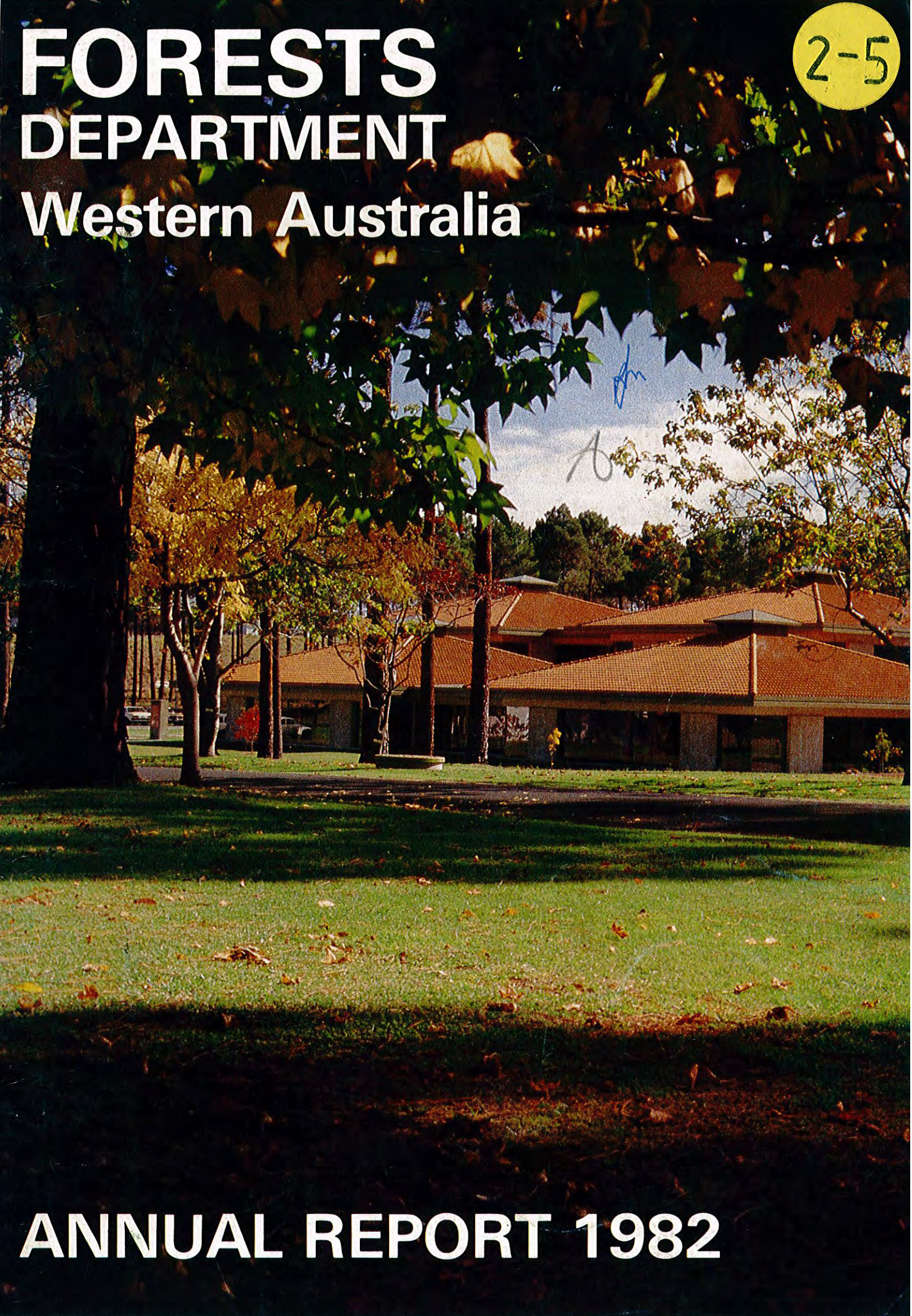
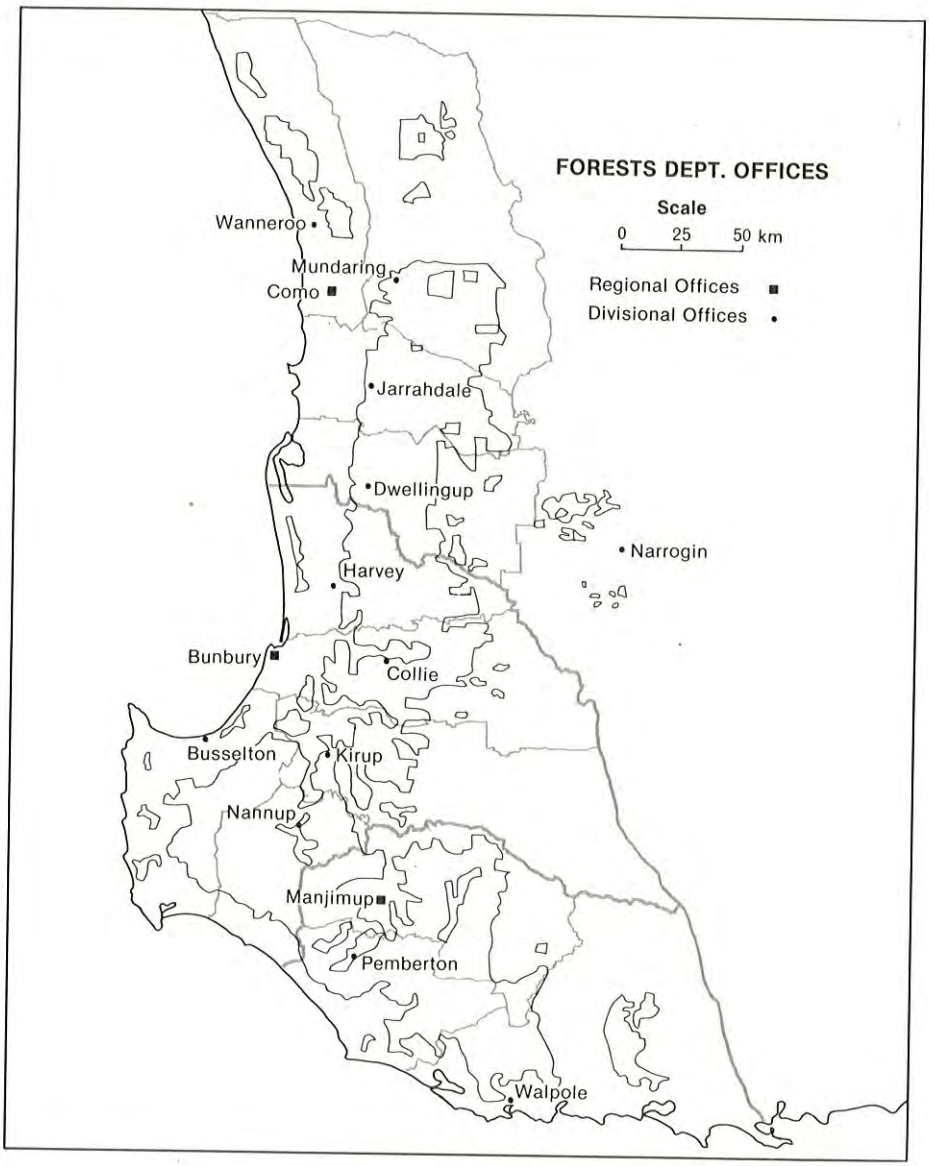
FORESTS DEPARTMENT
Western Australia



ANNUAL REPORT 1982



Front Cover

The pine forest at Como makes a pleasant backdrop for the new State Headquarters.

FORESTS DEPARTMENT COMO, W.A. 6152

TO THE HON. IAN LAURANCE, M.L.A.
MINISTER FOR FORESTS

In accordance with Section 42 of the Forests Act, I present the Annual Report of the operations of the Department for the year ended 30 June 1982.

B.J. BEGGS,
Conservator of Forests

CONTENTS

1 FOREWORD

This annual report for 1981/82 has been changed in format to make it more attractive to the general reader in the expectation that it will lead to a better understanding of our Department's approach to management of the State's forests.

It is a time of change and appropriately in the year under review we moved into our new permanent headquarters at Como. The completion of this new State Headquarters building, located in pine forest, was welcomed by all our staff. The move has been of considerable benefit in terms of efficiency and staff morale.

The building was formally opened by the then Premier Sir Charles Court, KCMG, OBE, on 30 October 1981. During his address Sir Charles announced the establishment of the "C.E. Lane-Poole Memorial Trust", in recognition of the contribution made by the pioneer Conservator of Forests Mr Lane-Poole during the period 1916-1921 when he laid the foundations of the Forests Department in this State. The Fund will provide Forests Department officers with travel and study opportunities.

A major project during the past year was the preparation and publication of a new General Working Plan for State forests in Western Australia. This document, approved by the Governor in Executive Council on 9 March 1982, sets out forest policies and the ways in which they will be pursued over the next five years. The new Working Plan continues and extends the policies on land use and long-term control of forest yield set out in the previous Working Plan approved in 1977.

One of the principal thrusts of the new General Working Plan is the continuing reduction of the level of cut in the hardwood forest and the substitution of locally grown pine to maintain the total timber supply. It takes into account the State's isolation, the escalating cost and unreliability of external sources of timber and a desire to provide alternative employment opportunities in the south-west area where traditionally the timber industry has played a very important role.

The computerized Forest management Information System (FMIS), initiated in the southern region, now provides detailed resource information and a vastly improved basis for land use management and planning. The compilation of the data contained in the Department's publication "Conservation of the Karri Forest" was greatly facilitated by the use of the FMIS programme.

During the year the Department's research teams continued to provide valuable data on which to base management decisions. We have also made considerable progress in our level of understanding of the way the disease *Phytophthora cinnamomi* or "dieback disease" causes tree death in our forest situation.

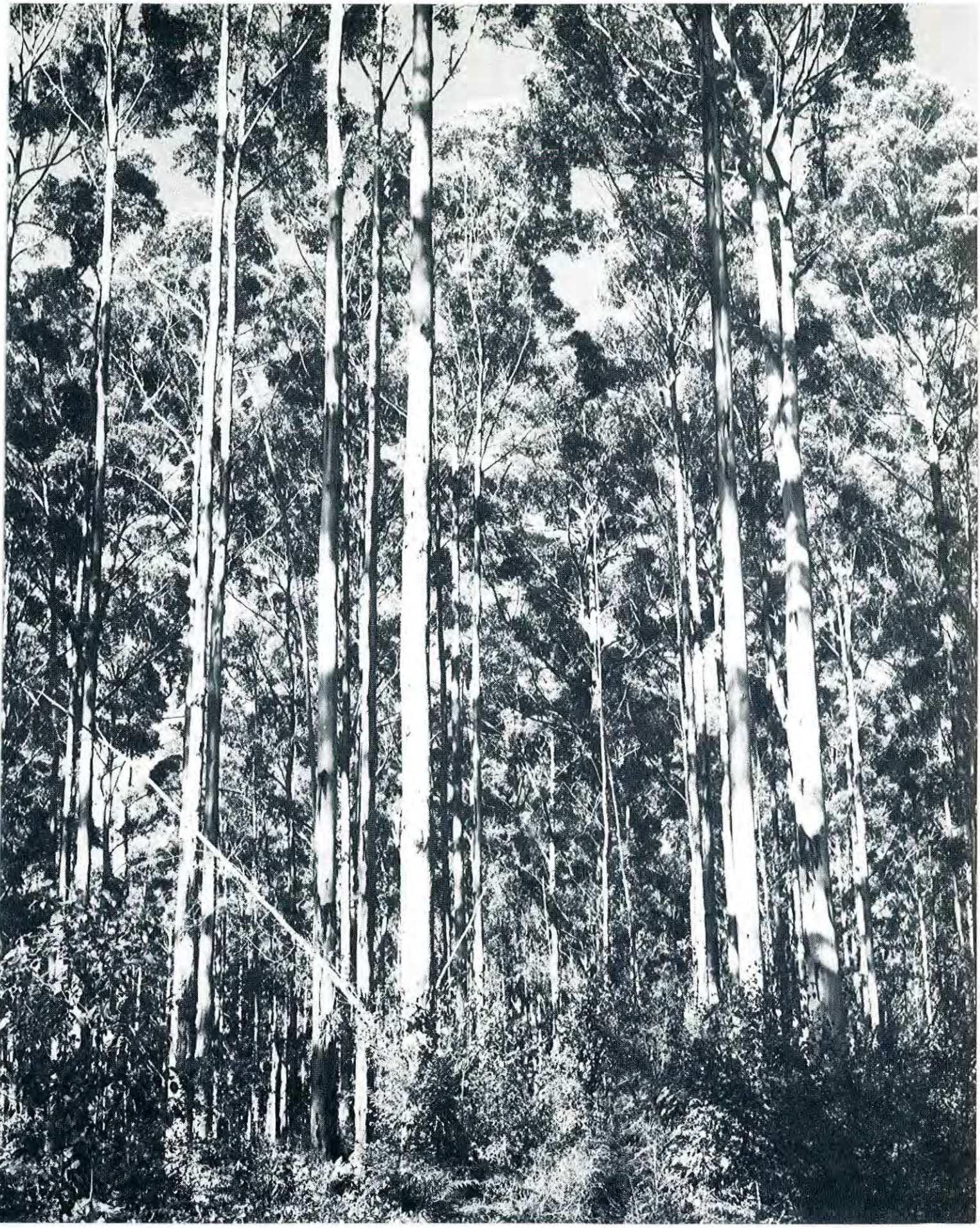
A disappointing feature of the year was the legal challenge mounted against a film produced jointly by the timber industry and the Forests Department with the objective of providing the public with a better understanding of some aspects of forest operations. Considerable officer time was involved in providing the technical background information for the successful defence of this injunction application.

It is disturbing to have unsubstantiated allegations levelled against the officers of the Forests Department by a small group of critics who have been consistently shown to lack credibility. Despite these attacks our staff have maintained a high level of morale and dedication to their tasks. I wish to record my thanks for their continued support.

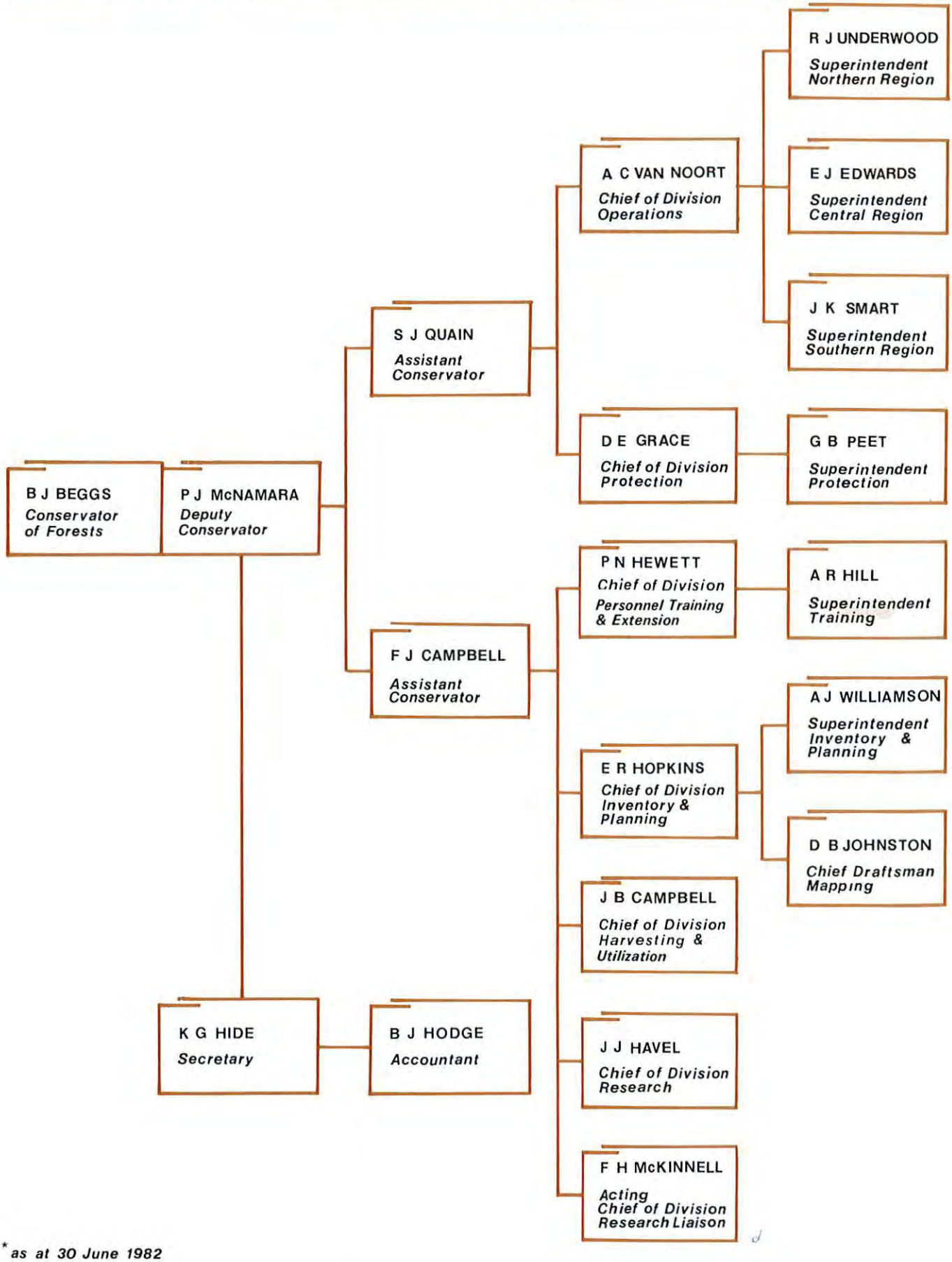
The Forests Department is conscious that there is genuine interest and concern in the community for the forest environment we administer. My officers and I will continue to meet the community need for information and explanation. This report to Parliament is an integral part of that communication process.

