

CHAPTER XXIV

FORESTRY

NOTE.—For further details on subjects dealt with in this chapter *see* the annual bulletins *Primary Industries, Part II.—Non-Rural Industries and Value of Production*, and *Secondary Industries* (for sawmills, etc., operations).

All values of Australian oversea trade shown throughout this chapter are expressed as £A. f.o.b., port of shipment. The export table on page 1112 relates to exports of Australian produce, but quantities and values quoted in the text sometimes include *re-exports*, the amounts involved, however, being generally small.

§ 1. Source of Statistics

Statistics relating to forestry are, in general, provided by the various authorities concerned with forestry administration. Particulars of forest reservations contained in this chapter have been collected by the Statisticians of the various States, mainly from information provided by the State forestry authorities. Other information on forested areas has been provided by the Commonwealth Forestry and Timber Bureau, which has also supplied certain other data.

Statistics of timber and by-products have been compiled from the annual factory collections undertaken by the Statisticians in the several States. Figures of production of gums, resins and tanning barks have been provided by the State forestry authorities.

Data of imports and exports of forest products and timber and timber products have been compiled in the Commonwealth Bureau of Census and Statistics as part of the statistics of oversea trade.

The figures shown relate, in general, to years ended 30th June.

§ 2. Forestry in Australia

1. Objects of Forestry.—The main object of forestry authorities is to manage the forests of the country in a manner that will provide the maximum benefits, both direct and indirect. Direct benefits include the provision of essential commercial commodities such as structural timber, pulpwood, plywood, veneers, firewood, bark products, tars, oils and resins.

Indirect benefits include protection of soil and stock from wind and exposure, regulation of stream flow, provision of recreational facilities, and aesthetic effects. Forestry also aims at improving existing forests and woodlands by properly controlled exploitation, by protection from such destructive agencies as fire and insect attack, and by inducing regeneration where it is desirable. The provision of a partial tree cover on denuded lands where this cover is necessary for protective purposes, and a complete cover when the land is better under forest than under any other land use, are further aims of forestry.

2. **General Account of Forests and Timbers.**—(i) *General.* The area of land in Australia suitable for the production of commercial timber as a primary crop is very small in comparison with the size of the continent. Hardwoods cover 97 per cent. of the total forested area, and approximately 94 per cent. of the hardwood area is occupied by eucalypts.

(ii) *Eucalypts.* The genus *Eucalyptus* is remarkable in that it includes over 600 species ranging in size from the mighty forest giants, mountain ash (*E. regnans*) of Victoria and karri (*E. diversicolor*) of Western Australia, down to the small mallee species which inhabit vast areas of the inland. The habitats range from the dry inland areas to the high mountain areas in the Australian Alps, from areas with the annual rainfall as low as 10 inches to those where it is 150 inches. Of the 600 species, only about 100 are used for sawmilling, and not more than 40 of these are exploited extensively.

The better class of eucalypt forest is concentrated mainly in the higher rainfall areas such as the east coast, the highlands of southern New South Wales, Victoria and Tasmania and the south-western corner of Western Australia. The more important species include blackbutt (*E. pilularis*), tallowwood (*E. microcorys*), flooded gum (*E. grandis*) and red mahogany (*E. resinifera*) of New South Wales and Queensland, alpine ash (*E. delegatensis*) of New South Wales, Victoria and Tasmania, mountain ash (*E. regnans*), messmate (*E. obliqua*) and blue gum (*E. bicostata*) of Victoria and Tasmania, and karri (*E. diversicolor*) of Western Australia. For height and grandeur, mountain ash and karri are unequalled among the hardwoods of the world, and are excelled only by a few North American softwood species.

In the coastal regions with lower rainfall, the eucalypt forests contain many durable species such as the ironbarks, grey gums and bloodwoods of the east coast and jarrah (*E. marginata*) and tuart (*E. gomphocephala*) of Western Australia. The spotted gum (*E. maculata*) occurring in New South Wales and Queensland is another example.

Along most of the inland streams and adjacent flood-plains, there are riverain forests consisting mainly of river red gum (*E. camaldulensis*), a very durable hardwood which has supplied large quantities of sawn timber, railway sleepers and fence posts.

Eucalypts also occur in open forest and savannah woodland formations in areas receiving a reliable annual rainfall of about 10 to 20 inches per annum, as on the goldfields of Western Australia where salmon gum (*E. salmophloia*), brown mallet (*E. astringens*) and wandoo (*E. wandoo*) occur. These forests are of considerable value for firewood, as mining timbers and for fencing. Minor forest products such as sandalwood, tan bark, essential oils, etc., also come from isolated areas in this type of country, and in the more arid areas.

As a measure of the relative significance of the more important eucalypts sawn in Australia, the table following shows the quantities of timber sawn from them in 1961–62.

SAWN TIMBER PRODUCED FROM EUCALYPTS(a): AUSTRALIA, 1961-62

(Source: Forestry and Timber Bureau)

('000 super. ft.)(b)

Species							Sawn timber
Messmate (<i>E. obliqua</i>)	..	..	..	..	..	..	206,007
Blackbutt (<i>E. pilularis</i>)	..	..	..	..	..	..	161,284
Jarrah (<i>E. marginata</i>)	..	..	..	..	..	..	156,539
Alpine ash (<i>E. delegatensis</i>)	..	..	..	..	..	..	135,801
Red gum (<i>E. camaldulensis</i>)	..	..	..	..	..	..	35,125
Mountain ash (<i>E. regnans</i>)	..	..	..	..	..	..	34,569
Karri (<i>E. diversicolor</i>)	..	..	..	..	..	..	29,033
Other eucalypts(c)	..	..	..	..	..	..	198,595
Total, Eucalypts	..	..	..	..	..	..	956,953

(a) Includes the volume of sawn sleepers and the sawn equivalent of ply and veneer. (b) A super. or superficial foot (true measure) can be defined as the equivalent volume of a solid body, one foot long by one foot wide by one inch thick. (c) Separate figures are not available for the production of other species, but the probable order of importance of the next three eucalypt species is: spotted gum (*E. maculata*), tallowwood (*E. microcorys*) and silvertop ash (*E. sieberiana*).

