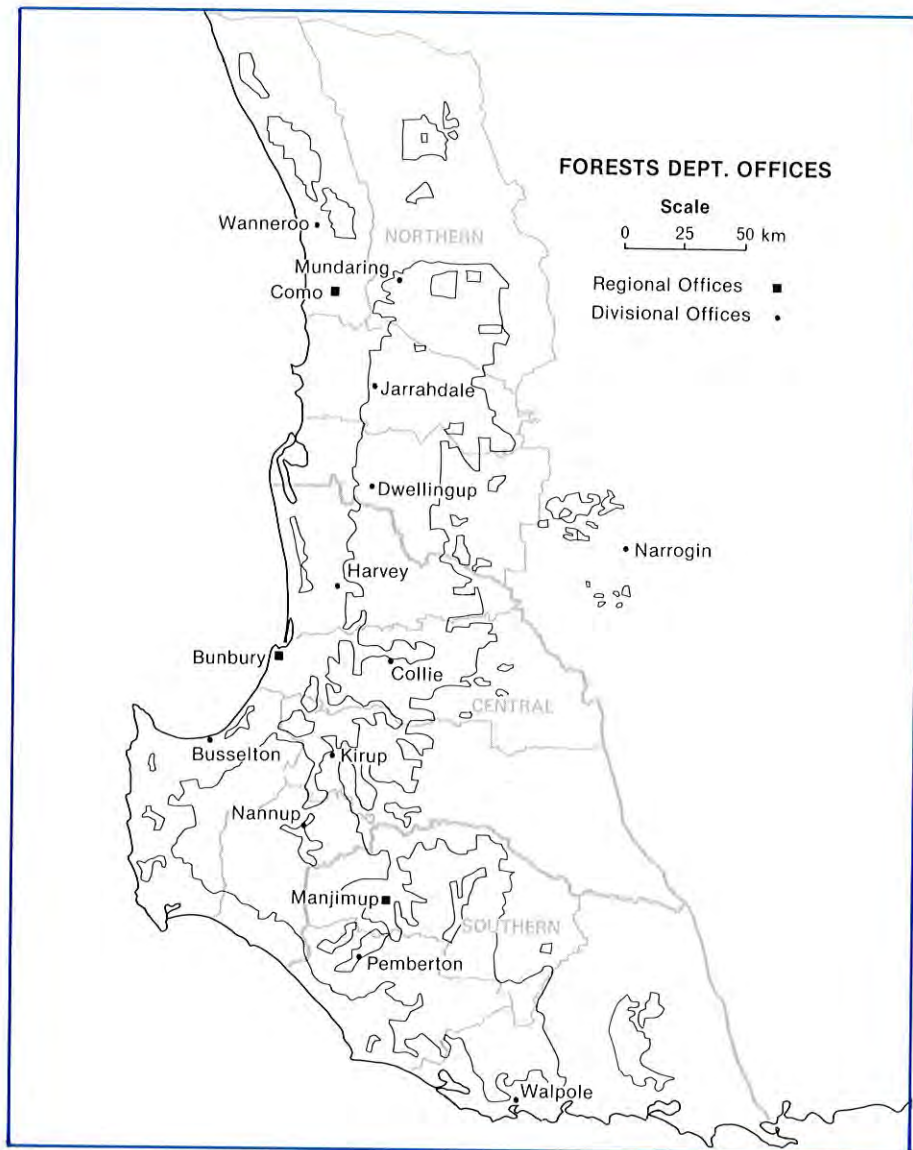




Forests Department Western Australia

Annual Report 1984



Front cover

Jarrah forest near Dwellingup.

This fine regrowth is about 65 years old. It was established after the original stand was clearfelled to provide timber for railway sleepers. Today the new forest continues to provide timber, as thinnings, for transmission poles and sawlogs, performs a vital role in catchment protection, and is increasingly appreciated as a recreation area by visitors from the city.

FORESTS DEPARTMENT COMO, W.A.

TO THE HON. BRIAN BURKE, M.L.A.
PREMIER AND 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 1984.

P.J. McNAMARA,
Acting Conservator of Forests

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1 FOREWORD



Substantial progress has been made towards implementing Government's policy initiatives, and routine programmes have also been maintained at acceptable levels.

Forward planning for the integrated management of the Shannon River Basin and the D'Entrecasteaux National Park, is well advanced and an explanation of the approach adopted by a joint planning group, will be released for public comment shortly. Following Government's declaration of the Murray valley conservation and recreation management unit, similar progress has already been made with the valuable assistance of a representative advisory committee. However, the cost aspects of the proposals for more intensive management, especially any special modifications of hazard reduction burning regimes, will need very careful attention in the final planning stages.

It has been found possible to compensate for the Shannon River timber resource by some expansion of cutting into road and stream reserves, and one substantial strategic fire protection buffer, previously regarded as unavailable for cutting. A carefully monitored programme is being prepared to explore the public acceptability of the landscape treatments proposed. These trials will be available for public inspection. They are planned to avoid extensive cutting in any one area at any time, and subject to satisfactory results, will form the basis for future operations.

Further econometric studies have confirmed that a substantial pine planting programme will be needed to meet a modest increase in timber demands due to population growth, rather than increased unit consumption, by early in the coming

century. The questions of land availability and alternative methods of financing the programme are being vigorously explored.

Studies have also shown that pine plantations can compare favourably as economic ventures with conventional grazing in the Manjimup area. Agroforestry has been shown to have considerable potential as well as favourable social consequences. This information is being made available to farmers and their opinions will be sought to find out the likely contribution from farm forestry to the total plantation area required. In the meantime, limited planting has commenced on former farmland in the Manjimup area and the availability of vacant Crown land for plantations or exchange is being examined jointly with the Department of Agriculture.

The State's housing industry revived somewhat during the year, and this was reflected in better trading conditions for the timber industry. Log intake for the hardwood industry reverted to more normal levels and demand for sawn pine is firm. It is particularly pleasing to report that joint research into timber seasoning by the Forests Department and Timber Industry, using the Department's drying kiln facilities at Harvey, has given encouraging results. It now seems likely that both the percentage of joinery grade timber recovered from each kiln load, and the speed with which joinery grade jarrah may be seasoned can be greatly increased using these new methods. This means improved supplies of jarrah for the State's expanding furniture manufacturing industry, and other higher grade uses.

On a broader scale, improvements in timber utilization and marketing were further explored by a combined task force containing wide representation from industry. This group also initiated surveys of materials used in building, and of the end use of timber products. These studies will provide first hand substantive information of interest, both to growers and processors. The utilization and marketing task force is currently preparing its report to Government.

An important stage was reached later in the year when the Government gave approval for re-entry on an operational scale to

disease risk areas ('quarantined' forest), with the proviso that the guidelines set down in the 1982 dieback management policy are followed. This followed encouraging preliminary results from experimental logging trials at several sites, and firm indications that the more susceptible sites can be detected by ecological survey. This invaluable information will enhance the reliability of forward planning.

The Government's hardwood forest rehabilitation initiative was launched on a limited scale due to planning complexities. However, sufficient forward site selections have been completed to enable the programme to be expanded.

Another highlight of the year was the completion of the Northern Region Recreation Framework Plan. Developed in conjunction with other authorities who have interests in the forest, the plan sets out guidelines for recreational development in the northern jarrah forest, and will be used as a model for plans for the central and southern regions. The plan was completed at a fortunate time, and was used as the basis for several job creation projects in the Dwellingup-Jarrahdale area.

Under Commonwealth assisted employment projects, some 205 people were engaged in activities ranging from recreation development at Shannon and in the Murray valley to data processing. The wide variety of supplementary skills available amongst these employees was most useful, and it was possible to undertake many much needed projects which could not otherwise have been completed.

Departmental staff were also heavily involved in the working parties assisting the Implementation Group set up to establish a consolidated department for conservation and land management.