B.J. BEGGS,
Conservator of Forests

Regenerated karri at pole stand size are picturesque as well as being a valuable resource.

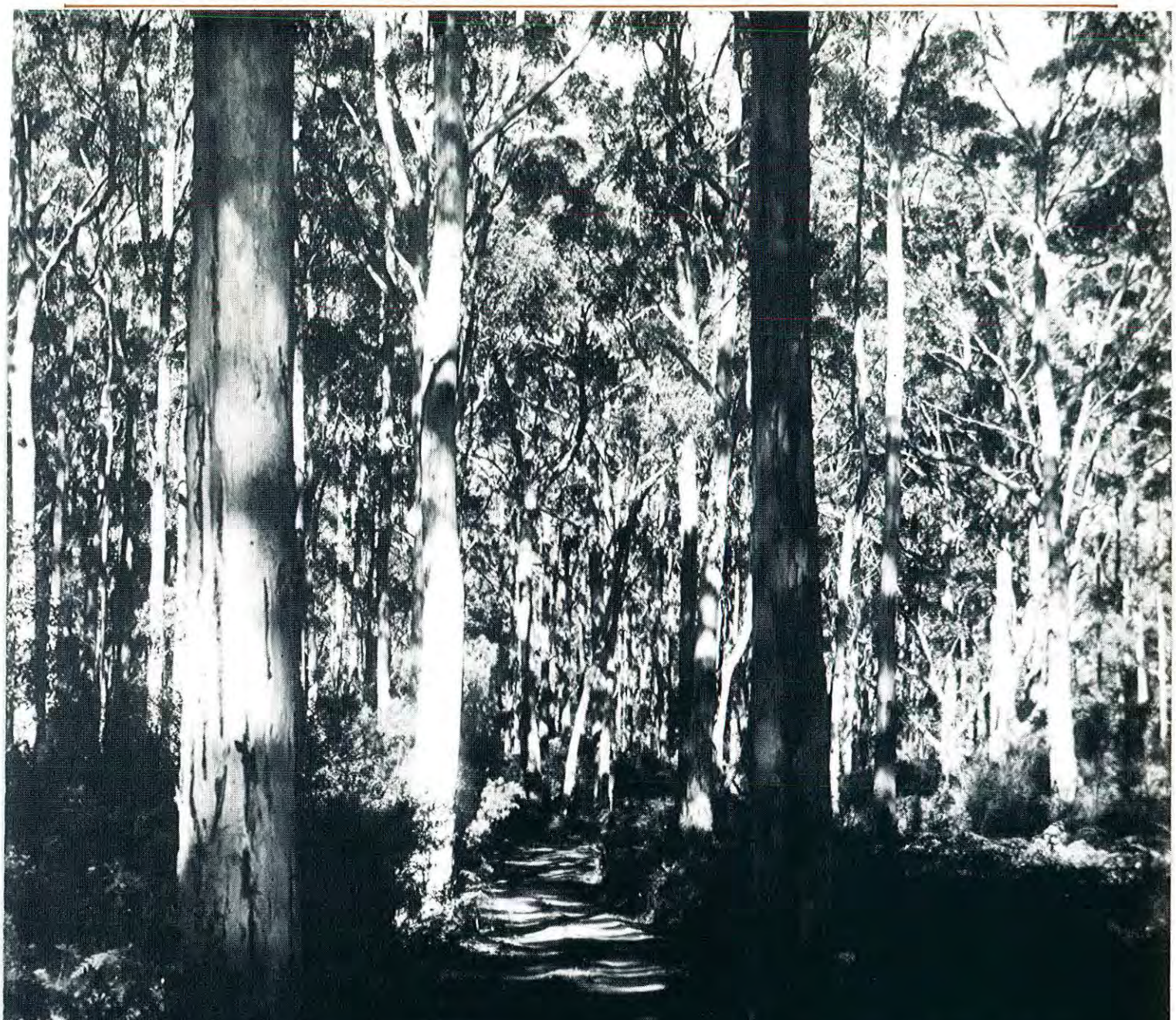


2 PRINCIPAL OFFICERS*



as at 30 June 1982

3 OBJECTIVES



The Government's forest policy involves the following management objectives.

Water Supplies: To protect, control and rehabilitate where necessary, those forest areas that contribute to the water supply requirements of the State.

Timber Production: To regulate the removal of produce from the native forests to a level that can be sustained by the forest growth in the long term.

Other Forest Produce: Within the management guidelines for the forest, to ensure the future livelihood of those persons involved in "less important" forest industries.

Recreation and Tourism: To extend access to the forests wherever this is possible and to provide additional facilities for people to enjoy the many forest values that are available to them.

Flora and Fauna: To conserve the habitats of the many species of flora and fauna that exist in the forests of Western Australia.

Special Scientific Values: To set aside specific areas of forests for the purpose of education, reference and scientific study.

Mining: To rehabilitate and stabilize those forest areas upon which the original vegetation has been destroyed in the course of mining operations.

Forest Protection: To maintain and add to the areas of permanently reserved forests; to protect these forests from fire, insects and other harmful agencies and to maintain and improve the health and vigour of the forest area.

Private Forestry: To encourage and assist private owners to establish and manage commercial forests and to provide landholders with advice on planting trees for their shelter and protective values in the rural areas.

4 STATISTICAL SUMMARY OF FORESTRY ACTIVITIES 1981/82

The Forest Estate

Total area of State forest	1 868 106 ha
Additions to State forest	589 ha
Excisions from State forest	316 ha
Timber reserves	118 788 ha
Freehold land held in the name of the Conservator of Forests	26 370 ha
Land purchased for pine planting	Nil

Hardwood Forest Establishment

Area of karri and karri-marri forest regenerated	3 605 ha
Wandoo forest regeneration	25 ha
Tuart forest regeneration	43 ha
Catchment regeneration	910 ha
Reforestation of disease killed forest	871 ha
Reforestation of gravel pits	75 ha
Reforestation of areas mined for bauxite	231 ha

Pine Forest Establishment

Areas planted with pines 1981	2 596 ha
Radiata	1 600 ha
Pinaster and other species	996 ha
Total area of pine forest established at 31 December 1981	52 787 ha
Radiata	26 961 ha
Pinaster and other species	25 826 ha

Nursery Production

Eucalypt plants for Departmental use	
Manjimup nursery	3 000 000
Hamel nursery	540 900
Narrogin nursery	5 800
Eucalypt plants for public sale	
Hamel nursery	140 700
Narrogin nursery	160 800

Nursery Production

Pine plants for Departmental Use	
Radiata	2 286 500
Pinaster	892 700
Pine plants for public sale	403 100
Other plants	
Karratha nursery	60 000

Forest Protection

Area of prescribed burning	316 507 ha
Fire outbreaks	
Number of fires	172
Area burnt	2 380 ha

5 STATISTICAL SUMMARY OF FOREST-BASED INDUSTRIES 1981/82

Sawn Wood Production

Total production of sawn timber	343 105 m^3

Log Production

	Crown land (m^3)	Private Property (m^3)
Saw logs hardwood+	849 546	96 875
Saw logs softwood+	54 425	8 930
Other logs hardwood*	369 207	16 116
Other logs softwood*	119 049	5 904

\+ includes logs used for production of plywood veneer.
* includes chip logs and particle board material.

Hardwood Chip Logs

Quantity produced	369 207 m^3

Firewood Production

Quantity produced	65 067 t

Poles and Piles

Quantity produced	385 932 lin m

Sandalwood

Quantity produced	1 686 t

Average Monthly Employment

Timber mills, including bush workers	2 116
Other timber reprocessing plants	3 306 (est.)
Firewood, mining timber and pole cutters	47 (est.)
Sandalwood workers	90
Apiarists	178 (est.)
Forestry (including contractors)	1235

6 THE FOREST ESTATE

Area of State Forest and Timber Reserves

The area of land held as State forest at 30 June 1982 was 1 868 106 ha, which represents a net increase of 273 ha compared with the area at 30 June 1981. The area of land under timber reserves (Forests Act 1918-76) was also increased this year by 16 ha to 118 788 ha. Freehold land held in the name of the Conservator of Forests totalled 26 370 ha, an increase of three hectares for the year.

Type	Area (ha)
Jarrah	1 449 000
Karri	149 000
Wandoo	106 000
Mallet	10 000
Tuart	3 000
Radiata	27 000
Pinaster	26 000
Goldfields species	30 000
Very open areas	213 000
	2 013 000

Land Alienation and Leases

Land alienation is the process of removal of land from the Crown for private ownership. This year a total of 27 applications for alienations were received involving 13 485 ha, and 27 applications for forest leases were received involving 1925 ha. The Department agreed to the following:

	Number	Area (ha)
(a) Alienations		
Timber Zone —		
State forest ..	Nil	Nil
Crown land...	7	3 126
Outside timber zone.....	2	2 182
(b) Leases		
Timber Zone —		
State forest	16	1 046
Crown land...	1	2
Outside timber zone.....	NA	NA

MAJOR FOREST TYPES WITHIN THE FOREST ESTATE

JARRAH. includes pure jarrah; jarrah with marri, W.A. blackbutt, wandoo, W.A. sheoak and bullich as minor species; stands dominated by marri with jarrah as the minor species; stands dominated by W.A. blackbutt with jarrah or marri as the minor species; stands dominated by bullich with jarrah or marri as the minor species.

KARRI. includes pure karri; karri with marri, and/or jarrah and the three species of tingle as the major or minor species.

WANDOO. includes pure wandoo; pure powderbark wandoo, wandoo and powderbark wandoo with jarrah, marri and brown mallett as minor species.

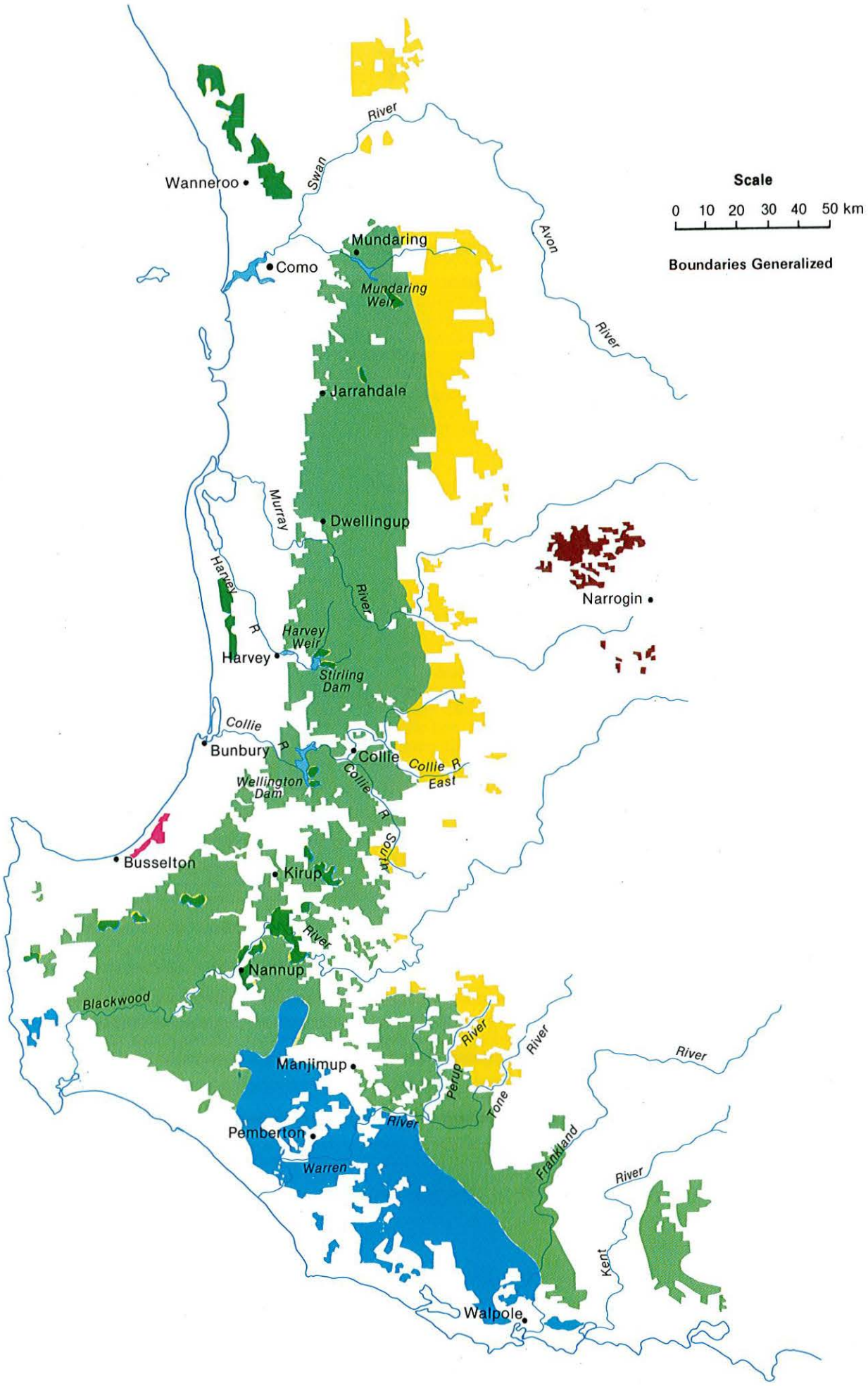
MALLET. includes 8 300 ha of brown mallet plantation; mallet species with wandoo as the minor species.

TUART. consists of pure stands only.

RADIATA. includes pure stands in plantations only.
PINASTER. includes pure stands plus a very small area of other species, in plantations only.

GOLDFIELDS SPECIES. (not shown) includes pure stands of salmon gum, Dundas mahogany, Dundas blackbutt, Cleland's blackbutt, silver gimlet, sandalwood, jam and many others, or any of these species in combination.

VERY OPEN AREAS. (not distinguished) containing coastal woodlands, swampy and rocky areas cleared for mining and not yet rehabilitated, land used for public utilities.


Scale
0 10 20 30 40 50 km
Boundaries Generalized
Wanneroo
Swan River
Mundaring
Como
Mundaring Weir
Avon River
Jarrahdale
Murray River
Dwellingup
Harvey River
Harvey R.
Harvey Weir
Harvey
Stirling Dam
Narrogin
Collie
Bunbury
Collie R.
Collie R. East
Wellington Dam
Collie R. South
Busselton
Kirup
Nannup
Blackwood River
Manjimup
Pemberton
Warren River
Perup River
Tone River
Frankland River
River
Kent River
Walpole

7 LAND MANAGEMENT

In accordance with its policy of multiple use, the Department manages forest land for the full range of forest values. Land management is an integral part of the Department's activities.