(iii) *Other Hardwoods.* Hardwood genera other than *Eucalyptus* cover a comparatively small portion of the forested land in Australia (some 6 per cent.), but these areas provide a great variety of timbers suitable for a multitude of uses. There are two basic types of forest containing supplies of hardwoods other than eucalypts, namely, the tropical and subtropical rainforests of coastal New South Wales and Queensland, and the temperate rainforests of southern Victoria and Tasmania, both of which yield species known collectively as rainforest or brushwood species. The total volume of brushwood species produced in 1961-62 was 66,869,000 super. feet, i.e. less than seven per cent. of the total hardwood cut in Australia.

The tropical and subtropical rainforest along the eastern coast of Australia contains a large number of different species. Tropical rainforest occurs in northern Queensland in the vicinity of Cairns and on the Atherton Tableland, providing such well-known cabinet woods as Queensland maple (*Flindersia brayleana*), Queensland walnut (*Endiandra palmerstonii*) and the silky oaks. The subtropical rainforest found in southern Queensland and northern New South Wales yields the tulip oaks, crab apple (*Shizomeria ovata*) and white beech (*Gmelina leichhardtii*). Coachwood (*Ceratopetalum apetalum*) and sassafras (*Doryphora sassafras*) occur in regions to the south near Dorrigo and have yielded valuable timber produce for many years.

Turpentine (*Syncarpia glomulifera*), an excellent harbour pile timber resistant to marine borer attack, and brush box (*Tristania conferta*), a superior structural and decking timber, are found in association with some eucalypts in the wetter rainfall areas on the north coast of New South Wales and in southern Queensland.

Temperate rainforest which is to be seen in southern parts of Victoria and western Tasmania consists mainly of myrtle beech (*Nothofagus cunninghamii*), but produces also southern sassafras (*Atherosperma moschata*) and blackwood (*Acacia melanoxylon*).

(iv) *Softwoods.* One of the most important species of native softwood is white cypress pine (*Callitris hugelii*). The main cypress pine forests of commercial value occur in New South Wales and southern Queensland west of the Great Dividing Range. The trees are comparatively small, but the timber has particular value owing to its durability and resistance to termites. It is suitable for use as scantlings, flooring, linings, weatherboards, poles and posts. As much of the area originally covered by cypress pine has been cleared for wheat farming and grazing, the production from the remaining State forests is now strictly regulated to ensure a continuous supply. The volume of cypress pine cut in 1961-62 was approximately 66.5 million super. feet, and in 1962-63 this cut rose to approximately 69.3 million super. feet.

Another important native softwood is hoop pine (*Araucaria cunninghamii*), which occurs naturally in the sub-tropical rain forest of southern Queensland and northern New South Wales associated with tulip oaks, crab apple, white beech, coachwood and sassafras. The greater part of the original hoop pine forests has been exploited, but considerable areas have been replanted to this species in Queensland and, to a lesser extent, in New South Wales.

Other native softwoods which have played a useful but minor part in the Australian timber industry include bunya and kauri pines (*Araucaria bidwillii* and *Agathis palmerstonii*) of Queensland, and celery top, Huon and King William pines (*Phyllocladus asplenifolius*, *Dacrydium franklinii* and *Athrotaxis selaginoides*) of Tasmania. Kauri pine is found in the tropical rainforest of northern Queensland in association with non-eucalypt hardwoods, while bunya pine occurs in the subtropical rainforests. In the temperate rainforests of Tasmania, celery top, Huon and King William pines are found in association with myrtle beech, southern sassafras and blackwood.

3. **Forested Areas.**—(i) *Extent of Forests.* Estimates prepared for the Eighth British Commonwealth Forestry Conference held in Kenya in 1962 show the total area of forest in Australia as 512.2 million acres, or about 27 per cent. of the total land area of the continent. In making these estimates, the F.A.O. definition of "forest" (published in *World Forest Inventory*, 1958, p. 123) was used. This definition includes areas of sparse or stunted tree growth, and in the case of Australia some four-fifths of the total forest area falls into this category.

CLASSIFICATION OF FOREST AREA(a): AUSTRALIA

(Source: Forestry and Timber Bureau)

('000 acres)

Type of forest	Area
LANDS	
Accessible forests—	
Productive forests in use—	
Coniferous (softwood)	492
Non-coniferous (broadleaved)	24,352
Mixed woods	5,636
Open areas	245
Total, Productive Forests in Use	30,725
Productive forests not in use	(b) 31,961
Unproductive accessible forests	(c) 257,687
Total, Accessible Forests	(d) 320,373
Inaccessible forests	191,795
Total, Forested Area	512,168

(a) Based on the 1960 classification of forests. (b) Includes approximately 25 million acres capable of producing fuelwood only. (c) This area carries only sparse, stunted trees. (d) Includes approximately 258 million acres of land carrying only stunted trees.

CLASSIFICATION OF FOREST AREA(a): AUSTRALIA—*continued*

(Source: Forestry and Timber Bureau)

('000 acres)

Type of forest	Area
OWNERSHIP OF ACCESSIBLE FORESTS	
Publicly-owned forests—	
State forests	23,534
Other forests	150,329
<i>Total, Publicly-owned Forests</i>	<i>173,863</i>
Privately-owned forests	145,537
Ownership not yet determined	973
<i>Total, Accessible Forests</i>	<i>320,373</i>

(ii) *Forest Reservations.* Statements furnished by State and Commonwealth authorities show reservations of forest areas in Australia as at 30th June, 1963, totalling 39.1 million acres, of which 24.8 million acres were dedicated State forests and 14.3 million acres were timber and other reserves. The distribution of those areas is shown by States in the following table. Detailed comparisons between States are not possible because of the lack of uniform definitions.