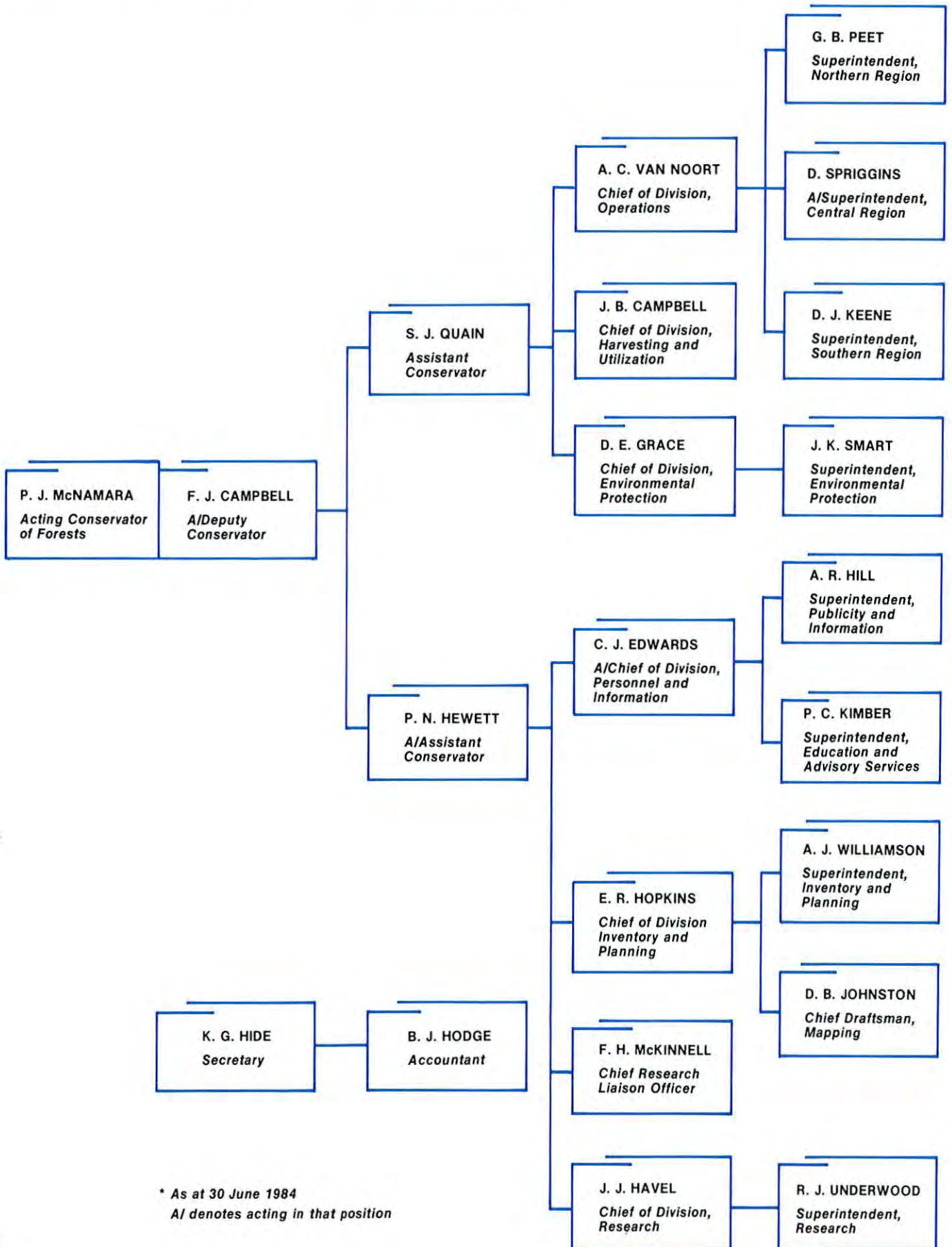
Finally, I would like formally to record my appreciation of the dedication and enthusiasm with which all staff and employees have responded to the demands of a challenging year.

P.J. McNAMARA
Acting Conservator of
Forests

Multiple use jarrah forrest near Mt. Dale.
Management in this area is designed to conserve flora and fauna, provide recreation facilities,
and protect the forest from fire and disease.



2 PRINCIPAL OFFICERS*



* As at 30 June 1984
A/ denotes acting in that position

3 OBJECTIVES



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 maintain the removal of produce from native forests at a level that can be sustained by the forest growth in the long term. To ensure sufficient supplies of softwood to guarantee Western Australia's long-term self-sufficiency in timber production.

Other Forest Produce: To manage State forest so that land use conflicts are minimized, and supplies of minor forest produce, such as honey, sandalwood, and wildflower seed are sustained undiminished.

Recreation and Tourism: To extend access to the forest wherever this is possible, and to provide additional facilities for people to enjoy the many aspects of forest recreation available to them.

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

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

Mining: To stabilize and rehabilitate forest areas upon which the original vegetation has been disrupted or destroyed by mining operations.

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

Private Forestry: To encourage private investment in commercial forests, and to assist in their establishment and maintenance. To provide advice on tree planting for shelter and protection, particularly in rural areas.

4 STATISTICAL SUMMARY OF FORESTRY ACTIVITIES 1983/84

The Forest Estate

Total area of State forest	1 869 942 ha
Additions to State forest	2 738 ha
Excisions from State forest	1 967 ha
Timber reserves	118 921 ha
Freehold land held in the name of the Conservator of Forests	24 065 ha
Land purchased for pine planting	218 ha

Hardwood Forest Establishment

Area of karri and karri-marri forest regenerated	2 294 ha
Wandoo forest regeneration	4 ha
Tuart forest regeneration	36 ha
Catchment regeneration	878 ha
Reforestation of disease killed forests (Forest Improvement and Rehabilitation Scheme [FIRS] and other treatment)	1 914 ha
Reforestation of gravel pits	101 ha
Reforestation of areas mined for bauxite	286 ha
Reforestation of areas mined for coal	31 ha

Pine Forest Establishment

Area planted with pines in 1983	2 207 ha
Radiata	1 380 ha
Pinaster and other species	827 ha
Total area of State pine forests	57 050 ha
Radiata	29 833 ha
Pinaster and other species	27 217 ha

Nursery Production

Eucalypt seedlings for Departmental use	
Manjimup nursery	4 000 000
Hamel nursery	372 000
Eucalypt seedlings for public sale	
Hamel nursery	289 000
Narrogin nursery	117 000
Pine plants for Departmental use	
Radiata	2 778 000
Pinaster	540 000
Pine plants for public sale	491 659
Other plants for public sale	
Broome nursery	40 800
Karratha nursery	73 760
Total seedling production 1983/84 (Including carry-over to 2 year old stock)	9 863 560

Forest Protection

Area of prescribed burning	252 851 ha
Fire Outbreaks	
Number of fires	249
Area burnt	2 560 ha

5 STATISTICAL SUMMARY OF FOREST-BASED INDUSTRIES 1983/84

Sawn Wood Production

Total production of sawn timber 273 333 m³

Log Production

	Crown land (m ³)	Private Property (m ³)
Saw logs hardwood +	689 742	73 765
Saw logs softwood +	50 332	2 412
Other logs hardwood*	445 014	57 598
Other logs softwood*	147 949	1 147

+ includes logs used for production of plywood veneer.

* includes chip logs and particleboard material.

Hardwood Chip Logs

Quantity produced 502 612 m³

Firewood Production

Quantity produced 51 344 t

Poles and Piles

Quantity produced 361 580 lin m

Sandalwood

Quantity produced 1 572 t

Average Monthly Employment

Timber mills, including bush workers	1 764
Other timber processing plants (est.)	3 000
Firewood, mining timber and pole cutters	55
Sandalwood workers	60
Apiarists	178
Forestry (including contractors)	1 231

6 THE FOREST ESTATE

Area of State Forest and Timber Reserves

The area of land held as State forest at 30 June 1984 was 1 869 942 ha, which represents a net increase of 771 ha compared with the area at 30 June 1983. The area of land under timber reserves (Forests Act 1918-76) was also increased this year by 28 ha to 118 921 ha. Freehold land held in the name of the Conservator of Forests totalled 24 065 ha: a decrease of 2303 ha since last year. This reduction was mainly due to the transfer of land to the Crown for inclusion in the Pardelup prison farm.