System 6 Participation

The Forests Department has submitted its comment on the System 6 Study Report. This comment, and those submitted by other organizations and individuals, is currently being considered by the Environmental Protection Authority and the Department of Conservation and Environment.

In the meantime, those recommendations made to the System 6 Study Report affecting land administered by the Forests Department are being implemented. This primarily includes Management Priority Areas for Fauna, Flora, Landscape and Recreation incorporated in General Working Plan No. 87 of 1982.

Land Use Management Plans

The basis for a land use management concept designed to include all State forest was thoroughly reviewed during the preparation of General Working Plan No. 87. This requirement was illustrated in a preliminary land use map which is included in the current Working Plan.

Flora and Fauna

A high proportion of Western Australia's flora is endemic to the State, so that its conservation is not only of regional but also of national and international significance. The conservation of native fauna in forested areas of Western Australia is also very important. The Forests Department recognizes these values, and, within its policy of multiple use, manages areas for the conservation of both flora and fauna.

This year, the Department again maintained close liaison with the Department of Fisheries and Wildlife in the control of commercial wildflower collecting in State forests.

As part of a programme to locate and map rare and endangered plant species, plant identification kits have been issued to field staff working in areas where such species may occur. Also, a seed orchard was established near Collie for tree species declared rare under the Wildlife Conservation Act.

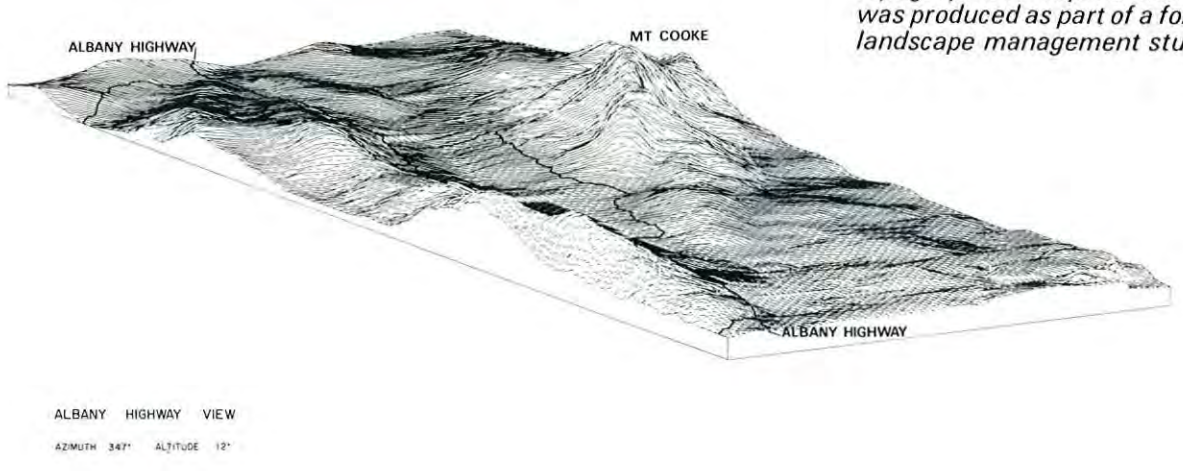
The collecting of botanical species continued in the Pilbara and Kimberley to determine plant distribution and to select species suitable for horticultural use.

Landscape Planning

The Department's capacity for landscape planning and design was expanded with the appointment of a second landscape architect.

Work has advanced on the development of a landscape management system for application to all State forest areas. This system, which is based on the identification and assessment of distinctive forest landscape types, provides for the preparation of landscape management guidelines covering various Departmental operations such as logging and road construction.

During the year, a number of planning and design projects was completed. These included the preparation of landscape plans for the new Pemberton divisional office and the design of an arboretum near Merredin. A 100 ha tree park, which is being developed in liaison with the Balingup Progress Association, was officially opened during the year. Recommendations for the rehabilitation and long-term management of State forest areas adjoining the Albany Highway have also been prepared following a detailed landscape assessment of this road corridor.



Three dimensional aerial diagram of the Mt Cooke region showing Albany Highway and Mt Cooke. This computer drawn topographical representation was produced as part of a forest landscape management study.

Recreation

There has been a continued emphasis on the preparation of both regional and divisional recreation land use plans, and on the design and redevelopment of recreation areas and facilities throughout State forest.

The preparation of recreation guidelines covering all aspects of recreation site planning, design and management is well advanced. A standardized sign system for use throughout State forest is also being developed.

As part of a general revision of brochures, the Department has created a recreation information series. Several brochures in this new series are available.

During the year, the Department hosted a four-day forest recreation workshop. This was attended by 35 people including representatives from a number of other State Government Departments and local organizations.

The Establishment and Tending of Forests

Jarrah Forest

Jarrah forest differs from the other forest types in Western Australia in that regeneration, in the form of dormant seedlings, is in most instances already present when logging takes place. The area logged is normally equivalent to the area regenerated. Some logging also takes place in stands which have been previously cut and in which the regeneration is at the sapling or small pole stage.

The Forest Improvement and Rehabilitation Scheme (FIRS) in the northern jarrah forests was continued in 1981/82, a total of 1836 ha being treated. FIRS involves the thinning of regrowth forest, the regeneration of disease affected forest and the development of recreational facilities in accordance with the land use priority set for a particular area. Most operations took place adjacent to ALCOA bauxite mines, and were financed by ALCOA of Australia Ltd.

A programme of rehabilitation of log landings in jarrah-marri forest was continued in conjunction with the timber industry. A total of 160 landings was ripped, fertilized and replanted with species resistant to dieback disease.

Karri Forest

During the winter of 1981, 3605 ha of cut over karri and karri-marri forest were regenerated. Of this, 1819 ha were established by natural seedfall from retained seed trees. Supplementary planting was required for 247 ha of poorly stocked seed tree areas. In addition, 1520 ha were planted and fertilized by hand and another 266 ha were regenerated by broadcast seeding methods.

A 34 ha block of recently acquired private property near Walpole was reforested with eucalypts.

The programme of rehabilitation of log landings, snig tracks and gravel pits was continued in conjunction with companies of the timber industry. Approximately 360 landings and associated snig tracks were ripped, fertilized and planted involving a total of 225 000 karri seedlings.

Wandoo Forest

In the eastern zone, 25 ha of wandoo were prepared for natural regeneration.

Mallet Forest

The State forest at Dryandra contains most of the mallet forest under Forests Department control. The area is managed primarily for the conservation of flora and fauna.

Thinning to produce mallet fence posts and material for tool handles was carried out on 60 and 65 ha respectively.

Tuart Forest

In accordance with the designated priority use of the Ludlow forest area, 43 ha of clear felled pine forest were replanted with tuart in 1982.

Pine Forests

In past reports it has been the custom to refer to areas afforested with pines as plantations. However, since these areas are now quite extensive and a familiar part of the landscape, and are in every sense a forest, they will in future be referred to as pine forests.

Pine Planting

The Department has a pine planting programme aimed at supplementing the production of the native hardwoods to provide net self-sufficiency in sawn timber

The Department's tree nurseries play a vital role in the re-establishment of damaged or cut over forest. Here forest worker Arthur Chappel tends karri seedlings in the Manjimup nursery.

supplies. State pine forests comprising radiata and pinaster now cover 52 787 ha.

Areas of pine planted during the year by the Department are detailed below. These include a total of 159.3 ha of second rotation planting; Harvey (32.1 ha), Kirup (17.5 ha) and Busselton (109.7 ha) divisions.

1981 PLANTING (ha)

DIVISION	Radiata	Pinaster and other species	Total
Wanneroo	—	513.8	513.8
Harvey	41.8	249.1	290.9
Kirup	356.8	—	356.8
Nannup	241.3	17.1	258.4
Busselton	959.9	216.4	1 176.3
Total	1 599.8	996.4	2 596.2

Tending

The following pine forest tending was carried out:

	ha
Scrub Control	2 643
Fertilizing with Superphosphate	7 880
Fertilizing with Minor Elements	2 064
High Pruning	3 781
Low Pruning	2 181

Private Pine Forests

Private interests advised that some 360 ha of pines had been planted in this financial year, bringing the total area of privately owned pine forest in the State to 11 996 ha.

In addition, some planting of eucalypts, mainly Tasmanian blue gum has been reported. A total area of 98 ha has been recorded.

The Department was represented on the Council and body of the Western Australian Chapter of the Australian Forest Development Institute, and Departmental officers also attended a conference at Mount Gambier and local field days at Dwellingup and Boddington.

Inland Forests

Goldfields

Renewed activity in goldmining created an increased demand for mining timber. The creation of a large flora and fauna reserve south of the Eyre Highway excluded a considerable area from timber harvesting. However, adequate resources of mining timber were located west of Norseman.

Liaison work continued with the Goldfields Dust Abatement Committee. This included significant progress with experimental work on the revegetation of mine waste dumps by directly seeding the dumps with salt bush and blue bush.

North-west

Departmental staff at Karratha continued their successful promotion of the low-water gardening concept, and mining companies began adopting the system in their new housing projects. The Department also participated in various revegetation projects at Karratha, in liaison with other Government Departments.

Vegetation surveys and visits to pastoral properties to advise on tree planting and fence post supplies continued during the year.

The Karratha Nursery has supplied 10 000 plants for rehabilitation, in conjunction with the Carnarvon Environmental Committee. Responsibility for the nursery was transferred from the Department of Regional Administration and the North-West to the Forests Department.

Kimberley

Departmental staff at Kununurra continued work on determining the distribution of tree species in the Kimberley and 400 specimens have been collected and identified, and store in the State herbarium.

Research projects included the introduction of tree species to lands degraded by fire and over-grazing, and the testing of species suitable for growing under irrigation. The number of queries from mining companies, Government Departments, Shires, pastoralists, communities, schools and householders increased greatly during the year. The queries mainly concerned tree planting and the restoration of vegetation in the Kimberley.

During the year negotiations proceeded for the transfer of the control of Broome Nursery from the Department of Regional Administration and the North West to the Forests Department.

Mining Rehabilitation

Dieback disease, mining, gravel pits and other clearings result in the denudation of some areas of State forest and timber reserves. These areas require rehabilitation to re-establish an appropriate forest environment.

Currently, the major mining activities in State forests are coal mining near Collie, bauxite mining near Dwellingup and Jarrahdale, mineral sands mining near Capel and tin mining at Greenbushes.

Residents of Karratha are encouraged to plant low water consuming gardens. The Forests Department nursery provides native species for planting throughout the town.

The Department also assists other Government agencies in the reforestation of repurchased farmland to reduce salinity levels in water supplies.

Bauxite Mining Rehabilitation

A total of 231.2 ha of pits, access roads and other clearings associated with mining was reforested by hand planting during the year. The Forests Department planted 114.2 ha at Jarrahdale. Under the terms of the mining agreement, which requires it to reforest mined areas to Forests Department specifications, ALCOA of Australia Ltd. planted 117.0 ha at the Huntley and Del Park mine sites near Dwellingup. Species planted included wandoo, spotted gum, red mahogany, Sydney blue gum, powder bark wandoo, bullich and marri. These species were selected because of their initial growing success and their potential commercial value in the new environment.

A number of scrub species was also introduced to provide rapid ground cover for beneficial nutrient input and erosion control.

Mineral Sands Mining Rehabilitation

A total of 8.6 ha mined over by Associated Minerals Consolidated at Capel was planted with tuart, yarri (Western Australian blackbutt), marri, yellow gum, river gum, black wattle, golden-wreath wattle and swamp oak. Prior to planting, the soil had been stabilized and its fertility improved by cropping with oats and lupins, followed by sowing with pasture grass.

Coal Mining Rehabilitation

The rehabilitation programme of the Griffin Coal Mining Co. Ltd. was confined to re-establishing pasture species on gently sloping and contoured overburden dumps at their Chicken Creek mine.

Western Collieries Ltd. sowed seed of some 50 native scrub species and eight eucalypt species on overburden dumps.

In association with the Mines Department, the Forests Department replanted 6 ha of abandoned mine sites with red mahogany, yarri and swamp mahogany.

Gravel Pit Rehabilitation

A total of 75 ha of disused gravel pits has been rehabilitated in State forest and timber reserves in the south-west. Species planted included wandoo, red mahogany, Sydney blue gum, spotted gum, powder bark wandoo, yellow stringy bark and karri.

Catchment Rehabilitation

The Forests Department planted 838 ha of former farmland in the Wellington and Helena catchment areas on behalf of the Public Works Department and 72 ha on behalf of the State Energy Commission. The species planted included wandoo, powder bark wandoo, flooded gum, Sydney blue gum, river gum, marri, jarrah, Tasmanian blue gum, red mahogany, sargent's mallet, stocking tree and tree-lucerne.

Protecting the Forest

Protecting the forest from destructive agents is essential to all forest land and resource management. During the year activities centred around the two major programmes — protection from wildfire and protection from the spread of dieback disease.

Rehabilitation of bauxite pits is under constant observation. Here research officer John Bartle shows the development of the understorey from the sowing of scrub species. ▲

A gravel pit recently replanted. ▼

Fire

The area of land under the control of the Forests Department and protected from wildfire was 2 013 264 ha. In addition, a measure of protection was afforded to a considerable area of private and other government land adjoining and near State forest through the Department's detection programme, co-operative burning ventures and neighbour-to-neighbour fire suppression activities.

The weather for the fire season was generally mild and cool which tended to aid the prescribed burning programme and mitigate the outbreak of extensive wildfires. The most notable features of the weather were the very heavy cyclonic rains throughout the south-west in January, which temporarily eliminated all wildfire risk. The extended, stable autumn weather provided excellent prescribed burning conditions.

The combined effect of the Department's prescribed burning programme, suppression organization and a mild summer has again maintained the number of wildfires and area burnt at the low levels achieved in the previous three years.

Prescribed Burning

The aerial burning programme, involving ignition from aircraft, was completed, apart from one burn that has been postponed until spring 1982. The favourable weather conditions also aided the completion of the Sunkland pine clearing burns and the karri regeneration burning programmes.

The Department has again co-operated with the Bush Fires Board, National Parks Authority and Public Works Department in fuel reduction using prescribed burning programmes on areas of mutual interest.

Areas of prescribed burning for the last five seasons are shown overleaf.

Detection

Wildfire detection was mainly provided by pilots flying light aircraft. In pine forest areas requiring constant surveillance, four lookout towers were regularly manned. A further tower was used in the Narrogin division and 20 others in the south-west were maintained in full readiness for emergency use. During the season, a trial was conducted at Wanneroo to determine the feasibility of replacing three lookout towers with aircraft. The results are still being evaluated.

Other significant activities were the construction of a landing strip at Walpole and the purchase of the ninth Piper Cub aircraft.

The table overleaf shows the number of wildfires attended and the areas burnt during the past five fire seasons.

Other Activities

The Forests Department's incendiary machine developed in conjunction with WAIT-Aid, was refined and tested during the prescribed burning season.