AREA OF FOREST RESERVATIONS, 30TH JUNE, 1963

('000 acres)

State or Territory	State forests	Timber reserves (Forest Acts)	Other reserves (a)	Total
New South Wales	6,724	1,371	(b) 1,546	9,641
Victoria	5,580	(b) 151	(b) 368	6,099
Queensland	5,474	2,619	947	9,040
South Australia	280	1	470	751
Western Australia	4,454	(c) 2,617	324	7,395
Tasmania	(d) 2,287	137	(e) 1,217	3,641
Northern Territory .. .. .	..	9	(f) 2,394	2,403
Australian Capital Territory .. .. .	..	..	(g) 131	131
<i>Australia</i>	<i>24,799</i>	<i>6,905</i>	<i>7,397</i>	<i>39,101</i>

(a) Includes national parks and scenic reserves. (b) Reserved under Lands Acts. (c) Includes 775,000 acres reserved under Lands Acts. (d) Includes 465,000 acres of State forests under pulpwood concessions and 274,000 acres under exclusive and general forestry permits. (e) Includes 612,000 acres of Crown land under pulpwood concessions and 360,000 acres of Crown land under exclusive forestry permits. (f) Comprises a fauna and flora reserve on Coburg Peninsula (352,000 acres), land covered by pastoral leases (942,000 acres) and land within Welfare Reserves (1,100,000 acres). (g) Forest land not specifically reserved.

A considerable proportion of the permanently reserved areas is in inaccessible mountainous country, and many of the forests contain a mixture of species, only some of which are at present of commercial value. Much of the area consists of inferior forest, and a large proportion of the whole has been seriously degraded by recurrent fires.

(iii) *Plantations.* The indigenous forest of Australia does not contain adequate supplies of softwood, and Australia's requirements have had to be met largely by imports. As a result of the planned policy of the forest services and of several private commercial organizations, the area of softwood plantations, mainly of exotic species, is steadily increasing. It was natural that this aspect of forestry should receive earliest attention in South Australia, as this is the State most poorly endowed with natural forest. South Australia now has a larger area of planted softwoods than any other State in Australia, and for some years has been exploiting considerable quantities of timber from these plantations. Production is also increasing in the other States, and the thinnings from their plantations are already supplying a significant volume of timber.

The total production of roundwood from Australia's coniferous plantations is now almost 40 million cubic feet per annum and is expected to increase substantially during the next decade.

By 30th September, the planting season in the winter rainfall areas is completed, but that for the summer rainfall areas has not commenced. The following table shows the areas of softwood plantations at 30th September, 1963.

SOFTWOOD PLANTATIONS, 30TH SEPTEMBER, 1963

(Source: Forestry and Timber Bureau)

(Acres)

State or Territory	Government			Private (mainly <i>P. radiata</i>)	Total
	<i>Pinus radiata</i>	Other species	Total		
New South Wales	79,458	(a) 20,091	99,549	25,448	124,997
Victoria	44,443	10,043	54,486	(b) 75,000	129,486
Queensland	2,237	101,125	103,362	7,970	111,332
South Australia(c)	112,704	9,904	122,608	39,750	162,358
Western Australia	14,828	24,434	39,262	1,370	40,632
Tasmania	17,917	431	18,348	7,108	25,456
Northern Territory .. .. .	..	(d) 251	251	23	274
Australian Capital Territory..	24,130	2,238	26,368	..	26,368
Australia	295,717	168,517	464,234	156,669	620,903

(a) Includes 3,791 acres of hoop, bunya and kauri pine. (b) Estimated. (c) Excludes the 1963 plantations. (d) Cypress pine (*Callitris intratropica*).

A special article prepared by the Forestry and Timber Bureau giving a detailed account of the history and development of softwood plantations and of the characteristics of individual species, is included in Year Book No. 44, page 975.

Hardwood plantations (mainly *Eucalyptus spp.*) comprise a much smaller area, and the total acreage at 30th June, 1963, was 36,000 acres, about two-thirds of which was mallet. Plantations of this species have been established in Western Australia for tan bark production.

4. *Forest Administration and Research.*—(i) *Forestry Activities of the Commonwealth Government.* (a) *Commonwealth Forestry and Timber Bureau.* The functions of the Commonwealth Forestry and Timber Bureau are laid down in the Forestry and Timber Bureau Act and include forestry research and education, the study of timber supply and advice to the Government on forestry matters. The administering department is the Department of National Development.

In 1961, the Commonwealth Government decided to expand its activities in forestry research in Australia. The existing Divisions of Silvicultural Research and Forest Management Research were combined to form the Forest Research Institute. The purpose of the Institute is to provide complete coverage in forestry research, ensuring that all problems of primary importance to the practice and development of forestry in Australia are investigated.

In developing a programme with this aim, the Institute takes account of the research activities and potential of the State forest services and other organizations. The research work carried out by the existing sections of the Forest Research Institute covers a wide range of studies, including the following: factors affecting tree growth, tree breeding, introduction of exotic species, forest nutrition, forest botany, forest entomology and pathology, fire protection, watershed management, forest mensuration, forest management and management economics, and aerial inventory. The Forest Research Institute maintains five regional establishments in the Commonwealth, two of which have an outstation in addition to the regional headquarters. These regional stations are run on a co-operative basis with State forest services and private forest companies or other government instrumentalities.

The Australian Forestry School, located in Canberra, trains professional foresters. Training at the school covers the third and fourth years of a four-year degree course in forestry. The first two years of the course are spent in a study of prescribed science subjects at one of the Australian universities. The third and fourth years are spent at the Forestry School studying specialized forestry subjects. Students who complete the course satisfactorily graduate in Forestry at their home university and are awarded the Commonwealth Diploma in Forestry. The Commonwealth Diploma in Forestry or the Diploma in Forest Technology may also be awarded to suitable graduates from Australia or overseas who complete a course at the Australian Forestry School.

