hope of success. Efficient fire control must be the basis of all work. Local timber-men of long experience have maintained that fire protection is impossible. The insidious doctrine that frequent creeping fires assist the forests in their growth and a universal mania for setting " the bush " on fire have increased the difficulties. The wonderful vitality of the eucalypts has maintained a green-looking forest after being subjected to comparatively fierce fires every few years for the past 50 years. The traveller, and even the bush worker, look on the delicate green of sucker shoots and malformed saplings and rejoice in the supposed growth of young trees. The forester in Western Australia is often driven to wish that burning caused more apparent damage in the forest.

Fire control by lookout towers has been shown to be not only practicable but economically possible over extensive areas of jarrah forest. Men are employed on effective work in " the bush " and maintain communication with the lookout tower by telephone or heliograph. Old timber tramway tracks and roads left by timber-getters form invaluable lines of transport and serve as firebreaks. Direct beating of fires is the method employed early in the season, but counterfiring is necessary in the height of summer. The rake is found to be the most efficient weapon of the fire fighter. Dangerous hazards, such as gullies carrying heavy undergrowth and little timber, are burnt early in the season, but often the hot weather sets in so rapidly after the rains finish that such precautionary measures are impossible. The burning of fire hazards was not possible in the Collie district during the past season, with the result that costs of fire control were somewhat high, but the following summary is an interesting indication of what may be done under difficult conditions:

WORKING PLAN NO. 3.

(One lookout tower fitted with range-finder).

Area under protection	102,000 acres.
Number of outbreaks of fire ..	95.
Area burnt..	1,741 acres.
Percentage	1.70 per cent.
Cost	1.85 pence per acre.

This forest, which surrounds an important coal mining centre, is one of the first areas on which regeneration work was undertaken and fire control established. During the past four years leaf litter has been accumulating, so that the figures given are a fair indication of what is possible. The total area under complete fire control at the end of last season was 228,000 acres.

In addition to intensive fire control where regeneration work is in progress, steps are now taken to dispose of lop and top resulting from felling operations on all permit areas being worked in prime forest. Until such time as the marking of trees to be felled can be undertaken, permit-holders are working under minimum girth restrictions. A mature jarrah tree is taken to be one at least 90 inches in circumference at 4 ft. 3 ins. above ground level. The work known locally as "top-disposal operations" is carried out more or less on the following lines by employees of the Forests Department. The coupe to be cut over during the ensuing six months is burnt by a creeping fire in the spring. Debris is cleared to a distance of three feet from the butts of sound, immature trees, and the individual tops are burnt where little damage will result to the crop of jarrah trees remaining. During the past twelve months 30,000 acres have been treated, and many hundreds of thousands of growing trees saved from serious damage.

As rapidly as staff can be trained in the elements of silviculture, the marking of trees to be removed is being substituted for minimum girth restrictions. The silvicultural system of selection by groups is followed in all but a few cases, and, when dealing with a pure forest of light-demanding species, this system amounts to clear felling in small patches of varying extent. General seed years do not occur more often than every three years, although observations have not been carried out over a sufficiently long period to establish any periodicity. Eight thousand acres have been silviculturally treated and closed for regeneration, in nine working circles. This work is being rapidly extended.

Working plans are being prepared as quickly as limited staff permits, and fifteen working plans, covering 331,108 acres, have been prepared. The difficulties of preliminary work are greatly increased by the necessity for the preparation of maps showing the topography, timber tramlines, roads and tracks in use by timber-getters. Seven camps of men specially trained for this work are operating at the present time.

Crosscutting a Karri Log.

Indigenous forests, apart from a few supplying cabinet timbers, contain no softwoods, with the result that considerable quantities of Oregon and Baltic deal are imported. Steps are now being taken to grow home supplies on waste lands, and, despite climatic disabilities and poor soil conditions, plantations are being successfully established. *Pinus maritima* (*Pinaster*) on deep, sandy soils, and *Pinus radiata* (*insignis*) on gravelly loams, form the main planting stock, although many other species are being planted on an experimental scale. The area of effective plantations established is 950 acres. Seven new nurseries have been established and seed sown sufficient to provide for planting 1,000 acres in 1926 and the carrying over of additional plants to provide two-year old stock, where required, in 1927.

A school for the training of officers for the non-professional division of the service has been established, and boys of 14 to 16 years of age are apprenticed for a period of four years, during which time they receive a sound, practical training in the elements of forestry. The professional staff is composed of graduates of a number of recognised schools, but now that arrangements for the establishing of a Commonwealth School of Forestry have been completed, Western Australia will nominate students and will build up the professional staff from this source. Work has developed more rapidly than the number of the staff. This was inevitable, but the enthusiasm of all officers has secured results which have attracted new men to the Department, so that the number of administrative and field officers, apart from casual employees, is now listed as follows:

Professional officers	9
Non-professional field staff	62
Apprentices	16
Research staff (chiefly engaged on problems relating to wood technology and utilization)	5
Draftsmen	5
Clerical staff	31

Hopes are entertained that a Department having the confidence of the timberman and the public generally may at last be regarded as firmly established, to carry on the work of controlling the economic utilization and regeneration of the great timber wealth of the State.

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