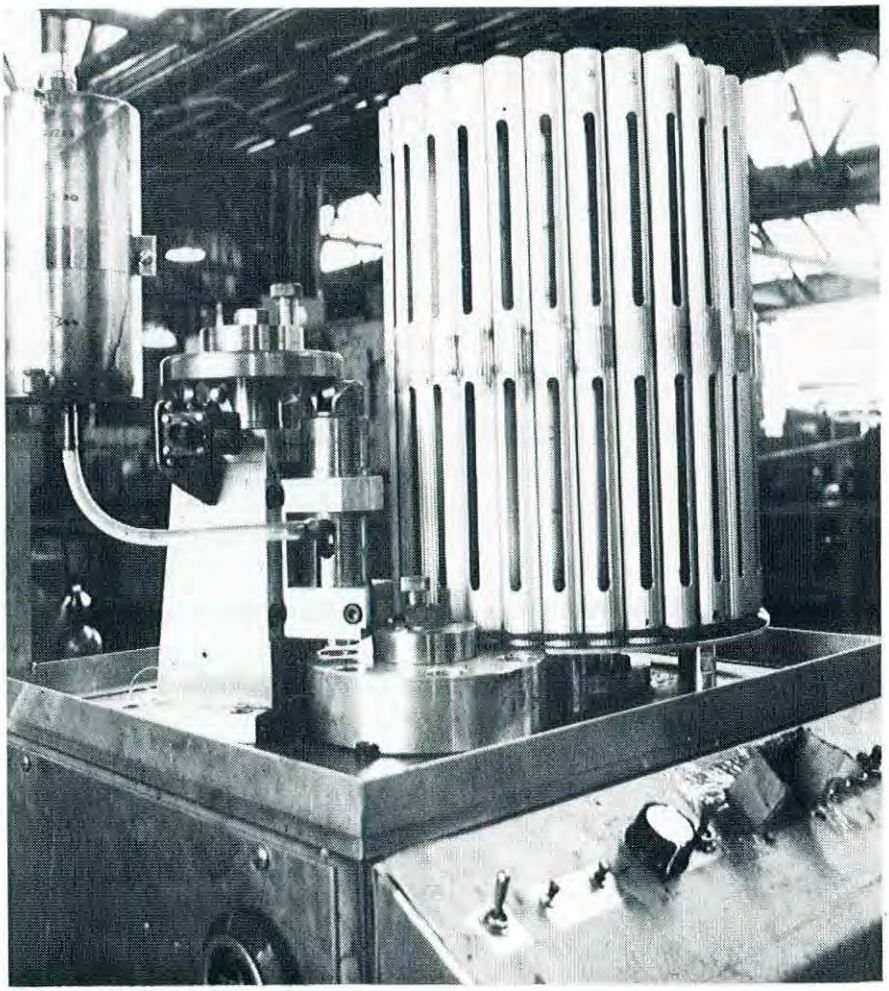
An officer from Protection Branch was seconded to the Bush Fires Council of the Northern Territory for four weeks in May to assist them with their aerial burning programme, using the new incendiary unit. An order for two additional machines followed.

In February 1982 the Department hosted, for a week, a party of seven United States and Canadian fire control foresters visiting Australia on a Fire Management Study Tour. The visit was a continuation of regular exchanges that have occurred periodically since 1970.

Disease

Jarrah dieback disease is widespread throughout the south-west, particularly in high rainfall areas, and is a major management concern.

Protecting the forest from



An incendiary machine is designed to drop capsules and fuel from the air onto forest areas to be control burnt. Development of this new machine was completed this year. ▶

Unusual cyclonic rains during the 1981/82 summer created flooding throughout the south-west of the State. Here Father Brian Morrison and forester Bruce Harvey discuss emergency services in the timber town of Nannup.
Photos, courtesy West Australian Newspapers Ltd.

dieback disease is best achieved by preventing its spread through areas of forest that are most susceptible. These areas are proclaimed Disease Risk Areas and are commonly known as dieback quarantine areas. As the disease is borne in the soil and can be carried on vehicles entering the forest, the most practical way of preventing inadvertent spread is to exclude vehicular traffic as far as possible from disease risk areas.

Disease Risk Areas

The area of State forest, timber reserves and other Crown land that has been proclaimed a disease risk area remained at 719 561 ha in 1981/82.

Access to the disease risk areas is restricted to essential services and controlled by a permit and patrol system. During the past year 240 permits were issued, of which 190 are in current use. A total of 1857 permits has been issued since the inception of disease risk areas in 1976.

A total of 3260 patrols has been carried out since 1976 to ensure that disease risk regulations were adequately enforced.

Environmental Protection

A survey of operations with the potential to damage the forest environment was undertaken for all 12 divisions. The survey included 57 operations such as logging, mining, road construction, recreation, public utilities, pine forest establishment and fire control. Many of these are common to all divisions.

The objective of the survey was to review control measures for minimizing damage to the forest environment and for rehabilitating damaged areas. Included were factors such as spread of dieback disease, damage to trees and vegetation, water quality, soils, native fauna, aesthetic values and damage from waste disposal and weed introduction.

Although considerable further work is required, the survey has provided a useful basis for identifying strengths and weaknesses in current management practices, thus enabling assessment of future needs in research and operational methods.

Vehicular access to State forest is restricted in those areas at risk from the spread of dieback disease. ▲

SUMMARY OF PRESCRIBED BURNING FOR PAST FIVE FIRE SEASONS

	FIRE SEASON				
	1977/78	1978/79	1979/80	1980/81	1981/82
Hardwood forest					
Burning by hand methods	36 567	57 801	53 137	42 561	34 946
Burning from aircraft	233 931	311 733	282 965	207 428	268 075
Total	270 498	369 534	336 102	249 989	303 021
Advance, top disposal and regeneration burns	3 674	3 861	3 051	9 014	6 382
Pine forest					
Clearing burns for pine establishment	2 530	2 008	987	3 749	4 158
Fuel reduction burning	1 779	1 932	1 938	1 798	2 946
Total	4 309	3 940	2 925	5 547	7 104

SUMMARY OF WILDFIRES FOR PAST FIVE FIRE SEASONS

	FIRE SEASON				
	1977/78	1978/79	1979/80	1980/81	1981/82
Number of wildfires attended					
Hardwood forest	221	121	81	95	87
Private property and Crown land adjacent to State forest	150	101	72	70	66
Pine forest	11	13	5	13	19
Total number	382	235	158	178	172
Area of State forest fires (ha)					
Hardwood forest	8 211	2 960	1 885	7 392	2 370
Pine forest	364	32	10	15	10
Total area	8 575	2 992	1 895	7 407	2 380

8 RESOURCE MANAGEMENT

The forest resource is composed of the produce yielded by the forest managed by the Department. It includes seed, production of seedlings, and wood and water. In order to ensure continued production, all require specific management within the multiple use policy.

Seed Supply

The seed from native species and pine trees growing throughout the State is an important forest resource. The mechanism to collect and successfully propagate seed has been established within the Department for many years to ensure continued supply.

This year seed collections totalled 879 kilograms (kg) comprising pine species (690 kg), native legumes (157 kg), and others, mainly eucalypts (32 kg).

Seed Store

Seed is distributed to Department nurseries and the general public from the seed store situated at the Forests Department State Headquarters.

This year seed store transactions included the receipt of 266 batches of collected seed, the sale of 669 small packets of seed and 326 despatches of seed lots. Included in these despatches were 325 kg of native legume seed and 57 kg of other species, mainly eucalypt seed for use in the rehabilitation of mined forest areas. Returns from sales of seed were $24 756 for the year.

Tree Nurseries

The Department operates a number of tree nurseries to provide seedlings for planting in various projects.

In 1981 Forests Department nurseries raised some 7.4 million trees, which included approximately 3.6 million pines for plantation projects and 3.8 million eucalypts for regeneration and rehabilitation projects, as well as for shelter and amenity purposes. Approximately 817 000 of these trees were used for reforestation on water catchment areas.

The Manjimup nursery is one of the largest hardwood nurseries in Australia. Over two million open-rooted karri were raised this year. ▲

NURSERY	For Sale to the Public		For Departmental Use		TOTAL
	Potted Stock	Open Rooted Stock	Potted Stock	Open Rooted Stock	
Commercial Nurseries (Mainly Hardwood)					
Narrogin	160 800	—	5 800	—	166 600
Hamel	140 700	—	540 900	—	681 600
Hardwood Nursery					
Manjimup	—	—	1 100 000	1 900 000	3 000 000
Pine Nurseries					
Gnangara	—	236 800	—	892 700	1 129 500
Nannup	—	166 300	—	2 286 500	2 452 800
TOTAL	301 500	403 100	1 646 700	5 079 200	7 430 500

Wood Production

The properly planned selection and removal of trees from a forest makes it possible to maintain the forest in a healthy and dynamic condition. Control measures are applied to ensure optimum timber return from the forest, while at the same time minimizing disturbance to the forest environment.

Areas Cut Over

Timber volume in an overmature forest is largely in a state of balance and has no net growth. As there is a continuing demand for timber, it is important to maximize the growth on those areas of forest allocated to wood production. Cutting the forest enables the forester to convert an overmature forest into a dynamic growing condition. It takes at least a full rotation (the time for a species to reach a nominated felling age) for the forest to be brought into a managed condition.

Immature hardwood and softwood forests are thinned (partially cut) to increase productivity, enhance the growth of the final crop trees and maintain the forests in vigorous health.

Log Production

In comparison with last year's log production figures, there was a decrease in the quantity of log timber produced from all sources. A summary of log production for the period 1968-82 is given in Appendix 5 (a).

FOREST AREAS CUT OVER		1981/82 ha	1980/81 ha
Jarrah		24 676	22 933
Karri	clear felled*	2 181	2 079
	removal of seed trees	1 848	1 292
	thinnings	319	183
Wandoo		609	1 435
Mallet		125	184
Pine	clear felled	266	212
	thinned	1 874	1 816

LOG PRODUCTION

Production of log timber (from all sources), including sawlogs and logs used for production of veneer, not including chip logs, mining timber, firewood, poles and piles —

	1981/82 m^3			1980/81 m^3		
	Crown land	private property	Total	Crown land	private property	Total
Jarrah	593 892	60 418	654 310	605 262	62 929	688 191
Karri	240 848	23 617	264 465	251 071	23 365	274 436
Wandoo	2 569	7 746	10 315	2 632	7 635	10 269
Yarri	1 605	3 311	4 916	4 714	4 801	9 515
Sheoak	1 199	222	1 421	959	120	1 079
Marri	9 120	891	10 011	11 689	487	12 176
Other	313	670	983	558	658	1 216
Total (Hardwood)	849 546	96 875	946 421	876 885	99 995	976 880
Pine	54 425	8 930	63 335	64 074	2 988	67 062
TOTAL	903 971	105 805	1 009 776	940 959	102 983	1 043 942
Other log material* Hardwood	369 207	16 116	385 323	515 075	58 983	574 058
Softwood	119 049	5 904	124 953	137 478	NA	137 478
TOTAL LOG TIMBER	1 392 227	127 825	1 520 052	1 593 512	161 966	1 755 478

* includes chip log and particle board material.

Veneer Log Production

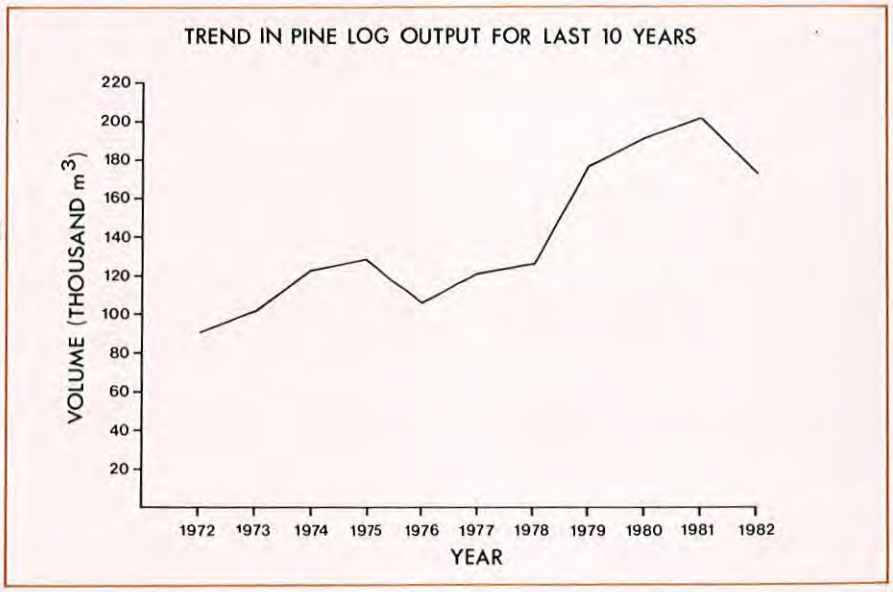
High quality logs for peeling and slicing into veneers (karri and pine), used for the production of plywood, continued to be supplied to local plywood factories.

VENEER LOG PRODUCTION	1981/82	1980/81
	m^3	
Karri	2 326	1 951
Jarrah	Nil	Nil
Pine	5 740	5 488

Hardwood Woodchip Production

Output in this industry declined this year because of adverse overseas economic conditions.

Marri and karri chip logs were supplied to the W.A. Chip and Pulp Co. Pty. Ltd. mill for the production of woodchips. Of the 369 207m^3 of chip logs produced, 69.55 per cent was marri and 30.45 per cent was karri. The W.A. Chip Pulp Company also obtained 16 116 m^3 of chip logs from private property and 74 561 of chips prepared from sawmill residue.



Production of Softwood Log Timber from Crown Land

The reduced pine log production this year, compared with the previous year, was chiefly caused by the temporary closure of a particle board factory.

Veneer logs, mill logs, case logs, fencing material and logs for particle board manufacture were supplied during the year.

There was an increase in the use of private contractors to produce and deliver pine logs to various buyers on the Department's behalf.

Harvesting of pines near Nannup.

Production of Hardwood Sawlog Timber from Crown Land

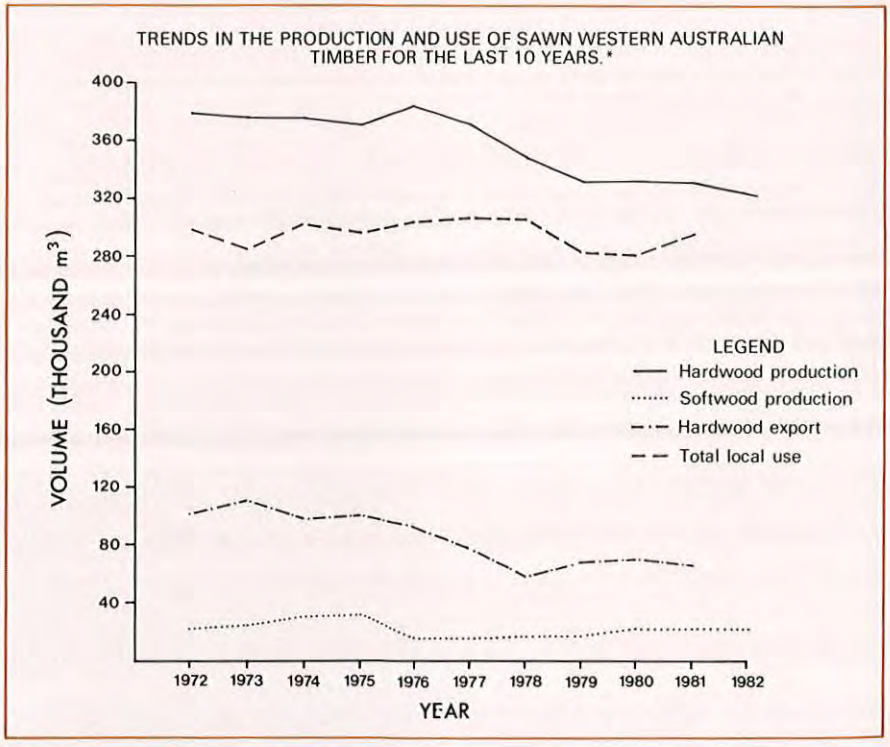
The Department's aim for a sustained yield has yet to be achieved in both the hardwood and softwood forests because of the unbalanced distribution of age classes in these forests. While working towards this goal, the level of hardwood sawlog cut (the allowable cut) is set such that it takes into account the State's present timber requirements, the inadequacy of hardwood forests to meet these requirements in future decades, increasing availability of pine and the need to provide a smooth transition in the timber industry from one type of resource to the other.

The allowable cut refers only to the volume of hardwood sawlogs used by general purpose sawmills and does not include other sawlogs which, because of size or defect, cannot be used by these mills. Such sawlogs are termed salvage logs and frequently provide short scantling, small sleepers and pallet material for which there is a limited market.

The allowable cut from the hardwood forest is controlled by permits and licences issued from Head Office, whereas salvage material is sold under local licences.

	1981/82	1980/81
HARDWOOD SAWLOG PRODUCTION FROM CROWN LAND		
Head Office licences	784 849	822 287
Local licences	64 697	54 598

SAWN TIMBER PRODUCTION FROM CROWN LAND AND PRIVATE PROPERTY		
Sawn Timber Production		
Crown land	283 356	287 672
private property	32 312	29 743
Sawn Sleeper Production		
Crown land	23 586	30 976
private property	3 851	5 426
Total	343 105	353 817



* Imports of sawn timber not included

Pine Logs Particle Board Production

During the year pine chip logs were made available to Wesfi Pty. Ltd. for the manufacture of particle board at Dardanup and Kewdale. Residues from private sawmills were also used by the industry.