Advice is currently made available to government departments and private enterprise on timber supply matters. Research is undertaken on logging methods and machines and on matters associated with the marketing of timber products.

(b) *Commonwealth Scientific and Industrial Research Organization, Division of Forest Products.* The Division of Forest Products was formed in 1928 to carry out investigations into Australian forest products, assist in the effective use of such products, reduce waste, reduce losses from decay and insect attack, and conduct research into the fundamental chemical, physical and mechanical properties of Australian timbers.

The research work of the Division is carried out by eight separate sections: wood and fibre structure, wood chemistry, timber physics, timber mechanics, timber preservation, timber seasoning, plywood and glueing, and timber utilization. In addition, the Division provides assistance to individuals and local industry, administers courses of instruction on timber properties and usage, and maintains co-operative projects with several overseas authorities operating in the same field.

(c) *Forestry in the Territories.* Forestry activities in the Territory of Papua and New Guinea are controlled by the Administration through its Department of Forests. The management of forests in the Australian Capital Territory is the responsibility of the Forestry Section of the Department of the Interior.

The Forestry and Timber Bureau advises the Administrations of the Australian External Territories on the management of the forests in those territories, while the Northern Regional Station of the Forest Research Institute advises the Northern Territory Administration on forestry matters affecting the Northern Territory.

(ii) *Forestry Activities of the States.* Forestry on State-owned lands in the various States is the responsibility of the respective State Governments, but they do not exercise any control over forestry activities on private property. The powers and functions of State forest authorities are laid down under forest Acts and Regulations. In each State, there is a department or commission to control and manage State forests, etc. Its functions include the introduction of proper measures for the control and management of forest land; the protection of forest land; the conversion, marketing and economic utilization of forest products; the securing of an adequate and permanent reservation of State forests; the establishment and maintenance of coniferous forests to remedy the existing deficiency of softwoods in Australia. All State forest services are actively engaged on research programmes, and the Forests Commission of Victoria maintains a Forestry School at Creswick where recruits are trained mainly for employment in the Commission. Annual reports are issued by each State forest authority.

In addition to developing permanent forest reserves in each State, foresters are surveying all forested crown lands with a view to obtaining dedications of new State forests to add to the permanent forest estate or to release areas unsuitable for forestry for other uses. State forest authorities also usually control all timber on unoccupied Crown lands as well as over 10 million acres of timber reserves, national parks, etc.

The universities in all States provide facilities for forestry graduates attending the universities or, in some cases, for forestry graduates working within, or outside, the States to proceed to advanced degrees. The University of Melbourne has established a School of Forestry to assist both undergraduate and post-graduate students.

(iii) *Private Forestry.* Privately owned lands contribute considerably to the total production from Australian forests. The most important areas of managed native forest in private ownership are the forests owned by pulp and paper companies.

The area of privately owned softwood plantations is rapidly increasing, and here again the pulp and paper companies are very active. In step with the increase in afforestation programs the number of professional foresters employed in private forestry enterprise is increasing, while several are engaged on research.

An estimate of the area of softwood plantations established by private companies and individuals is included in the table on pages 1100-1.

5. *Fire Protection.*—The provision of adequate fire protection is one of the main problems facing forest and rural authorities. Of some 52 million acres of forest land requiring protection, the forest services maintain a high degree of protection over a relatively accessible area of about 20 million acres; about 19 million acres, being more difficult of access, are not so highly protected; and about 13 million acres are, at present, not protected.

Very intensive fire protection is afforded the softwood plantation area of Australia. During the 1962-63 fire season, 475 acres were burnt from a total area of 492,000 acres for which fire statistics are available. This represents an annual burn percentage of 0.1 which compares very favourably with the 0.53 per cent. experienced in the eucalypt forest areas.

Protection of private property outside urban areas is undertaken by volunteer bush fire brigade organizations which are co-ordinated in each State by a committee or board carrying out functions of an advisory or educational nature and fostering the growth and organization of the bush fire brigade movement. Throughout the main agricultural and forest areas of Australia, there are over 5,000 registered volunteer bush fire brigades with a membership approaching 250,000. Although forest and rural fire organizations are entirely separate entities, a high degree of co-operation and liaison is maintained.

In addition to the forest service and rural organizations, various private and semi-governmental bodies in each State maintain fire protection organizations, which are generally concerned with the protection of private forestry operations and hydro-electric and water catchment areas.

Over the five-year period 1959 to 1963, the annual cost of protecting from fire the 39 million acres of forest land for which State forest services provide protection is estimated at £2,200,000 or about 1s. 1½d. an acre. The cost of rural fire control as a whole cannot be estimated with any degree of accuracy, because by far the greatest contribution comes from the personal efforts of volunteer brigade members.

The Australian fire season is very variable, with an average of one particularly bad fire season every seven years or so. Such years as 1926, 1939, 1944, 1952 and 1957 account for a large proportion of the average annual burn. Over 80 per cent. of the area burnt carries little commercial timber, being mainly firewood and protection forest. The number of fires and the forest area burnt during the last five years is shown in the following table.

NUMBER OF FIRES AND FOREST AREAS BURNT: AUSTRALIA

(Source: Forestry and Timber Bureau)

Year	Number of fires	Forest areas burnt	Burnt areas as a proportion of total forest areas(a)
			Per cent.
	No.	'000 acres	
1958-59	1,175	456	1.10
1959-60	1,504	1,314	2.48
1960-61	2,667	1,294	2.47
1961-62	1,761	297	0.57
1962-63	1,299	275	0.53

(a) Forest areas requiring protection. See above.

Intensive research work is being undertaken on fire problems, and several governmental groups are working on such projects as the study of fire behaviour and associated fuel and meteorological conditions, the use of chemical aids in fire suppression, the development of protective clothing and devices to aid fire-fighters, and the development of more efficient fire-fighting equipment.