Type	Area (ha)
Jarrah	1 447 000
Karri	148 000
Wandoo	106 000
Mallet	10 000
Tuart	3 000
Goldfields species	30 000
Radiata	30 000
Pinaster	27 000
Very open areas	212 000
	<hr/>
	2 013 000

Land Alienation and Leases

Land alienation is the process of moving land from Crown to private ownership. This year 13 applications for alienation were received, involving 476 ha, and 55 applications for forest leases were received involving 4478 ha. The Department agreed to the following:

(a) Alienations

	Number	Area (ha)
State forest	2	42
Crown land	3	16

(b) Leases

State forest	32	2 232
Crown land	9	1 104

MAJOR FOREST TYPES WITHIN THE FOREST ESTATE

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

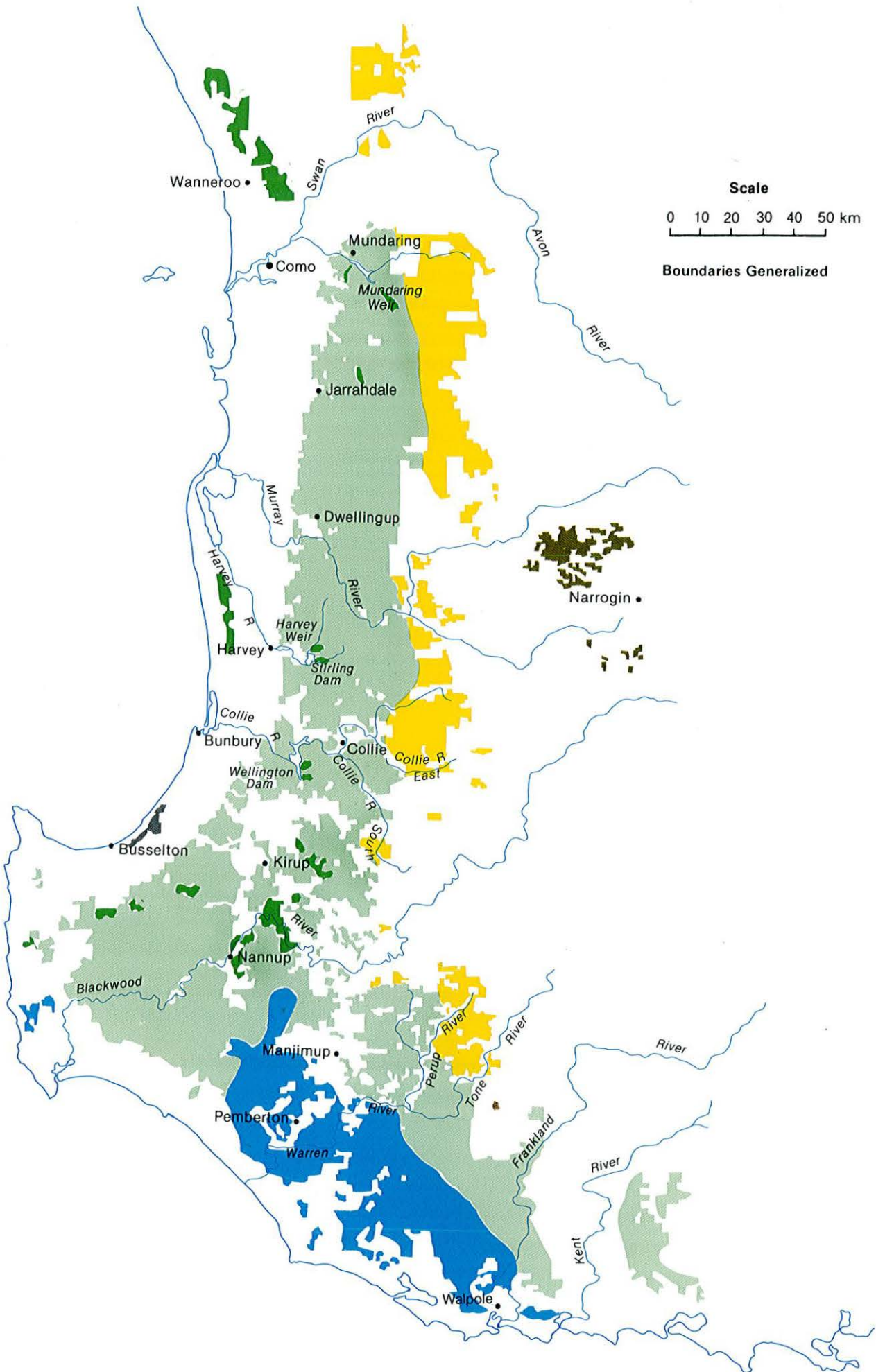
MALLET includes 8300 ha of brown mallet plantation, mallet species with wandoo as the minor species.

TUART consists of pure stands only.

RADIATA consists of pure stands only.
PINASTER consists of pure stands, plus a very small area of other species.

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

VERY OPEN AREAS (not distinguished) include swampy and rocky areas with sparse tree canopy; areas cleared for mining and not yet rehabilitated; powerlines, and dams.



7 LAND MANAGEMENT

The Department manages forest land for the complete spectrum of land use activities and land values. These range from flora and fauna conservation to the rehabilitation of land cleared by mining. Multiple-use, and the resolution of conflict are the key concepts behind the system of land management practised by the Department.

Land Use Management Plans

The proposed amalgamation of land management departments altered priorities, and further development of the forest land use management plan has been deferred. The proposed zonings are, however, currently in use by the Department, and should serve as a satisfactory basis for future development.

Flora and Fauna

A major review of Management Priority Areas (MPAs) for the conservation of flora and fauna, and for recreation, situated in the northern jarrah forest was undertaken.

Some of the most acute land use conflicts have occurred in this area in the past. This review led to the combination of several MPAs in a single reserve, centred on the Murray valley. An advisory body has been set up to assist the Forests Department in defining appropriate management policies and strategies for this reserve.

Negotiations also covered several MPAs to the north of the Murray valley, and existing conflicts may be most appropriately resolved by the minor readjustment of boundaries. An additional benefit is the greater contiguity of some MPA boundaries achieved by these adjustments.

Dryandra MPA was surveyed by research staff to obtain data for the formulation of management plans. This MPA is the largest of its kind in the western wheatbelt, and is a habitat for several rare fauna species. It is encouraging to note that the population level of some of these rare species; particularly the woylie, numbat, and red-tailed wambenger, appears higher than at any time during the past decade. A similar

population increase has also been observed in another key fauna reserve at Perup, east of Manjimup.

Landscape Planning

The Department's landscape management section was mainly involved in the preparation of recreation management, and site development plans funded by the Federal Government's employment programme. Landscape plans were also prepared for several other projects, including the construction of a major recreation area at Dwellingup. This latter development was planned in consultation with the Hotham Valley Tourist Railway, and will cater, when complete, for 600 visitors at any one time.

Assistance with landscape planning was also given to operations staff, who were involved in planning for such activities as the rehabilitation of mined areas, and the reforestation of agricultural land with pines. Due to these commitments, further work on the development of a landscape management system had to be deferred.

Recreation

Funds from the Federal Government's employment programme enabled the Department to extensively upgrade many existing recreation facilities, and develop several new areas in State forest. Most of this work was undertaken in the recently established Shannon and Northern Jarrah forest reserves, where 30 additional workers were employed on the development of camping and picnic areas, interpretative facilities, and the construction of walk tracks.

A recreation operations manual was produced for use as a field guide to recreation site planning and development. The manual, which provides guidelines and specifications for the planning and construction of recreation areas and support facilities, will assist the Department in its efforts to improve the standard and quality of recreation developments throughout State forest.

Assistant Forester Tom Leftwich (L) and Forest Ranger Mike Cully have been engaged in the research of woylie populations in the Perup.