SANDALWOOD	1981/82	1980/81
From Crown land		
	t	t
Green sandalwood	1 021	1 092
Dead sandalwood	663	873
From private property	2	12
Total	1 686	1 977

Sandalwood

Sandalwood is obtained from the goldfields and Murchison areas for export mainly to Asia. Exports for the year ammounted to 1643.5 t for all classes of sandalwood.

Licences to obtain sandalwood were held by 23 contractors. Ninety people were registered as employed in the industry.

FIREWOOD PRODUCTION AND CONSUMPTION*

Crown land			
		t	t
Sawmills	for sale	40 219	38 464
	for own use	2 150	2 375
Firewood contractors	local firewood permit	2 726	3 029
	forest produce licence	14 054	11 017
Industrial use (Wundowie)		Nil	40 024
Total		59 149	94 909
Private property			
Sawmills	for sale	5 492	7 905
	for own use	426	356
Total		65 067	103 170

*These figures do not take into account the private collection of firewood from the forest.

Firewood Production and Consumption

Residue wood material for firewood is obtained as a by-product of sawmilling and also from dead trees in the forest.

OTHER FOREST PRODUCE

South-west Division and agricultural areas			
Mining (m^3)	Crown land	3 649	3 727
	private property	NA	NA
Piles, poles and bridge timber (m)	Crown land	385 932	318 480
	private property	NA	NA
Fence posts and rails (No.)	Crown land	207 048	232 160
	private property	30 759	23 210
Strainer posts (No.)	Crown land	23 531	29 798
	private property	NA	NA
Goldfields area Crown land			
Mining timber (m)		138 784	166 984
Fenceposts and rails (No.)		25 086	35 229
Strainer posts (No.)		1 486	4 311

Other Forest Produce

There was an increase this year in the number of poles and piles obtained from State forests and Crown land. Limited supplies were also obtained from private property, however, there are no production figures available.

Timber Utilization

Timber utilization includes the harvesting and processing of the forest crop.

The Department's major role in utilization is to conserve the forest resource by maximizing the recovery and sale of all the forest crop and avoiding waste. In addition, it monitors and advises private enterprise on the processing and use of the end product, paying special attention to quality control.

Hardwood Utilization

The Department's experimental hardwood sawmill at Dwellingup ceased operations at the end of February 1982. Several major sawmillers are involved in utilization research.

Softwood Utilization

The research into milling and seasoning of pine timber at the Harvey sawmill has been expanded.

The acquisition of a proof grading machine that tests and grades the strength of timber has enabled the Harvey Research pine processing plant to produce strength graded pine for construction purposes. Proof grading has proved far more efficient than visual grading, the present method employed in Western Australia and by other small pine producers throughout Australia. The Department is continuing research into the application of proof grading. To ensure the reliability of proof grading, quality testing of proof graded timber samples has been carried out independently by the Western Australian Institute of Technology.

The capacity of the high temperature kiln at the Harvey mill was increased to allow the facility to be used by private pine producers, prior to the development of their own kilns.

Timber Inspection

The Forests Department continued to offer a timber grading service to industry.

Log Pricing

The charges for hardwood logs supplied from Crown land are termed royalties and those for softwood logs are termed stumpages.

Hardwood sawlog royalties increased by 20 per cent from 1 July 1981, in line with other increased Government charges. Hardwood chip log royalties, which are reviewed at five-yearly intervals under the Wood Chipping Industry Agreement Act, rose from 74.16 cents to $3.15 per cubic metre in January 1981.

In accordance with the movement of the Consumer Price Index for Perth this year, softwood sawlog stumpages were increased in March 1982 by 12.6 per cent. This was provided for in the conditions of tender when log contracts were let in 1978.

Softwood particle board log stumpage is controlled by the Wesply (Dardanup) Agreement Act, and did not alter during the year.

The Consumer Price Index for Perth was used on a six-monthly basis to increase prices for all other logs during the year.

Water

The Department is charged with managing water catchments on State forest to the requirements of the water supply authorities and aims to maintain and enhance the quality and quantity of water resources through the protection and maintenance of forest on water catchments.

During the year, catchment protection continued to receive high priority in Departmental planning, in close co-operation with the Public Works Department and the Metropolitan Water Supply, Sewerage and Drainage Board.

Management of water resource areas includes the coastal pine forests overlying shallow aquifers, from which water is drawn for the metropolitan area and the hardwood forests in the reservoir catchments of the Darling Range. The research into logging practices of forests in high rainfall zones, where water yield may be increased without increased salinity risk, was intensified this year.

There has also been close co-operation with the Public Works Department in the reforestation of catchments where agricultural clearing has resulted in increased stream salinity and the consequent planting of 910 ha in the current year. The aim of research in this field has been the development of reforestation systems in which catchment protection objectives may be achieved.

Assistant Forester Paul Liddelow inspects logs at the W.A. Chip and Pulp Company to ensure that only logs unsuitable for sawmilling are pulped for chipwood. The logs pictured here are marri.

9 SUPPORT SERVICES

The Department has several branches providing support services for its management requirements. These services provide information, advice, trained personnel and equipment necessary for the land and resource management objectives of the Department to be achieved.

Research

The activities of the research branch are organized from the Como research headquarters, and field research stations at Wanneroo, Dwellingup, Busselton and Manjimup.

The research branch received a further boost during the year with the appointment of another three research officers.

Como

Research continued on the ecology of the northern jarrah forest, concentrating on the growth rate of jarrah on different site types, the effect of fire on the jarrah growth rate and soil arthropod populations and on the biology of understorey species, such as bull banksia.

The sandalwood establishment and management research programme continued, although disease problems caused the abandonment of a large field trial testing a variety of host plants at Dryandra forest.

Considerable progress has been made in the study of the *Phytophthora cinnamomi* attacks on pines in the Donnybrook Sunkland. The main effort, in conjunction with the Department's tree breeding section, went into testing seed orchard trees for their resistance to the *P. cinnamomi* pathogen.

Wanneroo

The Wanneroo research station is principally concerned with the tree improvement program for radiata and pinaster. Over the last year there have also been studies of the variation in a number of characteristics of wandoo, such as its tolerance to salt and its suitability for reforestation of bauxite mined areas in jarrah forest. A progeny trial of wandoo was established to determine whether characteristics such as stem form and vigour could be inherited.

A new research programme was initiated this year to study second rotation problems in the pine species used in Western Australia. A large second rotation experiment was established at Gnangara to study these problems.

Dwellingup

The research at Dwellingup is primarily concerned with the jarrah dieback disease caused by *P. cinnamomi*. A wet autumn in 1981 and unseasonal midsummer rains in 1982 created good conditions for the study of the pathogen on various forest sites and of its mode of attack on jarrah. The seasonal and site conditions which cause mass deaths of jarrah are now better understood, and this knowledge is being directed towards the development of forest management procedures which prevent such occurrences.

Other research undertaken at Dwellingup includes the measurement of evapo-transpiration of jarrah and marri using the ventilated chamber method, the thinning of the jarrah forest to create optimum wood and water production and the ecological impact of fire in the jarrah forest. Toward the close of the financial year, a new research officer was appointed to work on management problems of reforested bauxite mined areas.

The monitoring of streamflow, stream salinity and groundwater levels in boreholes was continued in several experimental catchments, and additional monitoring of areas treated under the Forest Improvement and Rehabilitation Scheme was undertaken.

Busselton

In the Sunkland, research on nutrition of radiata pine has advanced, concentrating on refining the superphosphate-clover system currently in use. Other work on pine silviculture is focussed on examining the effect of various levels of thinning of tree branch development and wood quality. Long-term thinning experiments were remeasured and a number of new planting and weed control trials was established.

Agro-forestry research was expanded during the year. In the Sunkland the co-operative trial with the Department of Agriculture has included pasture improvement, weed control and tree tending work. Stockyards were also erected. In the Collie River catchment, several methods of combining farming and tree growing are under investigation, using both pines and eucalypts replanted onto former farmland. These latter studies are being carried out in conjunction with the Public Works Department.

Mechanical equipment which allows tree pruning to a height of ten metres has been developed in association with a local machinery firm.

Former Conservator of Forests Mr A.C. Harris shows research officer Dr Ian Abbott a jarrah management plot he established in 1930. ▲

As part of research into forest ecology in the southern region, bird studies have been commenced this year. Here a white-browed scrub wren has just been banded.

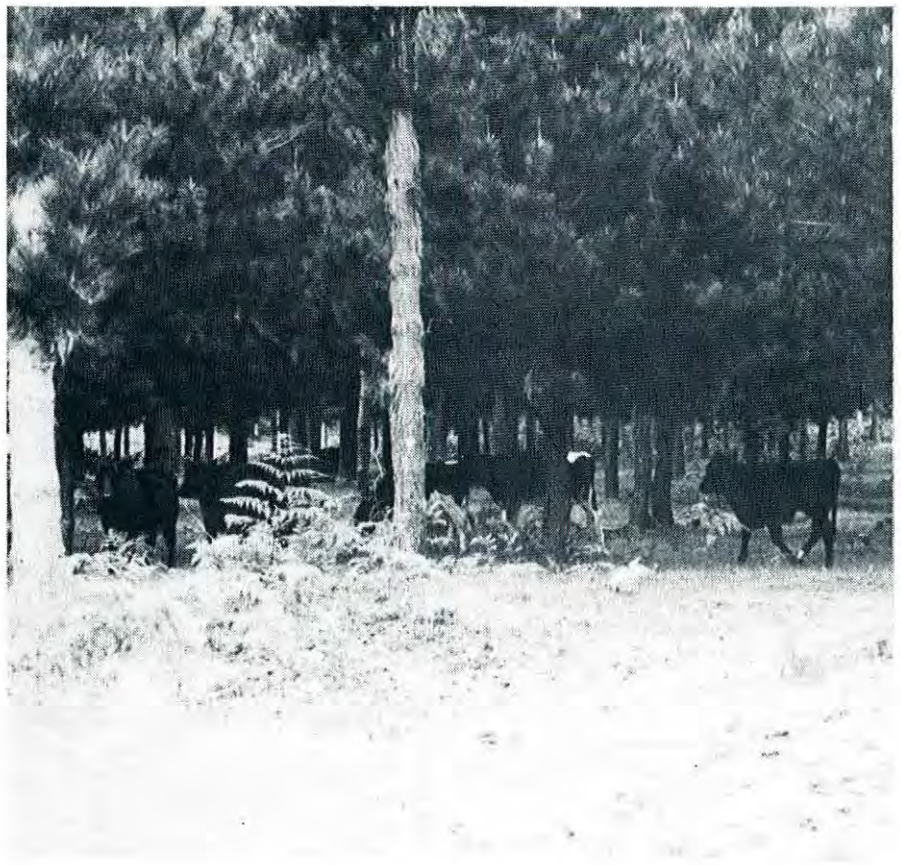
Manjimup

The primary topics of fauna research included the study of the biology of one of the rarer species, the numbat, and the effect of summer and autumn burns in the forest on bird and mammal communities. In addition, the management of the forest understorey to favour the tammar wallaby was investigated, and the effect of different methods of karri regeneration on bird populations was assessed. Finally, the survey of the distribution of the little known frog species, previously assumed to be restricted to the karri forest, was concluded.

Research into reduction of litter in young karri regrowth areas by prescribed burning was recommenced, and further progress was made in the investigation of fire behaviour in the jarrah forest under summer and autumn conditions. Preparations have commenced for a large-scale study, in co-operation with the CSIRO Division of Forest Research, designed to investigate the behaviour of large-scale coalescing summer fires.

In karri silviculture, most work has been concerned with the extension of karri seed orchards and seed production areas, and with further development of techniques for the direct sowing of karri. Some work has also been carried out on the management of regenerated stands, following a review of earlier research which indicated that markedly improved growth could be obtained by thinning young karri regrowth.

An extensive survey of southern jarrah forest types, aimed at gaining an understanding of their composition, structure and dynamics, was completed during the year. In conjunction with the CSIRO Division of Entomology, work was intensified by establishing trial plots on a variety of sites and forest types, so that the effect of the jarrah leaf miner insect on the growth of jarrah can be quantified.



Agro-forestry in practice. Here cattle grazing under young pines reduce the fire hazard and utilize grass which would otherwise be wasted.

Data Processing

The Department's second minicomputer was installed during the year. The increased data processing capacity enabled further software development to proceed and ensured continuous computer availability for vital systems such as the fire behaviour prediction system.

The computer-based accounting system became operational and the pine logging computer system was improved. The latter now allows for direct payment to contractors and invoicing of customers, and the provision of management and financial reports. It also enables a comparison of log volume data from data input at computer terminals in the divisions where logging is taking place.

Inventory and Planning

The inventory and planning branch is generally concerned with the collection of data on the forest resource and with planning for its management. The branch also carries out economic analyses, prepares plans for logging operations and for long-term yield estimates, and is responsible for most technical data processing in the Department.

The major project of the branch for the year was the preparation of the General Working Plan No. 87, which is a policy document controlling Departmental activities over the next five years.

Plans for hardwood logging for the next three years were developed for each of the five divisions in the central region. An integrated hardwood sawlog and chip log plan was prepared for the southern region. A softwood logging plan integrating the harvesting of all pine products was produced for the central region.

Economic analyses during the year included an evaluation of the financial aspects of several strategies for softwood forest development, calculation of values of softwood stands for compensation purposes and further work for the Commonwealth Grants Commission. Estimates of future demand for wood products were revised.

The computer-based Forest Management Information System (FMIS) was further improved and a private consultant was engaged to assist in its development.

Mapping of dieback disease occurrence using shadow-free 70 mm aerial photography continued. Unfavourable weather conditions resulted in the area of forest photographed being less than the target of the year. The capacity to produce maps of forest affected by dieback disease was improved by the appointment of two more teams of photo interpreters.

A new computer-based fire behaviour prediction system became operational on the Department's computer in February 1982. It provides up to date weather information to regional and divisional centres and assists in planning the prescribed burning programme.

Detailed inventory of hardwood forest to provide wood resource information on 31 500 ha of forest was concentrated in the central region during the year.

A special inventory was carried out in Lupton Block in response to a proposal from the Department of Agriculture for the alienation of part of the area.

In the southern region, nine areas of private property were assessed for compensation claims where clearing bans were in force.

The assessment of the sandalwood resource on pastoral leases in the goldfields and Murchison areas was continued.

A large number of temporary and permanent increment plots in regrowth karri forest and pine forest was remeasured during the year.

Duncan Brown examines 70 mm film of vegetation deaths caused by dieback disease. ▼

Mapping

Multi-coloured 1:500 000 maps of the three regions showing provisional land use management priorities over the forest estate were produced during the year. After necessary changes were made to their scale and quantity, these maps were incorporated in General Working Plan No. 87.

The Forest Management Information System was used for the first time to select and compile all the information needed for the special maps in the publication "Conservation of the Karri Forest".

A computer assisted mapping project team under the chairmanship of the chief draftsman was established. Its objective is to define and document the overall need for computer graphics in the Department.

Five new 1:500 000 maps (for Donnelly, Pemberton, Frankland, Broke Inlet and Northcliffe) were printed both with and without contours.

Twenty-eight maps for the Department's new 1:25 000 Topographical Series were completed during the year. Thirteen of these were further developed as colour maps that indicated dieback-free areas of forest.

Four projects involving computer manipulation of Landsat satellite data are in progress, and mapping of areas cleared for bauxite mining and of new pine planting has continued.

The revision of the Department's land tenure maps is now carried out on an annual basis, and 26 new 1:50 000 land tenure maps have been prepared.

Caroline Greenhalgh of Mapping Branch traces a map on the new reflective projector which has been purchased this year. The machine is a valuable aid for any work needing reducing or enlarging. ▲

Extension

Extension activities provide advice and information as an important communication link between the Forests Department, other organizations and the general public.

Over 5000 public enquiries about tree planting and the maintenance and use of trees were handled during the year. Subjects of queries were very wide, ranging from windbreaks for farms, to species selection, to tree hazards, to techniques for smoking fish.

Further interest in tree planting on farms was generated by a three-day conference "Trees in the Rural Landscape", organized by the Forests Department in conjunction with the Departments of Agriculture, and of Conservation and Environment in October 1981. This interest was serviced by extension branch staff who made 127 farm visits, demonstrated tree planting methods at 21 agricultural field days and nine agricultural shows, and gave more than 70 talks at seminars and meetings of farmer groups.