Since fire prevention is one of the most important aspects of the problem, intensive campaigns are being conducted to reduce the incidence of man-caused fires. A study of fire causes in recent years reveals that human agencies account for approximately 90 per cent of all fires, and of this figure at least 80 per cent. are preventable. It is estimated that "burning-off" (much of which is started illegally) accounts for 30 per cent. of all fires. Lightning accounts for a little over 10 per cent. of all fires in Australia, although the incidence of fires caused by lightning is much higher in certain areas, especially the Southern Highlands region in New South Wales and Victoria. Although lightning is a relatively small numerical cause of fire, the percentage area burnt from this cause is estimated at about 20 per cent. This higher figure is due to the occurrence of multiple fire outbreaks which cause fire fighting difficulties and to the inaccessibility of the areas in which such fires generally occur.

§ 3. Employment in Forestry

1. Persons Engaged in Forestry Activities.—In the following table, which shows particulars collected in the Population Censuses of Australia of 30th June, 1947, 1954 and 1961, the numbers of persons whose industry statements were classified to "forestry (excluding sawmilling)" are shown, together with the numbers engaged in all primary industries and the total work force.

PERSONS ENGAGED IN FORESTRY: AUSTRALIA

Particulars	Census, 30th June—		
	1947	1954	1961
Persons engaged in—			
Forestry (excluding sawmilling)	24,793	15,468	13,847
All primary industries	563,607	560,100	513,286
Total work force	3,196,431	3,702,022	4,225,096
Persons employed in forestry (excluding sawmilling) as a proportion of—			
All primary industries %	4.4	2.8	2.7
Total work force %	0.8	0.4	0.3

NOTE.—An adjustment was made to the 1947 and 1954 industry data by distributing over the range of recorded industry the number of persons whose industry was not stated. No such adjustment was made to the 1961 figures.

2. Employment by Forestry Departments.—In the table below, details are shown of the number of persons employed by State forestry departments, and by the Forestry and Timber Bureau in the Australian Capital Territory and the Northern Territory, at 30th June, 1963.

PERSONS EMPLOYED BY FORESTRY DEPARTMENTS, 30th JUNE, 1963

Occupational group	N.S.W.	Vic.	Q'land	S. Aust.	W. Aust.	Tas.	N.T.	A.C.T.	Aust.
Professional staff	235	213	104	78	54	35	5	8	732
Non-professional field staff ..	236	263	91	8	158	96	11	1	864
Clerical staff ..	300	260	195	102	60	88	5	8	1,018
Extraction of timber ..	1,314	96	115	41	31	..	24	..	6,750
Milling of timber ..		19	..	714	19	..	..	..
Labour (forest workers, etc.)		879	2,075	266	588	341	167	61	
Total ..	2,085	1,730	2,580	1,209	910	560	212	78	9,364

3. **Employment in Milling Operations.**—Details of the average number of persons employed, including working proprietors, in sawmills during the year 1962-63 are shown in the next table. Further details regarding the operations of sawmills in 1961-62 are shown in Chapter VI. Manufacturing Industry.

NUMBER OF SAWMILLS AND NUMBER OF PERSONS EMPLOYED, 1962-63

Particulars	N.S.W.	Vic.	Q'land	S. Aust.	W. Aust.	Tas. (a)	Aust. (b)
Number of sawmills	822	457	544	85	207	324	2,439
Average number of persons employed during year—							
Males	7,965	5,870	5,289	2,145	3,393	2,625	27,287
Females	375	243	270	196	61	66	1,211
Total	8,340	6,113	5,559	2,341	3,454	2,691	28,498

(a) Includes plywood mills.

(b) Excludes Northern Territory and Australian Capital Territory.

§ 4. Forest Production

1. **Forest Products.**—The table below shows details of production of forest products in each State and Territory in 1962-63.

FOREST PRODUCTION, 1962-63

Product	N.S.W.	Vic.	Qld	S.A.	W.A.	Tas.	N.T.	A.C.T.	Aust.
Logs for sawing, peeling, slicing or pulping—									
Forest hardwoods	'000 cub. ft. 48,640	66,910	20,751	458	46,178	47,325 (a)	25	114	b 230,401
Brushwoods and scrubwoods	4,494	..	8,161	..	..	.. (a)	2	..	(b)12,657
Softwoods—									
Indigenous forest "pines"—									
Cypress	7,236	1	5,196	..	..	.. (a)	56	..	(b)12,489
Other	361	..	3,225	4	..	209	..	..	3,799
Plantation grown "pines"	7,068	9,615	3,298	25,984	1,535	1,148	..	921	(b)49,569
Total, logs	67,799	76,526	40,631	26,446	47,713	48,682 (a)	83	1,035	b 308,915
Value of logs	£'000 9,608	9,442	6,828	2,646	3,455	5,362 (a)	21	115	(b)37,477
Hewn and other timber (not included above)—									
Firewood(c) (weight)	'000 tons 253	1,708	135	509	542	419 (a)	2 (a)	3 (b)	3,571
Other(d) (value)	£'000 3,979	(a)1,101	909	n. a.	(e) 567	220 (a)	24 (a)	2 (b)	6,802
Value of hewn and other timber	4,610 (f)	8,804	1,230 (f)	1,401	1,806 (g)	1,192 (a)	29	14 (b)	19,086
Other forest products (h) (total value)	(i) 121	(i) 86	29	38 (j)	11	9	..	..	(b) 294
Total Value of Forest Products	f14,339	f18,332	8,087 (f)	4,085 (k)	5,438	6,563 (a)	50 (f)	129 (b)	57,023

(a) Incomplete; no details available of production from private land.

(b) Incomplete; see footnotes to individual State and Territory figures.

(c) Includes mill waste used as firewood.

(d) Includes sleepers, transoms, girders, bridge timbers, mining timber, poles, piles, timber used for tannin extract, etc.

(e) Excludes timber used for tanning extract, details of which are not available for publication.

(f) Incomplete; see footnotes to individual items.

(g) Includes an estimate of the value of timber taken from private land.

(h) Includes charcoal (forest production only), tanning bark, essential oils, sandalwood, eucalyptus leaves, crude rutin, etc.