Establishment and Tending of Forests

Jarrah Forest

The jarrah forest regenerates from lignotuberous seedlings on the forest floor. Following logging, fire, or natural death, openings are created in the forest canopy allowing seedlings to develop into saplings which grow into mature trees. The spread of the cinnamon fungus (the fungus that causes the symptoms of jarrah dieback) has severely affected the capacity of the jarrah forest to regenerate naturally on certain sites.

Under the Forest Improvement and Rehabilitation Scheme (FIRS) treatment was confined to the rehabilitation of areas severely affected by the cinnamon fungus, and to the removal of bull banksia, which harbours the fungus, from susceptible or partially infected areas. Most operations took place adjacent to ALCOA of Australia Ltd. bauxite mines near Jarrahdale (965 ha), Dwellingup (784 ha), and Harvey (174 ha), and were financed by ALCOA. A total of 1914 ha was treated under this scheme.

Karri Forest

During the winter of 1983, 2294 ha of cutover karri forest were regenerated. Of this, 600 ha were regenerated by natural seed fall from retained seed trees, 256 ha were sown with karri seed, and 1448 ha were hand-planted with nursery-raised karri seedlings. In addition, some 180 ha of the areas regenerated in 1982 were restocked.

Rehabilitation of log landings, snig tracks, and gravel pits continued with the co-operation of the timber industry and other government departments. Karri seedlings were planted on 782 landings and associated snig tracks, which had been ripped to prepare the ground.

Wandoo Forest

Wandoo was regenerated on 60 ha of the Helena catchment, by Mundaring divisional staff and the Public Works Department.

Mallet Forest

The Narrogin division contains most of the mallet forest under Forests Department control. This forest is mainly in plantation form. During the year 157 ha were thinned for tool handles and fence posts.

Tuart Forest

At Ludlow, 36 ha of tuart forest were prepared and regenerated.

Pine Forest

The Department has a pine planting programme to provide Western Australia with self-sufficiency in sawn timber supplies. State owned forest of radiata pine, pinaster pine, and other species now covers 57 050 ha.

PINE FOREST ESTABLISHMENT

Area planted with pines 1983	
Radiata	1 380 ha
Pinaster and other species	827 ha
	2 207 ha
Total area of pine forests at 31 December 1983	
Radiata	29 833 ha
Pinaster and other species	27 217 ha
	57 050 ha

1983 PLANTING (ha)

DIVISION	Radiata	Pinaster and other species	Total
Wanneroo	Nil	615.8	615.8
Harvey	10.5*	Nil	10.5
Kirup	279.3	Nil	279.3
Nannup	577.7	Nil	577.7
Busselton	512.3	211.3	723.6
TOTAL	1 379.8	827.1	2 206.9

* Second rotation planting.

Tending

The following pine forest tending was carried out during the year:

Scrub Control	5 414 ha
Fertilization	
At planting	2 115 ha
Refertilization	5 783 ha
High pruning	3 338 ha
Low pruning	2817 ha

Private Forests

Private interests advised the Department that 182 ha were planted with pine during the year. This brings the estimated area of privately owned pine forest in the State to 12 417 ha.

The W.A. Chip and Pulp Co planted 241 ha of eucalypts (mainly Tasmanian blue gum) as a future chipwood resource. This brings the total area of private eucalypt plantation to 385 ha.

Inland Forests

Goldfields

The major emphasis of forestry activities in the goldfields area is the conservation of woodlands. Staff are also involved in the direction and control of timber cutting, rehabilitation, and sandalwood operations.

Although a steady price for gold ensured a continuing expansion of mining activity, the production of mining timber from the goldfields woodlands was 50 per cent below the 1982/83 figure. The decreasing demand is attributed to an increase in open-cut mining, and alternatives to wood being used underground.

The Goldfields Dust Abatement Committee planted a tree buffer near Boulder, and held a successful field day in October, 1983. The Committee was able to secure finance for a further 5 years' operations. Their annual budget is now \$38 000.

Assessment of the sandalwood resource has continued, and 7.8 million hectares have now been surveyed.

The routine inspection of sandalwood operations continued in order to ensure proper conservation, and the efficient use of available material, especially of dead wood.

Proposals for sandalwood reserves at Kadji-Kadji and Lake Minigwal were negotiated, but had not been finalized by the end of the financial year.

The Kalgoorlie office continued to provide an advisory service in the Goldfields and Esperance areas.

Pilbara/Gascoyne

The Karratha nursery remained the focal point of the Department's work in the Pilbara. Approximately 110 000 plants were raised during the year, and of these about 74 000 were dispatched. The balance was retained as stock.

Over 30 000 plants were supplied for the Carnarvon Soil Conservation Project where funds from the Federal employment programme allowed the work to continue. This is a joint project administered by the Carnarvon Shire Environmental Advisory Committee, which includes both Government and pastoral industry representatives. The project is designed to reduce dust and erosion on the Carnarvon South Common.

Another 32 000 plants were distributed within the region under the North West Tree Scheme. Many of these plants were transported free, with the generous assistance of Ansett Air Freight.

Two planting trials have been carried out at Karratha station and Winning station. Approximately 5 000 plants, mainly hardy shrubs, were planted to test establishment techniques on degraded rangeland.

Eroded riverbanks on the new extension of the Millstream/Chichester National Park were fenced and restocked with trees, in conjunction with National Parks staff. Over 500 plants were established, and included over 100 millstream palms, raised from seed at the nursery.

The shadehouse area of Karratha nursery has been increased by 200 m² to cater for an increased demand for plants. A demonstration garden featuring Pilbara plants was established to illustrate the potential of these species.

Field trips were undertaken to collect seed, distribute trees, collect plants for the recently opened Pilbara Herbarium at Karratha College, advise on tree establishment, and assist with the identification of new species. Two new eucalypt species from the Hamersley Range are being described by Mr M.I.H. Brooker. During the year 80 kg of seed was collected for Departmental use.

Visits by advisory staff were made to the Aboriginal communities of Jigalong and Strelley. Over 1000 trees were distributed to the village homes of Roebourne to provide shade and improve town gardens.

Extension work at Karratha nursery continues to demand considerable time from the staff as new and old residents seek advice on a variety of horticultural problems. Over 282 extension enquiries, excluding requests for plants, were handled during the year.

Kimberley

Broome nursery continued to supply trees to householders, Aboriginal communities, local government, and community projects.

Species raised in the nursery included native Kimberley and Pilbara trees and shrubs, tropical fruits, and exotic species suited to a semi-arid environment.

Advice and assistance was given to Shires in planning urban tree planting programmes in parks and reserves.

The Aboriginal community at Derby initiated the establishment of a 0.5 ha woodlot of river redgum for future firewood supplies. Tree seedlings were supplied by the Broome nursery, and the Shire donated machinery for general preparation.

Plots of mixed tropical fruit trees and shade trees were planted at two Aboriginal communities in the Kimberley, and inspections and maintenance were carried out on other community plantings.

This year Kimberley staff examined the extent of forests developing on the shores of Lake Argyle. These forests of river redgum are very fast growing, and appear to extend over an area of 2000 ha, however a further 9000 ha of shoreline appears suitable for natural forest development.

More tree species, to enhance the local environment and possibly produce timber, were planted at arboreta in Broome and Kununurra.

Judymae Jackson (L) and Michael Hughes completed four year Horticultural Apprenticeships at Bentley College this year. Judymae and Michael are both employed by the Department in the nursery at Karratha.



Hardwood Forest Rehabilitation

A major Government initiative has been the establishment of a hardwood forest rehabilitation programme covering 2000 ha annually. Due to complexities of site selection this target could not be achieved in 1983-84 (the first year) however, a total of 600 ha was treated in the Mundaring, Jarrahdale, Dwellingup, Collie, Kirup, Manjimup and Walpole divisions. This work included replanting 67 ha with karri and 60 ha of treatment in wandoo. Elsewhere in jarrah, the treatments involved thinning overstocked regrowth forest and restocking understocked areas.

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

Bauxite Mining Rehabilitation

The dispersed pattern of clearing required for bauxite mining radically alters the composition of the forest. After rehabilitation, there are small areas of healthy, natural forest; patches of dieback infected forest; mine sites that have been revegetated using a variety of techniques and species; rehabilitated dieback areas; rehabilitated transport and service corridors; and access roads.