This branch continued to research the subject of tree planting on farms. Projects undertaken during the year included the establishment of experimental windbreaks, trials of herbicides suitable for weed control in eucalypts and direct seeding trials.

Arbor Day was again celebrated on the "Day of Trees", 11 June 1982, as a part of Western Australia Week.

Arboreta

The Department's extensive range of inland arboreta, which received greater publicity this year, is now proving its worth with the rapidly increasing interest in tree planting, particularly in the wheatbelt.

Further plantings were made at Coolgardie, planting was completed in the Helms Arboretum at Esperance, and a new arboretum at Grasspatch was prepared and planted in June 1982.

Education

Talks and films on forestry were presented to 57 schools in the metropolitan area and to an unrecorded number of country schools. The development of an activity sheet, which was used in conjunction with the talks, increased the interest in forestry of primary school children. Conducted visits to forest and bushland areas proved popular with high school students.

A colourful cartoon style booklet called "Nifty Numbat's Walk Through the Forest" was produced as an introduction for children to forest ecology and resources.

The Department's collection of 16mm films on forestry and forest related subjects was increased to eight films and almost 100 screenings took place during the year.

Extension branch officers were involved in an Expedition Skills Training Course run by the Education Department.

Publicity

During the year displays were prepared for the following events:

Dowerin Field Days

Royal Show

Trees in the Rural Landscape Conference

State Headquarters official opening

Technology Week

Advance Australia Display

Western Australia Week Exhibition

The tree promotion exercise at the Dowerin Field Days was most successful. Tree care advice was given to over 300 people, with more than 2000 copies of one leaflet being distributed over the two days.

Wood Use

The Department maintains a utilization information service whose aim is to answer the many public enquiries concerning wood products and preservatives.

Hundreds of private and commercial enquiries were answered during the year by staff of the Department's utilization branch. The enquiries cover a wide range of subjects including recommendations for specific timber usage, timber preservation, building practice, identification of timbers and knowledge of timber properties.

Of note was the assistance given to the State Energy Commission for improving the methods and accuracy of detecting decay in power line poles.

Publications

The Department produces technical, informational and educational publications that are distributed world wide to members of the public and to professional persons and organizations.

Production of *Forest Focus* has continued to inform the public about forests and forestry and the role and activities of the Department. In addition, two issues of a new colour journal, *Special Focus* were produced. Regrettably, it has been found

The drawing up of plans for landscaping, recreation and arboreta establishment within the forest forms a large part of the work of Extension Branch. Here silviculturist Alec Hart checks plans for one of the many recreation areas under review.

necessary to charge for *Special Focus* issues, in an attempt to defray costs. Whereas *Forest Focus* presents a variety of short articles, *Special Focus* explores a single subject in depth.

Research Papers and *Bulletins* have continued to be produced, to disseminate the Department's scientific research, and a new technical publication has been added, the Technical Paper.

A new Tree Care Series of brochures was commenced and the first production widely distributed. Recreation guides for Dale Forest, Brockman Sawpit and the Bunbury region have been produced.

Appendix 6 lists this year's Departmental publications as well as those articles prepared by Departmental officers and published externally.

Library

The relocation of the library in the new State Headquarters building has made possible a more convenient layout of the work and reading areas and a re-organization of the book stock. This has improved access to library material.

Engineering

This branch provides engineering services in accord with Departmental needs.

Regional workshops are located at Manjimup, Collie and Gnangara where major plant repair, and development and fabrication of special equipment is carried out for forest operations. There are 21 tradesmen and nine apprentices employed in these centres.

In support of the regional workshops there are 12 maintenance workshops located at Yanchep, Walpole, Nannup, Pemberton, Harvey, Jarrahdale, Grimwade, Como, Dwellingup, Mundaring, Margaret River and Ludlow. Nineteen tradesmen and 11 apprentices are employed in these facilities.

During the year several short courses were conducted for Engineering staff aimed at improving techniques in operating and maintaining field units.

The Department's workshops also undertook a number of design and fabrication projects on a wide range of industrial plant and equipment.

Radio Communications

This branch services the Department's extensive and effective radio communications network including the establishment and maintenance of repeater stations, fixed radio stations and aircraft radio equipment.

A repeater station was set up at Carlotta tower to improve radio communications in the Nannup division. Five other repeater stations were provided with upgraded antenna systems and solar power systems.

As part of an improvement to external communication a very high frequency (V.H.F) radio was installed at the Manjimup office providing direct radio contact with the Boyup and Cranbrook Shires.

To provide an essential backup service for the nine Piper Cub fire spotting aircraft, three stand-by private aircraft were installed with Forests Department radio systems.

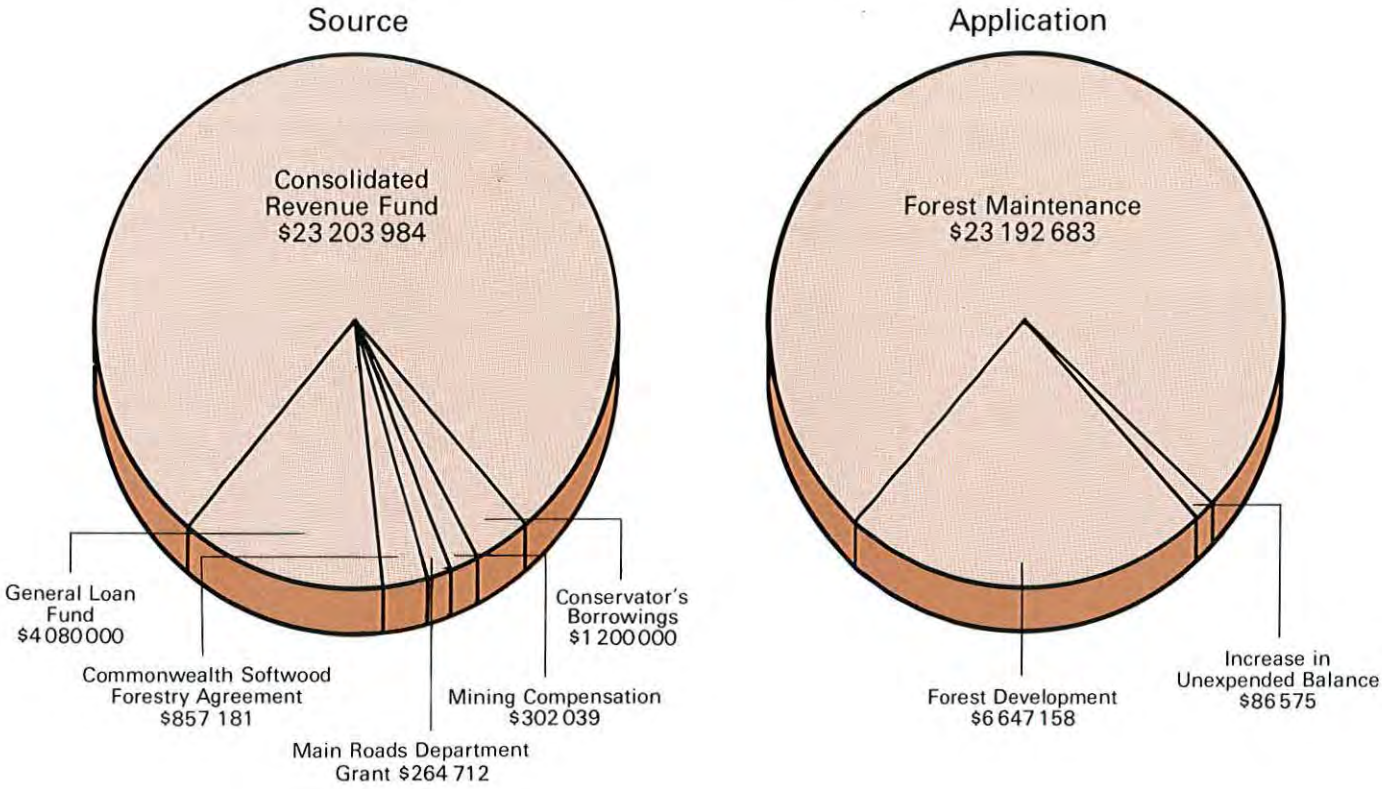
The second automatic weather station was established at Mt. Burnside, using the V.H.F. radio system, to convey information to the Pemberton Office, where this information is decoded and displayed.

Library facilities in the new State Headquarters have been greatly improved for easy access. ▼

10 ADMINISTRATION

FINANCE

TOTAL FINANCE 1981/82: $29 926 416



Finance

All Territorial and Departmental revenue is paid into the Consolidated Revenue Fund. Allocations are made from this fund for forest maintenance activities and from the General Loan Fund for forest development.

Departmental Staff

Training

Twelve cadets commenced the first year of their training at Bunbury Technical College and 23 cadets went on to the second year of the course in January 1982. Fifteen second year cadets completed their training in December 1981, graduating at a formal ceremony at Bunbury in April 1982. The Keynes Memorial Prize was won by J. Bennett and the Conservator's Prize was won by B. Doust.

One Departmental officer is currently on study leave at the Australian National University pursuing post graduate studies, and another officer has just returned from study leave at the University of Western Australia.

The Department continued to conduct internal training courses in accident prevention, first aid, machinery operation, fire control, dieback hygiene and financial management.

The organizational development programme was continued during the year with a highly successful series of video presentations aimed at stimulating personal development of all staff.

A review of field staff structure was completed and recommendations for some changes were submitted to the Public Service Board.

Conferences, Study Tours and Awards

Twenty-two officers attended interstate conferences or courses covering a wide range of subjects.

Cadet M.E. Rayner was awarded three prizes in 1981, the Commonwealth Forestry Bureau Prize, the Institute of Wood Science Prize and the Timbind Medal.

At the Bunbury Technical College, cadet G. Yates was awarded the prize for being the top student for 1981.

The Department's 1981 map, "Vegetation of Western Australia" was highly commended in April in an Australia-wide competition for cartographic excellence. The competition was run by the Australian Institute of Cartographers.

Employment in the Forestry and Forest-based Industries

The number of salary and wage earners employed in forestry or in forest-based industries was estimated at 6972 people.

This is calculated as follows:

Forestry —	
Professional officers	101
General field staff	331
Clerical and drafting	108
Cadets —	
Professional	6
Field	35
Full time wages employees	504
* Contract personnel	150
	1 235
Forest-based Industries	
+ Sawmill employees, including bush workers	2 116
△ Other wood reprocessing industries	3 306
Firewood, mining timber and pole cutters working under licences (est.)	47
Sandalwood workers	90
Apiarists est. (2 275 sites registered)	178
	5 737
Total	6 972

* Contractors are employed periodically for clearing, road building, pine logging and hardwood logging. The figure given here is an estimate of average employment over the year.

\+ Includes employees of registered sawmills only and excludes persons employed in associated yards in metropolitan and country areas.

△ Includes employees "working in wood" as defined under the Factories and Shops Act (1963).

Housing and Building

The new State Headquarters complex at Como was officially opened on 30 October 1981 by the then Premier of Western Australia, the honourable Sir Charles Court, KCMG, OBE.

The complex unites the formerly scattered components of Administration, Communication, Fire Control, Research, Engineering Services, Inventory and Planning, Stores, Data Processing and the Northern Region Administration. Already the benefit of this centralization has been felt by both staff and visitors.

On 26 February 1982, the Hon. Ian Laurance MLA, the Minister for Forests opened a new office at Pemberton.

The general programme of housing, building and settlement maintenance included the relocation and renovation of eight houses in the southern and northern divisions. Specific projects included extensions to the Harvey, Nannup and Kelmscott offices, the purchase of a house at Dwellingup for Research staff, and the construction of a new staff house at Collie and a single officers quarters at Jarrahdale.

Forest Offences

Nineteen breaches of the Forest Diseases Regulations were reported during this year. Legal proceedings were instituted in six cases and all other offenders were warned.

There were also ten other breaches of the Forests Act and Regulations reported. No legal action was taken but warnings were issued in all cases.

Timber Industry Regulation Act, 1926-1969

A total of 142 mills was registered under the provisions of the Act at 31 December 1981; 69 mills on Crown land and 73 mills on private property.

The average number of persons employed in the timber mills each month throughout the year was 2166, a decrease compared with the 1980/81 figure of 2136.

The District and Workmen's Inspectors made 1 078 mill inspections and 875 bush inspections.

There were 132 notifiable (lost time) accidents during the year. None of these were fatal. A notifiable accident under Section 14 of the Timber Industry Regulation Act is comparable with a Lost Time Accident as defined by the Australian standard.

The number of accidents per 100 persons employed was 6.24, an increase compared with the 1980/81 figure of 5.15. This is equivalent to a frequency rate of approximately 34. (The frequency rate is calculated as the number of lost time accidents per 1 000 000 man hours worked).

The cost of administering the Timber Industry Regulation Act for the year was as follows:

	$
Salaries	55 947
Travel Allowances, office rent, plant cost and sundries	20 362
Total	76 309

Safety, Health and Welfare

Training Departmental staff in the principles and practice of safety is an integral part of the safety, health and welfare programme.

The conclusion of the 1981/82 year marked 16 years of a sustained accident prevention programme in the Forests Department.

During these 16 years there has been outstanding improvement in the Department's safety programme:

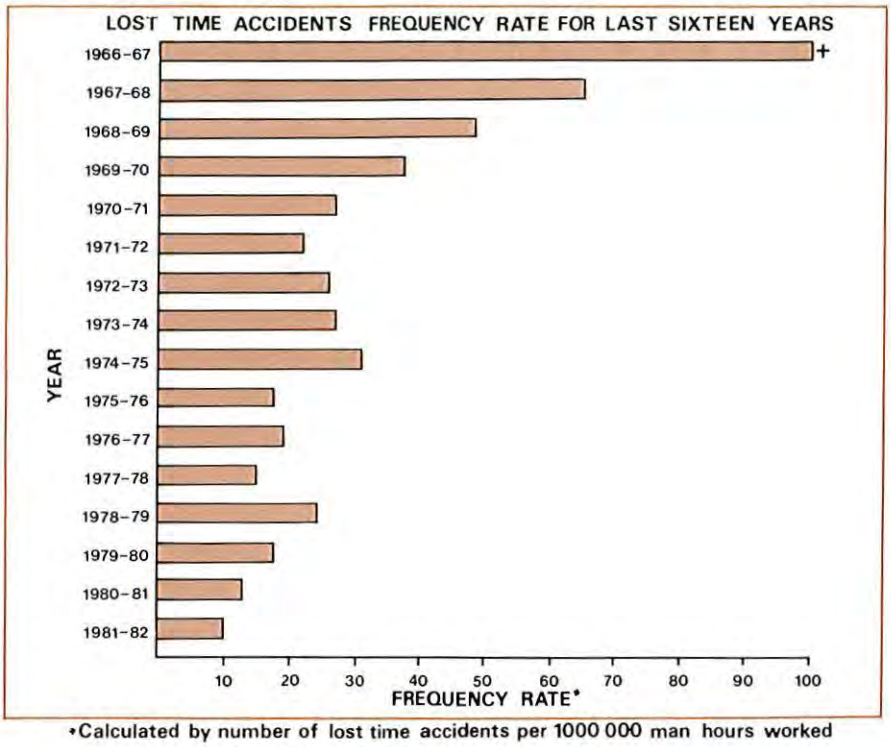
	1966/67	1981/82
Number of Lost Time accidents (L.T.A.)	185	19
Frequency Rate of L.T.A.	100+	10
Man Days Lost	2 896	459

During the last year, 1076 full time and 42 part-time personnel worked 1 915 684 man-hours and suffered 19 lost time accidents, the lowest accident rate on record.

Several divisions achieved the objective of a zero accident rate. These included the Busselton, Mundaring, Kirup, Manjimup, Pemberton, Jarrahdale and Collie divisions, the Cadet Training School and the personnel at the goldfields, Pilbara and Kimberley offices.

The Department's safety staff were invited to deliver addresses to the personnel of a number of other government departments and instrumentalities during the year.