(i) Incomplete, details of some production from private land not available.

(j) Excludes value of sandalwood and substitutes, details of which are not available for publication.

(k) Includes timber used for tannin extract and sandalwood and substitutes.

The following table gives particulars of the production of forest products in Australia.

FOREST PRODUCTION(a): AUSTRALIA

Product		1958-59	1959-60	1960-61	1961-62	1962-63
Logs for sawing, peeling, slicing or pulping—						
Forest hardwoods	'000 cub. ft.	239,968	243,940	242,142	223,389	230,401
Brushwoods and scrubwoods	"	14,518	14,287	14,689	11,890	12,657
Softwoods—						
Indigenous forest " pines "—						
Cypress	"	13,861	14,457	13,483	12,351	12,489
Other	"	5,746	4,716	4,726	3,676	3,799
Plantation grown " pines "	"	38,858	42,859	39,850	42,245	49,569
Total logs	"	312,951	320,259	314,890	293,551	308,915
Value of logs	£'000	37,167	38,972	38,475	35,588	37,477
Hewn and other timber (not included above)—						
Firewood(b)(weight)	'000 tons	4,081	3,997	3,705	3,514	3,571
Other (value)(c)	£'000	8,191	8,066	8,320	7,779	6,802
Value of hewn and other timber(d)	"	20,489	20,337	20,544	19,741	19,086
Other forest products(e) (total value)	"	448	345	372	421	294
Total Value of Forest Products(f)	"	58,190	59,842	59,763	55,992	57,023

(a) Excludes some production from private land thought to be relatively small, details of which are not available. (b) See footnote (c) to previous table. (c) See footnotes (d) and (e) to previous table. (d) Incomplete, see footnote (e) to previous table. (e) See footnotes (h) and (j) to previous table. (f) Includes timber used for tannin extract and sandalwood and substitutes in Western Australia; but excludes timber other than logs and firewood in South Australia.

2. Value of Production.—(i) General. While statistics of both the gross value (at principal markets) and local value (at place of production) of the forestry industry are available, particulars of the value of materials used in the process of production are not available for all States. For this reason, values cannot be stated on a net basis, as has been done with most other industries.

(ii) Gross and Local Values, 1962-63. The following table shows gross and local values of forestry production for each State in 1962-63. A more detailed reference to the value of production of forestry and other industries in Australia, as well as a brief explanation of the terms used, will be found in Chapter XXX. Miscellaneous.

GROSS AND LOCAL VALUE OF FORESTRY PRODUCTION, 1962-63
(£'000)

State or Territory	Gross value(a)	Marketing costs	Local value(b)
New South Wales	14,339	351	13,988
Victoria	18,332	1,521	16,811
Queensland	8,087	2,099	5,988
South Australia	4,085	27	4,058
Western Australia	5,438	357	5,081
Tasmania	6,563	906	5,657
Northern Territory	50	} n.a. {	50
Australian Capital Territory	129		129
Australia	57,023	5,261	51,762

(a) Gross production valued at principal markets. (b) Gross production valued at place of production.

(iii) *Local Values, 1958-59 to 1962-63.* In the following table, the local value of forestry production and the local value per head of population are shown by States for the years 1958-59 to 1962-63.

LOCAL VALUE OF FORESTRY PRODUCTION

Year	N.S.W.	Vic.	Qld	S.A.	W.A.	Tas.	Aust.(a)
LOCAL VALUE (£'000)							
1958-59	15,574	16,148	8,356	4,103	5,067	4,887	54,358
1959-60	15,169	17,618	8,469	3,929	5,085	5,556	56,001
1960-61	15,300	16,713	7,149	3,729	5,167	5,735	53,975
1961-62	14,431	16,449	5,895	3,733	5,191	5,090	50,937
1962-63	13,988	16,811	5,988	4,058	5,081	5,657	51,762

LOCAL VALUE PER HEAD OF POPULATION (£)

1958-59	4.2	5.9	5.8	4.5	7.2	14.4	5.5
1959-60	4.0	6.2	5.7	4.2	7.1	16.1	5.5
1960-61	3.9	5.8	4.8	3.9	7.1	16.4	5.2
1961-62	3.7	5.6	3.9	3.8	7.0	14.3	4.8
1962-63	3.5	5.6	3.9	4.1	6.7	15.6	4.8

(a) Includes Northern Territory and Australian Capital Territory.

§ 5. Timber and Timber Products

1. *Mill Production of Timber.*—Particulars of logs treated and the production of sawn, peeled and sliced timber by sawmills and other woodworking establishments are shown in the following table. These figures have been compiled from the annual factory collections in each State, which cover virtually all sawmills. The only omissions are some small portable mills operated by itinerants, e.g. sleeper cutters.

OUTPUT OF AUSTRALIAN-GROWN TIMBER: ALL MILLS, 1962-63 (^{'000} super. feet)

Particulars	N.S.W.	Vic.	Q'land	S.A.	W.A.	Tas.	Aust.(a)
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LOGS TREATED (TRUE VOLUME)

Hardwood ..	601,570	639,031	343,093	7,434	554,143	397,705	2,542,976
Softwood ..	159,415	80,191	142,935	362,574	18,422	15,568	779,105
<i>Total</i> ..	<i>760,985</i>	<i>719,222</i>	<i>486,028</i>	<i>370,008</i>	<i>572,565</i>	<i>413,273</i>	<i>3,322,081</i>

SAWN, PEELLED OR SLICED TIMBER PRODUCED FROM LOGS ABOVE

Hardwood ..	301,888	288,244	161,803	4,434	178,072	153,756	1,088,197
Softwood ..	76,005	30,760	65,663	136,310	7,560	6,072	322,370
<i>Total</i> ..	<i>377,893</i>	<i>319,004</i>	<i>227,466</i>	<i>140,744</i>	<i>185,632</i>	<i>159,828</i>	<i>1,410,567</i>

(a) Excludes Australian Capital Territory and Northern Territory.