This year, 286 ha of pits, access roads, and other clearings associated with mining, were reforested. The Forests Department hand planted 136 ha at Jarrahdale, whilst ALCOA planted 150 ha at Huntley and Del Park mine sites, near Dwellingup.

Species planted include wandoo, powderbark wandoo, red mahogany, spotted gum, blackbutt, marri, Sydney blue gum, and flooded gum. These species were selected because of their inherent qualities and apparent adaptability to the reclaimed site. Jarrah was seeded at all upland rehabilitated sites at the rate of 0.25 kg/ha, and blackbutt was seeded in all low-lying areas. Scrub species were also introduced to provide rapid ground cover for beneficial nutrient input, and erosion control.

Mineral Sands Mining Rehabilitation

A total of 16 ha mined by Associated Minerals Consolidated has been landscaped and sown with

pasture grasses. An area of 30 ha previously landscaped by Westralian Sands Ltd. has been refertilized, and part of this planted with 1500 trees.

Tin Mining Rehabilitation

A total of 16 ha mined by Greenbushes Tin Ltd. has been rehabilitated. The areas were landscaped, drained, covered with topsoil, and planted with wandoo, red mahogany and spotted gum.

Coal Mining Rehabilitation

Western Collieries Ltd. rehabilitated 31 ha of mined areas. These were landscaped and sown with native plant species. 26 ha was direct seeded with 22 shrub species and 5 local eucalypt species. An area of 4 ha was planted with powderbark wandoo, jarrah, red mahogany, swamp mahogany, and flooded gum. One hectare of the wet area was sown with clover.

Griffin Coal Mining Co. Ltd. re-established 1 ha of the 1982-83 rehabilitation area which had eroded.

Gravel Pit Rehabilitation

A total of 98 disused gravel pits, totalling 101 ha, has been

rehabilitated in State forest and timber reserves in the south-west. The Main Roads Department funded the rehabilitation of 14 of these under a joint arrangement. The species used include wandoo, red mahogany, Sydney blue gum, spotted gum, and yellow stringy-bark.

Miscellaneous Rehabilitation

In the Busselton division, 21 km of disused roads were ripped and planted with eucalyptus species, and 2 ha of coal and oil exploration clearings were rehabilitated at the explorer's expense.

Catchment Rehabilitation

The Forests Department planted 878 ha of former farmland in the Wellington and Helena catchment areas on behalf of the Public Works Department. Eleven local eucalypts and eight Eastern States eucalypt species were used.

In areas east of Jarrahdale degraded by dieback 22 ha were planted with red mahogany, wandoo, Sydney blue gum and blackbutt.

A heavy duty IZUZU tanker being used to damp down hot spots after a hand burn in the Warren Block, Pemberton.



Protecting the Forest

Fire

The area of land under the control of the Forests Department and protected from wildfires was 2 012 928 ha. In addition, the Department was also directly involved in the protection of a further 360 000 ha of other Crown land through the Department's detection programme, co-operative prescribed burning ventures, and neighbour-to-neighbour fire suppression activities.

A total of 249 wildfires, covering 6600 ha, was attended by Forests Department fire suppression forces. Approximately 44 per cent of these fires originated outside the forest estate.

The 1983/84 fire season was longer than normal due to an early onset of summer conditions, and an extension of dry conditions in April. The summer temperatures were higher than normal in 5 out of 7 months of the fire season in the northern jarrah forest, and in 4 out of 7 months in the karri forest.

Several periods of extreme fire conditions resulted from hot, dry weather associated with low-pressure

trough developments along the south-west coast. The number of wildfires (249) was above average with large fires occurring in the Mundaring (Gosnells fire), Manjimup and Pemberton divisions.

Prescribed Burning

Forty-nine aerial prescribed burns, covering 212 478 ha of forest, were completed. In addition, approximately 40 373 ha were burnt by ground crews. These areas were burnt for a variety of purposes including: hazard reduction, hardwood logging slash disposal, and clearing for pine plantation establishment.

Several jobs programmed for autumn burning had to be postponed due to the unseasonably dry conditions experienced during this period.

The Department assisted the Bush Fires Board, National Parks Authority, local government authorities, and the Public Works Department in fuel reduction programmes. One burn, conducted in spring for the National Parks Authority near Walpole, helped to contain a fast-running wildfire in summer, which could well have threatened the town and nearby farms.

Detection and Fire Suppression

The Department's fleet of nine Piper Super Cub aircraft flew a total of 7718 hours to provide aerial surveillance of State forest and adjoining lands. This was 14.7 per cent above the 5 year average; a result of the early spring start to the fire season, and the extended dry autumn conditions. Four lookout towers were used to maintain a constant watch on important pine plantations, whilst another 20 towers were maintained as a backup to spotter aircraft.

Despite the long, dry summer and the relatively high number of fires requiring attention, the area burnt in State forest by wildfires was only 2412 ha. This compares favourably with the annual average over the past 10 seasons of 4772 ha. The average forest fire size was only 20 ha, and reflects the efficiency and effectiveness of the fire prevention and suppression measures undertaken by the Department and neighbouring fire organizations.

A fire resulting from a trail bike accident near Gosnells, in February, burnt 2300 ha of vacant Crown land and 200 ha of State forest. The fire was contained by the combined fire suppression forces of the Forests Department, voluntary bush fire brigades from local Shires, the Bush Fires Board, and the Police Department.

In March, a fire occurred in pine logging debris in the Grimwade pine forest. Under the influence of strong south-west winds, the fire burnt 49 ha of standing pines, and 71 ha of recently clearfelled areas, before being contained in the fuel reduced hardwood buffer on the perimeter of the pines. A total of 9747 m³ of saleable logs was salvaged, and the area has been prepared for replanting.

On 28th April unstable weather conditions, combined with strong winds ahead of an approaching front, contributed to the spread of 19 fires; 16 of which escaped from private property. The largest fire on that day escaped from private property into a nature reserve under the control of the Department of Fisheries and Wildlife, and into State forest some 90 km east of Manjimup.

One of the Kockam Forwarders used to extract high quality peeler logs during the salvage operation after the Grimwade fire.



This fire burnt 344 ha of State forest and 1400 ha of nature reserve and private property before it was suppressed by Departmental forces and local bush fire brigades.

Disease

Implementation of the Government's "Dieback Policy 1982" continued. All operations proposed within proclaimed Disease Risk Areas ("quarantine") were evaluated, and a total of 50 operations was approved. These included logging for sawlogs, chipwood and poles, ore drilling and exploration, maintenance work on State Energy Commission (SEC) lines, research studies, and laying of Telecom cables.

Maps at a scale of 1:500 000 showing the distribution and impact of dieback on State forests, were prepared. Additional washdown units and compressors were purchased for divisional use.

Disease Risk Areas

The area of State forest, timber reserves, and Disease Risk Areas, remained at 719 561 ha. Access to Disease Risk Areas is restricted and is controlled by permits, and by patrols.

During the past year 237 permits were issued, of which 183 are still current. A total of 282 patrols were carried out to assist enforcement of regulations.



Wash down stations are still used throughout the forests as a means of containing the spread of the cinnamomi fungus by vehicles.

A new look-out tower was erected at Gngangara to provide early warning of fire in the pine forests.



Environmental Protection

At the request of the Conservation Commission (Northern Territory), an officer visited Nhulunbuy in the Gove Peninsula, and Darwin. An outbreak of dieback on Darwin stringy-bark associated with the cinnamon fungus was inspected. Recommendations on quarantine, hygiene, education, nursery practices and research investigations were made.

Two major environmental schools involving 50 senior divisional staff and one National Parks representative were conducted at Busselton. A one-

day workshop on erosion control was held at Manjimup. The proceedings were published and distributed within the Department. Additional schools for Forests Department, industry, and other Government authorities were conducted.

Maps at a scale of 1:500 000 showing the distribution of leaf miner, leaf skeletonizer, and feral pig sightings were prepared. Progress with weed control programmes was monitored in liaison with the Agriculture Protection Board (APB). Expenditure increased considerably

due to the availability of personnel employed under the Federal employment programme.