The Department's Safety Record over the last 16 years



*Calculated by number of lost time accidents per 1000 000 man hours worked

11 APPENDICES

APPENDIX 1(a)

Statement of Revenue Paid into Consolidated Revenue Fund for the year ended 30 June 1982

1980-81 $		1981-82 $
	ROYALTIES	
6 942 374	Logs	7 811 410
788 015	Chip Logs	1 254 958
43 387	Sleepers	31 926
312 078	Poles and Piles	501 530
19 733	Mining Timber	24 799
27 287	Firewood	11 376
48 309	Posts	41 285
62 521	Sandalwood	62 256
61 596	Miscellaneous	51 763
8 305 300		9 791 303
	PINE CONVERSION	
4 002 806	Pine Logs	3 101 550
520 375	Sawn Pine	426 266
4 523 181		3 527 816
	HARDWOOD CONVERSION	
219 547	Sawn Hardwood	203 254
217 658	Logs	270 692
8 089	Posts and Other	7 693
445 294		481 639
	OTHER SALES AND FEES	
229 704	Seeds and Trees	255 388
92 696	Inspection Fees	91 129
99 860	Rents and Leases	136 951
1 404 536	Miscellaneous	1 394 125
1 826 796		1 877 593
	RECOUPABLE PROJECTS	
681 874	Miscellaneous	765 777
15 782 445		16 444 128

APPENDIX 1(b)

FORESTRY FUND ACCOUNT FOR THE YEAR ENDED 30 JUNE 1982

1980-81 $				1981-82 $
		EXPENDITURE		
1 438 188		H/W. Forests — Establishment & Tending		1 354 333
3 709 495		S/W. Forests — Establishment & Tending		4 204 261
355 952		Access Roads Construction		276 854
70 512		Land Purchase		530
445 759		Plant and Equipment		222 047
573 082		Housing and Buildings		584 053
33 484		Sawmilling and Seasoning Plant		5 080
2 487 932		Forest Protection		2 678 984
514 140		Access Roads Maintenance		684 972
1 829 468		Research and Other Services		2 018 011
3 246 440		Commercial Operations		3 111 629
207 938		Trade Operations		239 640
637 672		Recoupable Projects		772 302
	8 095 120	Salaries	9 836 994	
7 041 120	1 054 000	Less Charged to Development	1 100 000	8 736 994
	4 868 294	Administration Expenses	5 681 452	
4 168 294	700 000	Less Charged to Development	720 000	4 961 452
56 553		Cash Order Balance		— 11 301
26 816 029				29 839 841
		SOURCE OF REVENUE		
486 722		Balance Brought Forward		37 319
286 245		Main Roads Department Grant		264 712
811 352		Commonwealth Softwood Agreement		857 181
796 672		Mining Compensation		302 039
20 133 004		C.R.F. Contribution		23 203 984
3 000 000		General Loan Fund		4 080 000
1 200 000		Conservators Borrowings		1 200 000
139 353		Sundry Revenue		18 500
26 853 348				29 963 735
37 319		Less Balance Carried Forward		123 894
26 816 029				29 839 841

APPENDIX 2(a)

EXPORTS FROM WESTERN AUSTRALIA OF TIMBER, TIMBER PRODUCTS AND ESSENTIAL OILS FOR THE YEAR ENDED 30 JUNE 1982

ITEM AND DESTINATION	QUANTITY	VALUE ($)
1. Wood in the rough or roughly squared — conifer	m^3	
Interstate (A)	n.r.s.n.r.s.	
Overseas	.....	.....
2. Wood in the rough or roughly squared, non-conifer (including poles, piling, posts and other wood in the rough)	m^3	
Interstate (A)	n.r.s.	n.r.s.
Overseas	.....	.....
3. Sleepers	m^3	
Interstate (A)	n.r.s.	n.r.s.
Overseas	.....	
Belgium-Luxembourg	10 977	2 062 376
Cook Islands	10	3 154
Hong Kong	2 096	570 465
New Zealand	41	11 158
Saudi Arabia	13	4 060
United Kingdom	12 055	2 524 340
TOTAL	25 192	5 175 553
Timber, sawn lengthwise, sliced or peeled, but not further prepared, of a thickness exceeding 5 mm —		
Non-Conifer		
4. Jarrah	m^3	
Interstate	7 960	1 384 612
Overseas		
Belgium-Luxembourg	1 496	297 926
Canada	—	35
Cocos Island	185	51 835
Germany, Federal Republic	5	1 008
Greece	15	3 654
Mauritius	15	6 854
Netherlands	31	8 541
New Zealand	46	21 723
South Africa, Rep. of	5	1 386
Tonga	2	1 125
United Kingdom	19	5 001
U.S.A.	93	30 293
TOTAL	1 912	429 381
5. Karri	m^3	
Interstate	16 891	2 524 241
Overseas		
Belgium-Luxembourg	303	61 499
Canada	55	23 895
Cocos Island	21	17 179
Germany, Fed. Rep. of	407	73 951
Netherlands	90	20 661
New Zealand	927	240 040
South Africa, Rep. of	1 490	313 912
United Kingdom	342	87 357
U.S.A	845	300 774
TOTAL	4 480	1 139 268

ITEM AND DESTINATION	QUANTITY	VALUE ($)
6. Other	m^3	
Interstate (A)	n.r.s.	n.r.s.
Overseas		
Cocos Island	184	59 337
U.S.A.	8	4 688
TOTAL	192	64 025
Timber (including blocks, strips and friezes for parquet or wood block flooring, not assembled), planed, tongued, grooved, rebated, chamfered, v-jointed, beaded, centre beaded or the like but not further manufactured.		
7. Flooring	m^3	
Interstate (A)	n.r.s.	n.r.s.
Overseas (B)	.....	.....
8. Other	CU M	
Interstate (C)	7 802	1 372 126
Overseas		
Cocos Island	19	12 162
Germany Fed. Rep. of	6	2 242
Greece	355	118 176
Iraq	70	25 258
Italy	81	41 676
United Kingdom	122	32 370
U.S.A.	27	10 377
TOTAL	680	242 261
Total Timber Items 1-8	65 109	12 331 467
9. Wood, sawn lengthwise, sliced or peeled, but not further prepared, veneer sheets and sheets for plywood, of a thickness not exceeding 5 mm., plywood, blockboard, laminboard and the like: inlaid wood, cellular wood panels, whether or not faced with base metal.	m^2	
Interstate	n.r.s.	n.r.s
Overseas		
China — Taiwan province only	907	5 260
Christmas Island	1 090	4 016
Cocos Island	2 036	22 550
Hong Kong	45 536	235 833
New Zealand	288	2 045
Singapore	175 249	867 331
U.S.A.	310	1 162
TOTAL	225 416	1 138 197
10. Reconstituted wood (also known as particle board, chip board, sliver board, shaving board, flake board, residue board and wood waste board) —		
Interstate	n.r.s.	n.r.s.
Overseas	(D)	(D)
11. Casks, vats, barrels, etc., empty		
Interstate	n.r.s.	n.r.s.
Overseas		
United Kingdom	.....	22 754
TOTAL	.....	22 754

ITEM AND ORIGIN	QUANTITY	VALUE ($)
12. Manufactures of wood (except furniture) , N.E.S.		
Interstate	n.r.s.	n.r.s.
Overseas		
Christmas Island	.....	2 135
Cocos Island	.....	30 929
Iraq	.....	192 750
Nauru	.....	94
Singapore	.....	18 600
South Africa, Rep. of	.....	2 659
Sweden	.....	6 627
TOTAL	.....	253 794
13. Essential oils; concretes and absolutes; resinoids —		
Interstate	n.r.s.	n.r.s.
Overseas		
Cocos Island	.....	2 361
TOTAL	.....	2 361
TOTAL VALUE OF EXPORTS ON THIS RETURN		13 748 573

(A) Interstate exports included in Item 8. (B) Relates to Overseas exports of conifer flooring only. (C) Included details of Items 1-3 and 6-7. (D) Details are not available for publication.

N.E.S. DENOTES 'NOT ELSEWHERE SPECIFIED'
N.R.S. DENOTES 'NOT RECORDED SEPARATELY'
BASIS OF VALUE — F.O.B. AT POINT OF FINAL SHIPMENT
(INFORMATION SUPPLIED BY THE AUSTRALIAN BUREAU OF STATISTICS)

APPENDIX 2(b)

IMPORTS INTO WESTERN AUSTRALIA OF TIMBER, TIMBER PRODUCTS, TANNING SUBSTANCES AND ESSENTIAL OILS FOR THE YEAR ENDED 30 JUNE 1982

ITEM AND ORIGIN	QUANTITY	VALUE ($)
1. Sawlogs and veneer logs, in the rough or roughly squared, non-conifer, (including poles, piling, posts and other wood in the rough)	m^3	
Interstate	n.r.s.	n.r.s.
Overseas (A)		
Malaysia	3	1 255
TOTAL	3	1 255
2. Railway Sleepers —	m^3	
Interstate	n.r.s.	n.r.s.
Overseas	.....	.....
Timber, sawn lengthwise, sliced or peeled, but not further prepared, of a thickness exceeding 5mm — conifer		
3. Douglas Fir	m^3	
Interstate	n.r.s.	n.r.s.
Overseas (B)		
U.S.A.	1 382	469 799
TOTAL	1 382	469 799
4. Other —	m^3	
Interstate	n.r.s.	n.r.s
Overseas		
Canada	254	54 674
United Kingdom	—	736
U.S.A.	177	64 217
TOTAL	431	119 627
Timber, sawn lengthwise, sliced or peeled, but not further prepared, of a thickness exceeding 5mm — non-conifer		

ITEM AND ORIGIN	QUANTITY	VALUE
5. Meranti	m^3	($)
Interstate	n.r.s.	n.r.s.
Overseas (B)		
Malaysia	1 780	405 591
Singapore, Republic of	305	50 772
TOTAL	2 085	456 363
6. Ramim	m^3	
Interstate	n.r.s.	n.r.s.
Overseas (B)		
Indonesia	36	9 085
Malaysia	72	14 511
Singapore, Republic of	553	138 299
TOTAL	661	161 895
7. Teak	m^3	
Interstate	n.r.s.	n.r.s.
Overseas (B)		
Burma, Soc. Rep. of the Union of	97	116 693
TOTAL	97	116 693
8. Kapur	m^3	
Interstate	n.r.s.	n.r.s.
Overseas (B)		
Malaysia	2 883	529 067
Singapore, Republic of	98	19 954
TOTAL	2 981	549 021
9. Keruing	m^3	
Interstate	n.r.s.	n.r.s.
Overseas (B)		
Malaysia	1 314	157 281
Singapore, Republic of	48	7 007
TOTAL	1 362	164 288
10. Nyatoh	m^3	
Interstate	n.r.s	n.r.s
Overseas (B)		
Malaysia	1 314	157 281
Singapore, Republic of	48	7 007
TOTAL	1 362	164 288
10. Nyatoh	m^3	
Interstate	n.r.s.	n.r.s.
Overseas (B)		
Malaysia	7 691	1 447 230
Singapore, Republic of	57	8 916
TOTAL	7 748	1 456 146
11. Other	m^3	
Interstate	n.r.s.	n.r.s
Overseas (C)		
Indonesia	56	12 170
Malaysia	456	78 591
Singapore, Republic of	4	416
United Kingdom	—	666
U.S.A.	60	27 061
TOTAL	576	118 904

ITEM AND ORIGIN	QUANTITY	VALUE ($)
12. Wooden beading and mouldings (including moulded skirting and other moulded boards)		
Interstate (D)	n.r.s.	n.r.s
Overseas		
Belgium-Luexmbourg	.....	3 609
Canada	.....	18 942
China — Taiwan province only	.....	3 404
Japan	.....	8 426
Malaysia	.....	4 095
New Zealand	.....	663
Singapore Republic of	.....	1 746
South Africa, Rep. of	.....	369
Thailand	.....	905
United Kingdom	.....	26 971
U.S.A.	.....	8
TOTAL	.....	69 138
13. Timber (including blocks, strips and friezes for parquet or wood block flooring, not assembled), planed, tongued, groved, rebated, chamfered, v-jointed, beaded, centre-beaded or the like, but not further manufactured —	m^3	
Interstate	n.r.s.	n.r.s
Overseas		
Ecuador	4	6 959
Germany, Fed. Rep. of	1	325
Malaysia	1 351	383 027
New Zealand	220	52 220
Singapore, Republic of	150	34 504
Thailand	1	157
U.S.A.	589	103 846
TOTAL	2 316	580 674
Total Timber Items 1-13 (E)		4 263 803
14. Wood, sawn lengthwise, sliced or peeled, but not further prepared, veneer sheets and sheets for plywood, of a thickness not exceeding 5mm; plywood, blockboard, laminboard and the like, inlaid wood, cellular wood panels, whether or not faced with base metal —		
Interstate (F)	.....	1 267 751
Overseas		
China — Taiwan Province only	.....	1 333 361
Fiji	.....	5 135
Germany, Fed. Rep. of	.....	4 617
Italy	.....	58 847
Malaysia	.....	202 818
New Zealand	.....	94 215
Papua New Guinea	.....	115 005
Singapore, Rep. of	.....	482 568
South Africa, Rep. of	.....	591 406
Thailand	.....	26 001
United Kingdom	.....	520
Origin Unknown	.....	4 000
TOTAL		2 915 503
15. Reconstituted wood (also known as particle board, chip board, sliver board, shaving board, flake board, residue board and wood waste board) —		
Interstate (G)	m^2	
TOTAL	2 627 017	7 112 545
Overseas	.....	.....
Total Timber Items 14, 15		11 295 799
Total Timber Items 1-15 (E)		15 559 602

ITEM AND ORIGIN	QUANTITY	VALUE ($)
16. Match splints, wooden pegs or pins for footwear —		
Interstate (D)	n.r.s.	n.r.s.
Overseas	.....	.....
17. Rulers, Wooden —	NO.	
Interstate	n.r.s.	n.r.s.
Overseas		
Hong Kong	1 152	1 167
Japan	80	207
United Kingdom	6	223
TOTAL	1 238	1 597
18. Wood Flour		
Interstate (D)	n.r.s.	n.r.s.
Overseas		
Japan	2	2
New Zealand	126	378
United Kingdom	570	66
TOTAL	698	446
19. Tool handles, wooden		
Interstate (H)	.....	183 338
Overseas	NO.	
Germany, Fed. Rep. of	99	105
Malaysia	36 075	8 574
Netherlands	32	93
Singapore, Rep. of	495	169
Switzerland	36	17
United Kingdom	72	110
U.S.A.	9 902	12 825
TOTAL	46 711	21 893
20. Doors, not incorporating locks, hinges or similar fittings —		
Interstate (D)	n.r.s.	n.r.s
Overseas	NO.	
China — Taiwan Province only	6 605	113 069
Indonesia	1	43
Malaysia	252	9 133
New Zealand	23	802
Philippines	1 503	8 675
Singapore, Rep. of	2 400	21 172
United Kingdom	10	194
TOTAL	10 794	153 070
21. Manufactures of wood (except furniture) N.E.S.		
Interstate (I)	.....	4 607 437
Overseas		
Belgium-Luxembourg	.....	35
Canada	.....	11,738
China — Peoples Republic of	.....	10 258
— Taiwan Province Only	.....	255 002
Denmark	.....	20 397
Egypt, Arab Republic of	.....	51 808
France	.....	58 665
Germany, Federal Republic of	.....	583
Hong Kong	.....	18 600
India	.....	7 116
Indonesia	.....	3 236
Italy	.....	13 417
Japan	.....	140 379

ITEM AND ORIGIN	QUANTITY	VALUE ($)
Korea, Republic of	.....	5 569
Macao	.....	335
Malaysia	.....	84 017
Mexico	.....	37
Nepal	.....	4
Netherlands	.....	65
New Zealand	.....	97 522
Philippines	.....	33 813
Singapore, Republic of	.....	31 758
South Africa, Republic of	.....	3 727
Spain	.....	1 985
Sri Lanka	.....	258
Sweden	.....	26 865
Switzerland	.....	3
Thailand	.....	23 935
United Kingdom	.....	23 006
U.S.A.	.....	202 993
TOTAL	.....	1 127 126
22. Furniture, wood or wooden — framed (J)		
Interstate	.....	4 166 327
Overseas		
Brazil	.....	53 454
Canada	.....	89
China — Excluding Taiwan Province	.....	18 982
— Taiwan Province Only	.....	521 434
Czechoslovakia	.....	36 431
Denmark	.....	146
Finland	.....	13 802
France	.....	875
Germany, Fed. Rep. of	.....	37 131
Hong Kong	.....	39 911
India	.....	4 615
Indonesia	.....	11 949
Ireland	.....	19
Israel	.....	5 877
Italy	.....	432 229
Japan	.....	5 590
Korea, Rep. of	.....	9 369
Lebanon	.....	429
Macao	.....	424
Malaysia	.....	31 128
New Zealand	.....	36 304
Philippines	.....	24 722
Singapore, Rep. of	.....	691 792
Thailand	.....	1 134
United Kingdom	.....	493 435
U.S.A.	.....	358 187
Yugoslavia	.....	41 703
TOTAL	.....	2 871 161
TANNING EXTRACTS OF VEGETABLE ORIGIN		
23. Wattle Bark Extract	kg	
Interstate (K)	n.r.s.	n.r.s.
Overseas		
South Africa, Rep. of	380 010	199 821
TOTAL	380 010	199 821
24. Other	kg	
Interstate (K)	n.r.s.	n.r.s.
Overseas		
France	6 750	4 219
TOTAL	6 750	4 219

ITEM AND ORIGIN	QUANTITY	VALUE ($)
25. Synthetic tanning substances artificial bates for pre-tanning; tanning (tannic acids) and their salts, esters and other derivatives —	kg	
Interstate (L)	.....	275 727
Overseas		
Belgium-Luxembourg	500	2 063
Italy	4 500	30 286
U.S.A.	.....	12
TOTAL	5 000	32 361
26. Essential oils; concretes and absolutes; resinoids —	kg	
Interstate	n.r.s.	n.r.s.
Overseas		
India	20	126
TOTAL	20	126
TOTAL VALUE OF IMPORTS ON THIS RETURN		29, 204 251

(A) Excludes overseas imports of veneer logs in the rough. Details are not available for publication. (B) Overseas imports exclude shooks and staves. (C) Overseas imports include shooks and staves. (D) Details included in Item 21. (E) Includes an interstate value of $1 480 576 covering Items 1-11, 13. (F) Relates to interstate imports of plywood only. (G) Includes interstate details of 'improved' wood. (H) Includes brush and broom handles and the like. (I) Includes details of Items 12, 16, 18, and 20. (J) Excludes imports of wooden medical, dental, surgical or veterinary furniture, non domestic chairs and mattress supports. (K) Details included in Item 25. (L) Includes details of Items 23 and 24.