The following table shows logs used, and sawn, peeled, and sliced timber produced, in Australia.

OUTPUT OF AUSTRALIAN-GROWN TIMBER, ALL MILLS: AUSTRALIA^(a)
(*000 super. feet)

Particulars	1958-59	1959-60	1960-61	1961-62	1962-63
LOGS TREATED (TRUE VOLUME)					
Hardwood	2,728,183	2,793,399	2,672,080	2,519,617	2,542,976
Softwood	677,607	705,772	646,801	641,185	779,105
Total	3,405,790	3,499,171	3,318,881	3,160,802	3,322,081

SAWN, PEELED OR SLICED TIMBER PRODUCED FROM LOGS ABOVE

Hardwood	1,158,799	1,208,595	1,152,995	1,063,086	1,088,197
Softwood	301,175	312,450	264,838	289,116	322,370
Total	1,459,974	1,521,045	1,417,833	1,352,202	1,410,567

(a) Excludes Australian Capital Territory and Northern Territory.

In addition to the mill production of timber shown in the preceding tables, a large amount of hewn and round timber, e.g. sleepers, piles, poles, fencing timber, timber used in mining, and fuel, is obtained directly from forest and other areas. Complete information in respect of the volume of this output is not available.

2. Veneers, Plywood, etc.—Cutting of timber for the manufacture of veneers, plywood etc., has been carried out in most States for a number of years. In recent years, this has been considerably extended, since plywood manufacture has allowed the use of some species unsuitable for sawing. Special attention has been paid to ensure that logs suitable for peeling are diverted to ply factories. However, because of insufficient supplies of Australian-grown logs, 40 per cent. of the logs used in 1962-63 were imported.

The following table shows the production of plywood.

PLYWOOD PRODUCED

(*000 square feet: $\frac{3}{8}$ -in. basis)

State	1958-59	1959-60	1960-61	1961-62	1962-63
New South Wales	56,378	62,701	64,930	56,184	56,766
Queensland	139,743	134,825	112,414	98,086	85,746
Other States	39,892	44,574	46,045	48,537	52,751
Australia	236,013	242,100	223,389	202,807	195,263

Of the total plywood produced in 1962-63, 133,664,000 square feet ($\frac{3}{8}$ -in. basis) were classed as "Commercial", 37,206,000 as "Waterproof", 1,899,000 as "Case", and 22,494,000 as "Sliced Fancy".

During 1962-63, 526.3 million square feet ($\frac{1}{16}$ -in. basis) of veneers were produced by the rotary process for the manufacture of plywood, and 244.9 million square feet ($\frac{1}{16}$ -in. basis) were sold or added to stock, the bulk of which would eventually be used in the production of plywood. In addition, 60.3 million square feet of sliced veneers were produced.

3. **Manufactured Boards.**—(i) *Hardboard.* There were five factories producing hardboard in Australia during 1962-63 (two in New South Wales, and one in each of Victoria, Queensland and Tasmania), and during the three years ended 30th June, 1963, the following quantities were produced:—1960-61, 31,085,000 square yards; 1961-62, 28,772,000 square yards; and 1962-63 33,317,000 square yards.

(ii) *Resin Bonded Boards.* Production of resin-bonded boards (made from wood chips, wood wool, sawdust, etc.) amounted to 2,123,399 square yards during 1962-63.

4. **Wood Pulp and Paper.**—(i) *Wood Pulp.* During 1962-63, seven wood pulp mills were operating in three States, and production was 190,782 tons of chemical pulp and 68,062 tons of mechanical pulp, a total of 258,844 tons. During the previous year, production was 152,175 tons of chemical pulp and 67,495 tons of mechanical pulp.

- (a) *Victoria.* In Victoria, wood pulp is produced at Maryvale in Gippsland by a chemical process known as the Kraft or Sulphate process. The pulpwood used at this mill consists mainly of eucalypt timber below sawmilling quality, chips from sawmill waste, and a quantity of plantation pine thinnings.
- (b) *South Australia.* Three wood pulp mills operate in the south-eastern part of South Australia, using raw material in the form of logs from the State forests.
- (c) *Tasmania.* In Tasmania, three mills are making pulp from indigenous hardwoods.

At Burnie, on the north-west coast, fine writing and printing paper, as well as parchment and other speciality papers, are produced together with hardboard. The company concerned, which produced 79,353 tons of paper in 1962-63, holds freehold and State concession forest areas which are managed on a permanent yield basis with regeneration of the eucalypts in all suitable areas. Pine plantations have been and are being established to provide softwoods for pulping. A particle board plant was erected by this company at Wesley Vale on the north-west coast, and this started commercial production in August, 1963. The factory uses plantation pine thinnings as a raw material to produce a particle board of resin bonded fine pine chippings.

The only newsprint mill in Australia is situated at Boyer, in the Derwent Valley, 20 miles from Hobart. Here wood pulp is produced from hardwoods drawn from State timber concession areas. A mechanical process was used until 1957, when additional plant was installed for the manufacture of semi-chemical pulp. This plant, which uses a cold soda process, can utilize additional species not suitable for ground-wood pulp. The components of Boyer newsprint average 60 per cent. of ground-wood pulp, 22 per cent. of cold soda pulp, both of which are made at Boyer from hardwoods, and 18 per cent. of imported long fibre kraft pulp made in New Zealand from *Pinus radiata*. Newsprint production capacity is 90,000 long tons per annum. To secure more complete bush utilization, the company has established sawmills to convert understorey species, principally myrtle and sassafras, to sawn timber. The forests are managed on a sustained yield basis. Forest utilization and management are designed to promote eucalypt regeneration. Experimental work into the problems involved is being carried out by the company and the Tasmanian Forestry Commission.