Blackberry and variegated thistle are severe weed problems in State forest, and a Departmental weed control policy has been developed. An attempt was made to control feral pigs in the Harvey division, using a professional hunter, and a pig poisoning programme was successfully undertaken in the Kirup division, by the Forests Department and the APB.

SUMMARY OF PRESCRIBED BURNING FOR PAST FIVE FIRE SEASONS

	FIRE SEASON				
	1979/80	1980/81	1981/82	1982/83	1983/84
Hardwood forest					
Burning by hand methods	53 137	42 561	34 946	36 193	27 480
Burning from aircraft	282 965	207 428	268 075	223 320	212 478
Total (ha)	336 102	249 989	303 021	259 513	239 958
Advance, top disposal and regeneration burns (ha)	3 051	9 014	6 382	7 333	6 342
Pine forest					
Clearing burns for pine establishment	987	3 749	4 158	3 560	2 118
Fuel reduction burning	1 938	1 798	2 946	2 580	4 433
Total (ha)	2 925	5 547	7 104	6 140	6 551

SUMMARY OF WILDFIRES FOR PAST FIVE FIRE SEASONS

	FIRE SEASON				
	1979/80	1980/81	1981/82	1982/83	1983/84
Number of wildfires attended					
Hardwood forest	81	95	87	121	123
Private property and Crown land adjacent to State forest	72	70	66	113	109
Pine forest	5	13	19	13	17
Total number	158	178	172	247	249
Areas of wildfires attended (ha)					
State hardwood forest	1 885	7 392	2 370	4 205	2 412
State pine forest	10	15	10	20	148
Private property and Crown land adjacent to State forest	7 047	9 356	5 896	7 288	6 604
Total area burnt (ha)	8 942	16 763	8 276	11 513	9 164

8 RESOURCE MANAGEMENT

Seed Supply

A reliable source of seed is essential for forest regeneration, rehabilitation, and conservation work.

Seed collections in 1983/84 totalled 662 kg, comprising pine species (100 kg), and eucalypts and legumes (552 kg).

Seed Store

Most seed issued this year was for use in Departmental nurseries, and for the rehabilitation of bauxite mine pits. The public and overseas organizations continued to purchase quantities of seed. Seed store transactions included 445 issues of seed, and 307 seed lots were received and processed for storing. Returns from sale of seeds during 1983/84 totalled \$15 894.

A new system of germination testing was introduced, based on sequential sampling. The system was far less labour intensive than the previous replicated testing system, and over 400 germination tests were completed, compared to 250 in the previous year.

Seed Orchards

Plans, and some preparatory ground work, were completed for the establishment of three eucalypt seed orchards at Hamel, Narrogin, and Esperance. Seed collection from many wheatbelt and goldfields eucalypts is becoming increasingly difficult and expensive. The establishment of these species in seed orchards will provide a readily accessible source of seed which will be cheap to collect.

Tree Nurseries

The Department now operates seven nurseries. Seedlings are produced all year round in the Broome and Karratha nurseries, whereas the southern nurseries have a well defined season which commences in September with sowing, and culminates between May and August with seedling distribution.

DEPARTMENTAL NURSERY PRODUCTION

NURSERY	For Sale to the Public		For Departmental Use		Carry Over to 1984/85	TOTAL
	Potted Stock	Open Rooted Stock	Potted Stock	Open Rooted Stock		
Commercial Nurseries Narrogin Hamel	117 000 289 000		372 000			117 000 661 000
Hardwood Nurseries Manjimup			1 300 000	2 700 000		4 000 000
Pine Nurseries Gnangara Nannup		411 650 80 000		540 000 2 778 000	861 350 300 000	1 813 000 3 158 000
Other Nurseries Broome Karratha	40 800 73 760					40 800 73 760
TOTAL	520 560	491 650	1 672 000	6 018 000	1 161 350	9 863 560

Bob McAlinden (L) and Paddy Kirby at work with seedlings on newly raised beds in the Narrogin nursery.



Wood Production

The management of wood harvesting, and the maintenance of the forest environment remains a vital part of the Department's activities. The implementation of the dieback disease management policy, and the increasing number of activities in Disease Risk Areas require an increasing staff input for planting, control, and monitoring.

Areas Cut Over

Three types of felling take place in the forest, according to the management system used for a particular area. These are clear felling, selection felling, and thinning.

Clear felling involves the felling, and regeneration of a whole stand. The felling may be done in one operation or in two. Trees are left to provide seed for regeneration, and are removed later, once seed shed has taken place.

Selection felling involves removing only the trees large enough for sale. The area is restocked from seed trees, or from seedling growth already on the forest floor.

Thinning refers to the removal of excess stems from overcrowded areas in either immature hard or softwood forest. This enhances the growth of final crop trees, and maintains the vigour and health of the forest. A forest may be thinned several times before it reaches maturity.

During the past year the commercial thinning of immature karri forests continued, and 264 ha were cut over. This brings to 1020 ha the total area of young karri forest thinned in this way. Regrowth karri forests are now producing logs for veneer production, sawlogs and chipwood. Often all three products come from the one tree, giving very efficient utilization of the resource.

The apparent increase, since last year, in the area of karri forest felled and regenerated was caused by the completion of felling in some areas, which were only partially logged at the end of the last financial year.

Log Production

Hardwood log production from State forest increased compared with production in 1982/83, due to an improvement in timber market conditions in Western Australia, notably the housing market.

Stocks of sawn timber held by

FOREST AREAS CUT OVER

		1983/84 ha	1982/83 ha
Jarrah	selection felled	21 537	23 744
Karri	clear felled	1 487	985
	removal of seed trees	488	451
	thinned	264	194
Wandoo	selection felled	579	326
Mallet	thinned	157	148
Pine	clear felled	161	160
	thinned	1 526	1 828

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 —

	1983/84 m ³			1982/83 m ³		
	Crown Land	Private Property	Total	Crown Land	Private Property	Total
Jarrah	461 635	39 187	500 822	435 227	44 790	480 017
Karri	216 265	26 820	243 085	190 144	21 336	211 480
Wandoo	1 365	4 046	5 411	1 433	5 000	6 433
Blackbutt	1 056	615	1 671	1 320	1 155	2 475
Sheoak	368	14	382	867	6	873
Marri	8 702	1 928	10 630	7 626	1 469	9 095
Other	351	1 155	1 506	446	1 703	2 149
Total (Hardwood)	689 742	73 765	763 507	637 063	75 459	712 522
Pine	50 332	2 412	52 744	41 611	1 908	43 519
TOTAL	740 074	76 177	816 251	678 674	77 367	756 041
Other log materials*						
Hardwood	445 014	57 598	502 612	412 117	21 835	433 952
Softwood	147 949	1 147	149 096	135 007	3 740	138 747
TOTAL LOG TIMBER	1 333 037	134 922	1 467 959	1 225 798	102 942	1 328 740

* includes chip log and particleboard material.

sawmilling companies reduced markedly during the year.

The production of softwood logs is still at a relatively low level. A new pine sawmill commenced operations at Mundijong during the year. Part of its intake comes from private property. Work commenced on the construction of a major new softwood sawmill at Dardanup, near Bunbury.

A summary of log production for the period 1970-84 is given in Appendix 5(a).

Production of Hardwood Sawlog Timber from Crown Land

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

The long term timber resource plans are described in the Department's 1982 General Working Plan.

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 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 the Forests Department State Headquarters, whereas salvage material is sold under local licences. This year the allowable cut of hardwood sawlogs was 784 500 m³. The hardwood sawmilling industry is under continual pressure to take as many of the poorer quality logs as possible, thus making a more efficient use of the resource. It is pleasing to note that there has been a marked decrease in the quality of logs used by the industry in recent years.