N.E.S. DENOTES 'NOT ELSEWHERE SPECIFIED'
N.R.S. DENOTES 'NOT RECORDED SEPARATELY'

Basis of value — Overseas: F.O.B. at point of final shipment
Interstate: Landed cost in Western Australia

(INFORMATION SUPPLIED BY THE AUSTRALIAN BUREAU OF STATISTICS).

APPENDIX 3
SUMMARY OF EXPORTS OF FOREST PRODUCE — SINCE 1968

Year	Timber		Wood Manufacture Value	Essential Oils and Tanning Material*
	m^3	value $	$	$
Brought forward	13 081 830	177 786 912	8 536 935	17 368 964
1968	84 569	4 947 595	3 016 850	280 806
1969	86 455	4 984 098	3 802 927	267 565
1970	96 275	5 661 547	3 906 699	317 553
1971	79 362	4 803 842	2 110 802	343 512
1972	101 191	6 439 732	2 369 541	348 762
1973	111 547	7 036 637	2 604 116	337 736
1974	98 200	7 366 709	3 769 461	433 627
1975	100 127	9 080 092	132 278	479 019
1976	94 136	9 823 037	993 199	214 918
1977	77 352	10 150 025	205 173	45 767
1978	58 833	8 809 324	4 625 089	41 422
1979	66 420	10 560 052	8 122 584	61 525
1980	71 955	12 265 737	591 670	255
1981	65 109	12 331 467	1 414 745	2 361
1982	N/A	N/A	N/A	N/A

* Tanning materials not recorded separately since 1967.

APPENDIX 4
SUMMARY OF IMPORTS OF FOREST PRODUCE — SINCE 1968

Year	Timber Woodware $	Tanning Materials $	Essential Oils $
Brought forward	63 937 163	1 344 397	4 600 226
1968	13 081 830	177 786 912	8 536 935
1969	8 731 114	109 905	206 309
1970	10 968 170	153 169	293 845
1971	6 761 806	103 857	175 331
1972	5 578 819	144 219	227 530
1973	8 326 939	225 463	366 786
1974	11 738 861	420 010	271 713
1975	14 053 751	465 884	641 859
1976	19 960 421	373 331	131 515
1977	24 857 792	603 819	39 143
1978	24 039 952	912 669	620
1979	18 200 508	614 628	48
1980	26 801 716	641 927	1 118
1981	28 691 997	512 128	126
1982	N/A	N/A	N/A

APPENDIX 5 (a)

SUMMARY OF LOG PRODUCTION — SINCE 1968

Year	Crown Land m³	Private Property m³	Total m³
Brought Forward	44 466 501	15 455 468	78 705 715*
1968	1 231 517	228 281	1 459 798
1969	1 143 705	160 771	1 304 476
1970	1 121 396	175 686	1 297 082
1971	1 145 161	161 990	1 307 151
1972	1 096 236	106 993	1 203 229
1973	1 060 359	102 992	1 163 351
1974	1 084 463	91 884	1 176 347
1975	1 096 356	87 957	1 184 313
1976	1 194 667	111 761	1 306 428
1977	1 429 493	106 848	1 536 341
1978	1 445 465	119 706	1 565 171
1979	1 489 515	129 665	1 619 180
1980	1 582 018	165 076	1 747 094
1981	1 593 512	161 966	1 755 478
1982	1 392 227	127 825	1 520 052

* Includes 18 783 746m³ estimated cut prior to 1917.

Note — as in previous years this total includes log material used for reconstituted wood and chipwood. The increase since 1976 is due to the use of karri and marri by W.A. Chip & Pulp Company.

5 (b)

TREND IN PINE LOG OUTPUT IN RECENT YEARS (INCLUDING PARTICLE BOARD LOGS).

1960	28 394
1970	81 281
1971	86 245
1972	90 761
1973	100 420
1974	123 393
1975	129 086
1976	105 567
1977	120 859
1978	125 548
1979	176 944
1980	191 363
1981	201 552
1982	173 474

5 (c)

TRENDS IN THE PRODUCTION AND USE OF SAWN WESTERN AUSTRALIAN TIMBER

Year ended 30 June	Sawn Production (m³)			Export	Local Use
	Hardwood	Softwood	Total		
1960	470 833	—	470 833	174 643	296 180
1970	425 295	16 893	442 188	96 275	345 914
1971	420 777	21 595	442 372	79 437	362 935
1972	379 006	21 733	400 739	101 191	299 548
1973	375 135	23 283	398 418	111 547	286 871
1974	374 899	26 534	401 433	98 200	303 233
1975	368 844	27 086	395 930	100 127	295 803
1976	383 010	16 258	399 268	94 136	305 132
1977	369 151	16 685	385 836	77 352	308 484
1978	347 111	18 669	365 780	58 833	306 947
1979	331 135	18 145	349 280	66 420	282 860
1980	331 411	21 400	352 811	71 955	280 856
1981	330 863	22 954	353 817	65 109	288 708
1982	320 915	22 190	343 105	N/A	N/A

APPENDIX 6

Forests Department Publications Produced During the Year Ended 30 June 1982

Annual Report 1981
General Working Plan No. 87, 1982
Conservation of the Karri Forest by F.J. Bradshaw and A.R. Lush.

Forest Focus No. 24	—	'Aircraft of the Forest' 'Clear Felling and Native Fauna' 'Recreation in State Forests' 'Recycled Towns'
Forest Focus No. 25	—	'Bush Pasture in the South-west' 'Fire and Forest Fauna' 'Canoeing'
Special Focus No. 1	—	Forest Fire Management in Western Australia by R.J. Underwood and P.E.S. Christensen.
Special Focus No. 2	—	The Blackwood — A Valley in Transition by P. Christensen, K. Pentony and W. Schmidt.
Bulletin No. 93	—	The Role of Invertebrates in Bauxite Mine Rehabilitation by J.D. Majer
Research Paper No. 67	—	Fire Hazard Reduction by Grazing Cattle in *Pinus radiata* (D. Don). Plantations in the Blackwood Valley by N.D. Burrows.
Research Paper No. 68	—	The Short Lived Response to Nitrogen and Phosphorous by young *Pinus radiata* on Sandy Soil. by R. Moore.
Research Paper No. 69	—	Selective Low Pruning in Initially Wide Spaced *Pinus radiata* in Western Australia by R.R.A. Fremlin.
Technical Paper No. 2	—	Review of the Dieback Disease Situation 1981 by F.H. McKinnell.
		Nifty Numbat's Walk Through the Forest by Cliff Winfield.

Extension Brochures

Tree Care Series No. 1	More Trees Please
Tree Care Series No. 2	Trees for Rural Areas
	Bunbury Region Scenic Tour
	Welcome to Dale Forest
	Brockman Sawpit

External Publications

Bartle, J.R., Shea, S.R. and Kimber P.C.	Management of tree cover on water supply catchments in Western Australia. In Tree Decline in Rural Landscapes in Australia Ed. K. Old. CSIRO 1982.
Batini, F.E. and Anderson G.W.	'Agroforestry under 13 to 18 year old *Pinus radiata*, Wellbucket, Western Australia,' Managing Nitrogen Economics of Natural and Man Made Forest Ecosystems. Eds. Rummery and Hingston. CSIRO Division of Land Resources Management.
Batini, F.E., Eckersley, P.P. and Thomas, J.F.	'Values of Land Use Activities', On Rational Grounds, Eds. Bennett and Thomas. Elsevier Scientific Publishing Co. 1982.

Batini, F.E. and Thomas J.F. 'Recreation Co-efficients', On Rational Grounds, Eds. Bennett and Thomas. Elsevier Scientific Publishing Co. 1982.

Bennett, D., Havel, J.J., McArthur, W.M., Batini, F.E. and Murray, A.M. 'The Murray River Catchment', On Rational Grounds, Eds. Bennett and Thomas. Elsevier Scientific Publishing Company 1982.

Bennett, D., Thomas, J.F., Batini, F.E., Havel, J.J. and McPherson, D.K. 'Background to the Study', On Rational Grounds, Eds. Bennett and Thomas. Elsevier Scientific Publishing Company, 1982.

Blowes, W.M., Heather, W.A., Malajczuk, N. and Shea, S.R. 'The Distribution of *Phytophthora cinnamoni* (Rands) at Two Sites in southern Western Australia and at Durras in south-eastern New South Wales', Australian Journal of Botany No. 30 1982.

Christensen, P. 'Inter-relationships between forest fauna, nitrogen fixing plant species and forest health', Managing Nitrogen Economics of Natural and Man Made Forest Ecosystems, Eds. Rummery and Hingston, CSIRO Division of Land Resources Management.

Greenwood, E.A.N., Beresford, J.D. and Bartle, J.R. 'Evaporation from Vegetation in Landscapes developing Secondary Salinity using Ventilated Chamber Technique, Part 3. Evaporation from *Pinus radiata* trees and surrounding pastures in an agroforestry plantation.' Journal of Hydrology, Vol. 50 1982.

Hatch, A.B. 'Pine legume mixtures in Western Australia', Managing Nitrogen Economics of Natural and Man Made Forest Ecosystems, Eds. Rummery and Hingston, CSIRO Division of Land Resources Management.

Havel, J.J. 'Vegetation Classification as a Basis for Land Use Planning', Vegetation Classification in Australia. Eds. A.N. Gillison and D.J. Anderson. Proceedings of workshop sponsored by CSIRO Division of Land Use Research Canberra, Oct. 1978. ANU Press 1981.

Havel, J.J. and Batini, F.E. 'Derivation of Constraints on the Area of Flora and Fauna Reserves', On Rational Grounds, Eds. Bennett and Thomas Elsevier Scientific Publishing Co. 1982.

Havel, J.J. and Bligh, K.J. 'Estimation of Water Yield Co-efficients.' On Rational Grounds, Eds. Bennett and Thomas, Elsevier Scientific Publishing Co. 1982.

Recher, H.F. and Christensen, P.E. 'Fire and the Evolution of the Australian Biota', Ecological Biogeography of Australia, Vol. 1. Eds. A. Keast, Junk and Haig 1981.

APPENDIX 7

THE DEPARTMENT'S SAFETY RECORD OVER THE LAST 16 YEARS

Year	M.H.W.	L.T.A.	M.T.A.	Total Accidents	Frequency Rate			Man Days Lost	Duration Rate (days)
					L.T.A.	M.T.A.	L.T.A. M.T.A.		
1966-67	...	185	...	...	100+	...	100+	2 896	....
1967-68	1 895 600	124	312	436	65	164	230	1 701	14
1968-69	2 019 568	96	155	251	48	76	124	1 738	18
1969-70	1 901 020	70	129	199	37	67	104	721	10
1970-71	1 808 406	48	158	206	27	76	110	458	9
1971-72	1 759 888	40	128	168	23	72	95	275	6
1972-73	1 728 577	45	112	157	26	64	90	414	9
1973-74	1 651 621	45	119	164	27	72	99	359	8
1974-75	1 748 219	55	127	182	31	72	104	634	11
1975-76	1 762 693	31	113	144	17.5	64	82	383	12
1976-77	1 707 635	32	157	189	19	92	111	620	19
1977-78	1 764 519	26	151	177	15	86	100	731	28
1978-79	1 835 917	44	143	187	24	76	100	810	18
1979-80	1 826 452	32	125	157	17.5	68	86	938	14
1980-81	1 897 463	24	135	159	13	71	84	490	15
1981-82	1 915 184	19	141	160	10	74	84	459*	18†

M.H.W. — Man Hours Worked. L.T.A. — Lost Time Accidents.

M.T.A. — Medical Treatment Accidens.

* Of the 459 days lost, 126 were carried over from accidents sustained during the previous year.

† The Duration Rate for the 19 L.T.A. this year is 18 days. If the 126 days lost from the two carry over accidents are taken into account, the Duration Rate is 22 days.

APPENDIX 8

Common and scientific names of plants and animals mentioned in this report

Plants

Jam	.....	Acacia acuminata
Black wattle	.....	Acacia decurrens
Golden-wreath wattle	.....	Acacia saligna
Bull banksia	.....	Banksia grandis
Swamp oak	.....	Casuarina obesa
W.A. sheoak	.....	Casuarina fraserana
Tree-lucerne	.....	Cytisus proliferus
Powder bark wandoo	.....	Eucalyptus accedens
Brown mallet	.....	Eucalyptus astringens
Rates tingle	.....	Eucalyptus brevistylis
Dundas mahogany	.....	Eucalyptus brockwayi
Marri	.....	Eucalyptus calophylla
River gum	.....	Eucalyptus camaldulensis
Silver gimlet	.....	Eucalyptus campaspe
Cleland's blackbutt	.....	Eucalyptus clelandii
Karri	.....	Eucalyptus diversicolor
Dundas blackbutt	.....	Eucalyptus dundasii
Tasmanian blue gum	.....	Eucalyptus globulus
Tuart	.....	Eucalyptus gomphocephala
Yellow tingle	.....	Eucalyptus guilfoylei
Red tingle	.....	Eucalyptus jacksonii
Stocking tree	.....	Eucalyptus kondininensis
Yellow gum	.....	Eucalyptus leucoxylon var. rosea
Spotted gum	.....	Eucalyptus maculata
Jarrah	.....	Eucalyptus marginata
Bullich	.....	Eucalyptus megacarpa
Yellow stringy bark	.....	Eucalyptus muellerana
Yarri or W.A. blackbutt	.....	Eucalyptus patens
Red mahogany	.....	Eucalyptus resinifera
Swamp mahogany	.....	Eucalyptus robusta
Flooded gum	.....	Eucalyptus rudis
Sydney blue gum	.....	Eucalyptus saligna
Salmon gum	.....	Eucalyptus salmonophloia
Sargent's mallet	.....	Eucalyptus sangentii
Wandoo	.....	Eucalyptus wandoo
Pinaster	.....	Pinus pinaster
Radiata	.....	Pinus radiata
Sandalwood	.....	Santalum spicatum

Animals

Numbat	.....	Myrmecobius fasciatus
Woylie	.....	Bettongia penicillata
Tammar wallaby	.....	Macropus eugenii

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