A semi-chemical pulp mill has recently been completed at Geeveston, 37 miles south of Hobart. This plant utilizes eucalypt timber, unsuitable for sawmilling, from southern forests. It has an installed capacity of 25,000 tons of pulp a year and will require some 25,000,000 super feet of timber in 1963-64. The pulp, produced in pellet form, is bulk loaded, shipped to Sydney and there converted to paper and paper board. The company has exclusive long-term rights to the pulpwood from the southern forests under the terms of a special licence. The Forestry Commission is responsible primarily for the planning and execution of forest management, including construction of access roads, and protection and regeneration of the forests. Planning provides for the integrated utilization of saw logs and pulpwood from the forests.

(ii) *Paper and Paper Board.* Paper and paper board are manufactured in all States, but the greater part of the industry is in New South Wales, Victoria and Tasmania. During 1962-63, twenty-four paper mills were operating, eleven in Victoria, four in New South Wales, four in Tasmania, two each in Queensland and South Australia and one in Western Australia. A wide variety of paper and paper board is produced in Australian mills. The table below gives details of the production of some of these items.

PRODUCTION OF PAPER PRODUCTS: AUSTRALIA

Type of paper	Quantity (tons)			Value (£'000)		
	1960-61	1961-62	1962-63	1960-61	1961-62	1962-63
Newsprint	88,039	89,758	90,245	6,491	6,445	6,434
Blotting	755	487	558	133	84	83
Duplicating	7,055	5,156	6,794	1,176	834	1,073
Printing and writing	80,166	58,647	85,711	12,641	9,751	13,378
Wrapping—						
Kraft	98,607	108,313	118,018	12,226	13,228	14,308
Other	9,828	12,151	9,942	1,829	2,152	1,760
Felt and carpet felt	3,112	2,356	1,889	327	248	200
Paper boards	210,072	206,909	242,019	17,687	16,374	19,033

§ 6. Oversea Trade in Forest Products, Timber and Timber Products

1. *Imports.*—Quantities and values of forest products, timber and timber products imported into Australia during the years 1960-61 to 1962-63 are shown in the following table.

IMPORTS OF FOREST PRODUCTS, TIMBER AND TIMBER PRODUCTS: AUSTRALIA

Particulars	Quantity			Value (£A.'000 f.o.b.)		
	1960-61	1961-62	1962-63	1960-61	1961-62	1962-63
Logs not sawn—						
Softwoods(a) .. '000 sup. ft.	2,008	2,024	3,226	63	68	119
Hardwoods(b)	58,313	33,650	47,312	1,710	985	1,357
Undressed timber—						
Dunnage .. ..	..	..	..	3	4	4
Softwoods(a), n.e.i.—						
Douglas fir .. '000 sup. ft.	183,126	168,436	154,457	8,498	6,606	6,759
Radiata pine	33,462	24,913	24,388	1,213	900	860
Other	35,152	17,702	26,465	2,705	1,006	1,542
Hardwoods(b), n.e.i.	85,262	53,450	64,300	5,157	2,669	3,419
Box shooks, n.e.i.	567	641	561	33	48	39
Dressed timber	13,178	7,250	8,997	887	532	634
Veneers '000 sq. ft.	18,755	15,978	2,063	185	190	311
Plywood	31,618	31,390	26,040	1,090	1,069	903
Tanning substances cwt.	164,596	145,329	161,209	402	380	370
Sandalwood oil lb.	1,540	1,508	2,516	9	14	9

(a) Non-pored woods.

(b) Pored woods.

Imports of softwood logs in recent years have come almost exclusively from the Solomon Islands and Sarawak, and more than two-thirds of the imports of hardwood logs have come from North Borneo. Imports of undressed softwood timber comprise mainly Douglas fir (Oregon pine) from Canada and the United States of America and Radiata pine from New Zealand. Imports of undressed hardwood timber come mainly from Malaya and Sarawak. Timbers from Scandinavian countries provide most of the dressed timber imports.

Imports of timber products are mainly veneers and plywoods. The Australian Trust Territory of New Guinea and Japan provide most of the plywood imports, and the United Kingdom and New Guinea supply about 47 per cent. of Australia's imports of veneer.

Tanning substances are the only other forest products imported in significant quantities. The most important of these is wattle bark produced in South Africa.

2. Exports.—Details of exports of Australian forest and timber products in the years 1960–61 to 1962–63 are given in the table below.

EXPORTS OF AUSTRALIAN FOREST PRODUCTS, TIMBER AND TIMBER PRODUCTS(a)

Particulars	Quantity			Value (£A.'000 f.o.b.)		
	1960–61	1961–62	1962–63	1960–61	1961–62	1962–63
Logs not sawn .. '000 sup. ft.	6,494	8,190	4,392	371	309	161
Undressed timber(b)—						
Sleepers "	17,779	27,464	22,998	931	1,518	1,285
Fence posts, girders and pole blocks "	387	879	373	31	51	20
Softwoods(c), n.e.i. "	134	74	112	14	8	11
Hardwoods(d), n.e.i. "	21,028	16,966	13,917	1,458	1,169	959
Dressed timber "	1,021	1,330	1,419	142	184	207
Veneers '000 sq. ft.	2,046	1,589	1,474	49	38	33
Plywood "	1,101	898	751	124	107	95
Tanning substances cwt.	63,582	88,659	88,317	182	256	237
Charcoal "	5,712	6,831	6,602	22	25	31
Eucalyptus oil '000 lb.	235	310	475	80	104	156
Acaroid resin, grass tree and yacca gum cwt.	8,949	15,714	10,934	17	32	20

(a) Excludes re-exports. (b) Excludes stumps and the like. (c) Non-pored woods. (d) Pored woods.

Of the exports of logs in 1962–63, 55 per cent. were consigned to New Zealand and 34 per cent. to Japan. In the same year, 37 per cent. of the sleepers exported were consigned to the United Kingdom and 13 per cent. to New Zealand, while of all undressed timber exported, 23 per cent. were consigned to New Zealand and 28 per cent. to the United Kingdom. Consignments to the United States of America accounted for 77 per cent. of the exports of tanning substances in 1962–63.