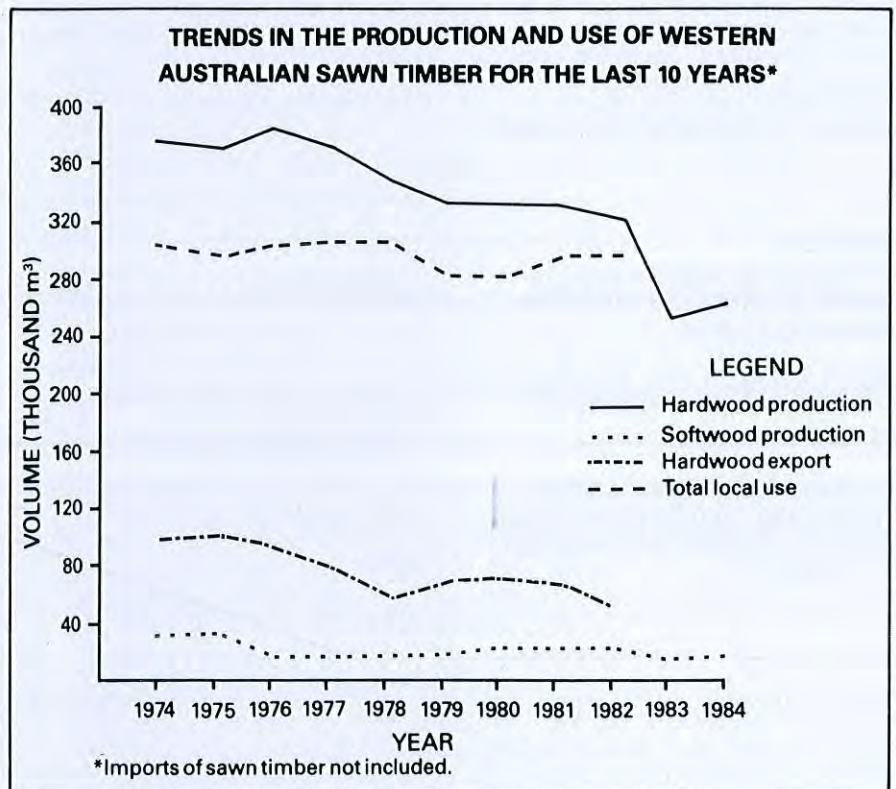
Production of sawn timber from Crown land increased compared with 1982/83, but production from private land continued to decline.

HARDWOOD SAWLOG PRODUCTION FROM CROWN LAND

	1983/84 m ³	1982/83 m ³
Head Office licences	625 785	582 525
Local licences	63 957	54 538

SAWN TIMBER PRODUCTION FROM CROWN LAND AND PRIVATE PROPERTY

	1983/84 m ³	1982/83 m ³
Sawn Timber Production		
Crown land	229 037	214 372
Private property	22 532	22 927
Sawn Sleeper Production		
Crown land	18 521	23 638
Private property	3 243	4 403
Total	273 333	265 340



Veneer Log Production

High quality karri and pine logs for production of veneers continued to be supplied to plywood factories. Salvage felling in the area affected by the wildfire at Grimwade caused a surge in production of veneer quality logs. To ensure their best possible utilization, logs in excess of immediate industry requirements were stockpiled under water sprays, a technique used successfully for radiata mill logs salvaged after the severe wind damage to pine forests caused by Cyclone Alby in 1978.

Hardwood Woodchip Production

Marri and karri chip logs were supplied to W.A. Chip and Pulp Co. Pty. Ltd. for the production of woodchips. Of the 445 014 m³ of chip logs produced 76.93 per cent was marri and 23.07 per cent was karri. The W.A. Chip and Pulp Co. Pty. Ltd. also obtained 57 598 m³ of chip logs from private property and 87 433 t of chips prepared from sawmill residue.

Production of Softwood Log Timber from Crown Land

The production of pine logs for all uses reached a new peak due to the general recovery in the timber industry in the latter half of the year. The increase was largely due to a higher intake of small logs for production of particle board by Wesfi Ltd.

Sandalwood

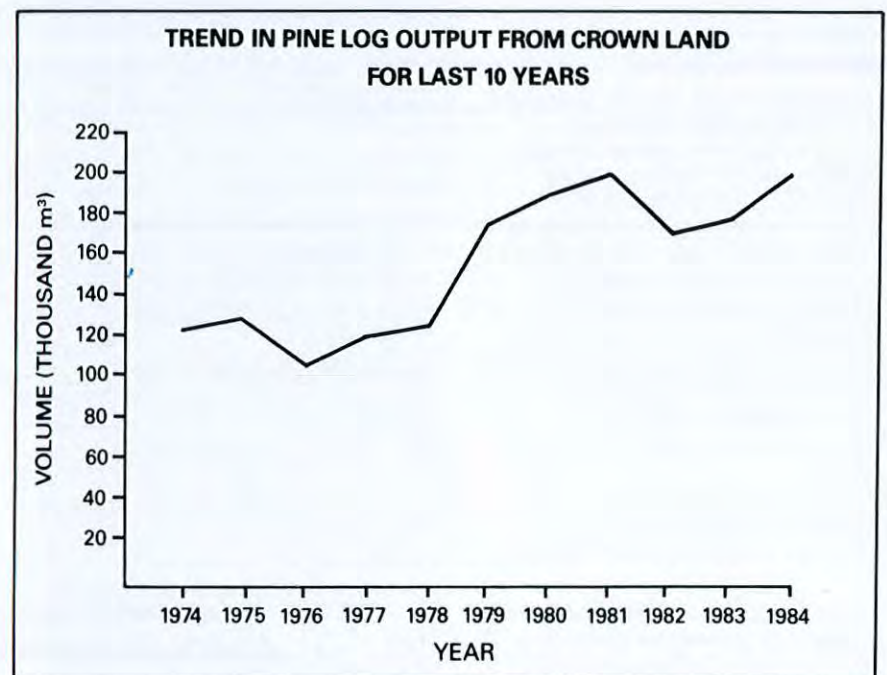
Sandalwood is obtained from the Goldfields and Murchison areas for export mainly to Asia.

Exports totalled 1 581.75 t this year, compared with 1 636 t in 1982/83.

Licences to obtain sandalwood were issued to 25 contractors. Sixty people were registered as employed in the industry.

VENEER LOG PRODUCTION

	1983/84 m ³	1982/83 m ³
Karri	1 753	975
Jarrah	Nil	Nil
Pine	6 926	3 741



SANDALWOOD

	1983/84 t	1982/83 t
From Crown land		
Green sandalwood	905	1 047
Dead sandalwood	665	654
From private property	2	13
Total	1 572	1 714

Firewood Production and Consumption

Firewood is obtained as a by-product of sawmilling, from forest thinning operations, and from dead trees in the forest.

The figures for firewood production and consumption are not a true reflection of the total quantities used as an increasing and unrecorded quantity of firewood is being gathered by the public for its own use. Resources of firewood from forests just outside the Metropolitan area have been allocated for home consumption.

Other Forest Produce

The demand for piles and poles was at about the same level as the previous year. It is becoming increasingly difficult to meet this demand due to the limited area of suitable forest.

FIREWOOD PRODUCTION AND CONSUMPTION*

		1983/84 t	1982/83 t
Crown land	for sale	33 024	35 950
Sawmills	for own use	1 457	1 390
Firewood Contractors	local firewood permit forest produce licence	2 112 6 619	2 130 9 665
Industrial use		Nil	Nil
Total		43 212	49 135
Private property	for sale	7 725	7 588
Sawmills	for own use	407	451
Total		51 344	57 174

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

OTHER FOREST PRODUCE

South-west division and agricultural areas.

		1983/84	1982/83
Mining (m ³)	Crown land	3 431	3 713
	private property	N/A*	N/A
Piles, poles and bridge timber (m)	Crown land	361 580	215 555
	private property	N/A	N/A
Fence posts and rails (No.)	Crown land	143 508	137 511
	private property	N/A	30 870
Strainer post (No.)	Crown land	20 035	23 962
	private property	N/A	N/A
Goldfields area	Crown land		
Mining timber (m)		153 477	158 543
Fence posts and rails (No.)		11 740	24 925
Strainer posts (No.)		310	1 126

* N/A — Not available.

Timber Utilization and Marketing Task Force

The Government wishes to co-ordinate the production and marketing of hardwood timber, and to improve the utilization and productivity of our hardwood forests. To advise the Government on these matters a task force comprising of representatives from the sawmillers, timber merchants, the Forest Products Association, the Guild of Furniture Manufacturers, the Housing Industry Association, and the Forests Department was nominated by the Hon. Premier and Minister for Forests, Mr Burke.

The Task Force has not concluded its recommendations, but has identified many areas of need: areas where promotion, research, Government action, and improved industry efficiency would be beneficial. An interim report was submitted to the Government in December 1983.

Market Surveys

Under the aegis of the Timber Utilization and Marketing Task Force, two market surveys were conducted. A Survey of Building Materials Used in House Construction in W.A. (Technical Paper No. 8), received a positive response from every local government authority in the State, and provided valuable data on all house permits issued in Western Australia between September and November 1983.

A survey of timber used in manufacturing resulted in a 31% response from 500 manufacturers of timber products. The survey has established the specific needs of this important group of timber consumers, and as such is a vital step in planning for their continued requirements.

Timber Utilization

Thinning of immature forests is essential to promote the growth of high quality sawlogs. Economic forest management requires a market for the thinned material, and a comprehensive research programme has commenced for developing utilization techniques for small jarrah and karri regrowth logs.

Completed during the year was the first stage of a modified version of a

progressive tunnel kiln designed by the CSIRO in Melbourne. This is a low cost, low temperature kiln providing the high humidity and controlled conditions necessary in the early stages of hardwood seasoning.

Research into the use of the high temperature kiln for the final stages of drying jarrah is continuing. The project, undertaken jointly by Bunning Bros. Pty. Ltd. and the Department, is showing considerable promise. The first parcel of high temperature dried furniture grade jarrah was recently released to selected furniture manufacturers for evaluation.

A restructuring programme on the sawmilling, seasoning, and processing complex at Harvey has commenced. This programme will refurbish or replace most of the sawmill equipment (installed over 25 years ago), and provide modern kiln seasoning facilities.

Timber Inspection

The Forests Department Timber Inspection service operated at a reduced level during the year due to the depressed state of the industry. Towards the end of the financial year, however, there were signs of increased activity.

A new Timber Inspection service for round timber was established during the year after consultation with the SEC. This was introduced in an effort to lift the quality, and therefore the service life of SEC poles. This service is also used by the SEC to identify poles most suited to preservative treatment.

Log Pricing

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

Due to the freeze on government charges, no escalation of softwood stumpages took place during 1983.

From January 1984 indexation of softwood stumpages recommenced. To alleviate the impact on the pine industry full indexation was deferred until July 1984.

Hardwood sawlog royalty increases of 9.1%, due in July 1983, were deferred until January 1984.

Water

The main water catchments for the southern portion of the State fall within forest managed by the Department, and there is close liaison and co-operation with the water supply authorities on their management. The objective is the maintenance, and where possible, enhancement of the quality and quantity of water yields. This is not merely reflected in the management of natural forests, but also in the rehabilitation of mined areas, and of agricultural land repurchased to ameliorate the salinity problem. The joint activities include research, planning, and operations. One of the milestones reached in the past year was an agreed policy on the control and management of recreational activity on catchments. Another milestone is a major advance in measuring the water use by jarrah: the species most common on the Darling Range.

The high temperature kiln at Harvey has been used recently to pioneer research into the artificial seasoning of timber sawn from jarrah regrowth.



9 SUPPORT SERVICES

The Department has several branches providing support services for management. These services provide information, advice, trained personnel and equipment necessary to achieve the management objectives of the Department.

Research

The Department's research activities are dispersed throughout the south-west of the State, with specialists stationed at centres at Manjimup, Busselton, Dwellingup and Wanneroo. Research programmes are co-ordinated and directed from research headquarters at Como.

Como

Research headquarters provides service facilities for regional and divisional centres, as well as carrying out a research programme. The biometrics section continued to provide a data processing service, but moves were made towards a more consultative role which included the dispersal of expertise and equipment to regional centres.

The chemical analytical service was used by all research centres.

Nutrition work on radiata pine grown in the Donnybrook Sunlands continued. A new project involving the examination of the carbohydrate and nutrient status of jarrah in relation to infection by the cinnamon fungus, which causes dieback, has been started.

A major watershed has been reached in jarrah silviculture, and a report detailing all past research and available information on the silviculture of northern jarrah has been assembled ready for publication. Further research data on the ecology of jarrah, bull banksia, and the invertebrate fauna of soil and litter in the jarrah forest are being prepared for publication.

Wanneroo

Screening radiata pine for genetic tolerance to the cinnamon fungus continued using elite radiata pine families from Victoria, New South Wales, South Australia, New Zealand and South Africa. One hundred and thirty-six elite families have now been classified as tolerant to the fungus.



Owen and Joan Loneragan unwrap presentation sandalwood bowls at Owen's retirement celebration. Owen Loneragan was a research officer with the Forests Department for 33 years.

Second generation selections within these tolerant families will be grafted in 1984 for new seed orchard establishment. The entire process, from the identification of the genetic variability in the tolerance of radiata pine to the disease, to its application in the establishment of the seed orchard, has been accomplished in five years.

Glasshouse studies have shown that the Ano Nuevo and Guadalupe Island provenances of radiata pine are highly susceptible to the cinnamon fungus, whilst the Cambria provenance is more tolerant. Usable variation exists in each population.

Comprehensive provenance trials of spotted gum were planted on bauxite mine sites at Dwellingup and Jarrahdale, and on salt-affected land in the Wellington catchment.

A major review of the silviculture of pinaster pine has been completed, and translated into management prescriptions. These are designed to maximise both timber and water production, and are now being applied in the field.

Research continues at Gngara into the establishment of the second rotation.

Dwellingup

Research at Dwellingup is primarily concerned with factors affecting the role of the jarrah forest as a water catchment for the Metropolitan area.

Earlier site classification based on vegetation indicated that the seemingly uniform upland portion of the jarrah forest in fact consists of a mosaic of site types. Studies on sites infected by the cinnamon fungus have shown that specific site characteristics favour sporulation, survival, and transmission of the fungus deep in the soil, and consequently infection of the root system of jarrah. Impact following infection may range from no effect, to high impact, depending on site type.

Accordingly, research has been re-organised with the object of predicting site impact should the fungus be introduced to a particular site type. The dieback programme now concentrates on four main areas:

site evaluation, disease assessment, processes within sites, and host response.

Approximately 350-400 sites in the northern jarrah forest are being assessed in detail. A major tree-root excavation programme is under way to examine the long term effects of infection on different sites. A long term monitoring programme has been started to determine the physical characteristics of sites which affect pathogen development at depth in the soil profile.

Work is progressing on problems related to the rehabilitation of bauxite pits. The predictability of long term tree survival in rehabilitated areas is being assessed using water stress information from young trees established in pits up to 10 years ago. For this work an electronic dendrometer band has been developed, capable of high resolution (0.007 mm diameter). The bulk density of the soil, determined by its original composition and subsequent treatment (compaction, ripping), has been identified as a strong determinant of tree performance.

Mechanical methods of reducing leaf litter build-up in successfully rehabilitated mine pits are also being examined. The fire hazard this build-up represents could threaten established trees should a wildfire occur.

A small experimental catchment (Yarragil 4L) was thinned to 20% crown cover early in 1983 after several years of monitoring. The treatment caused a rise in groundwater level of 0.9 m, but there has been no increase in streamflow and no detectable change in water quality.

A project to investigate potential utilization of thinnings from regrowth forest was commenced.

Busselton

Research at Busselton is almost entirely concerned with pine silviculture and utilization. Donnybrook Sunkland soils are generally deficient in the major elements, and the use of superphosphate and clover to improve soil fertility continues to be one of the main areas of investigation. A very effective means of supplying nitrogen, which is

normally needed at high levels yet is readily leached out of soil, has been developed using a clover sward prior to pine planting.

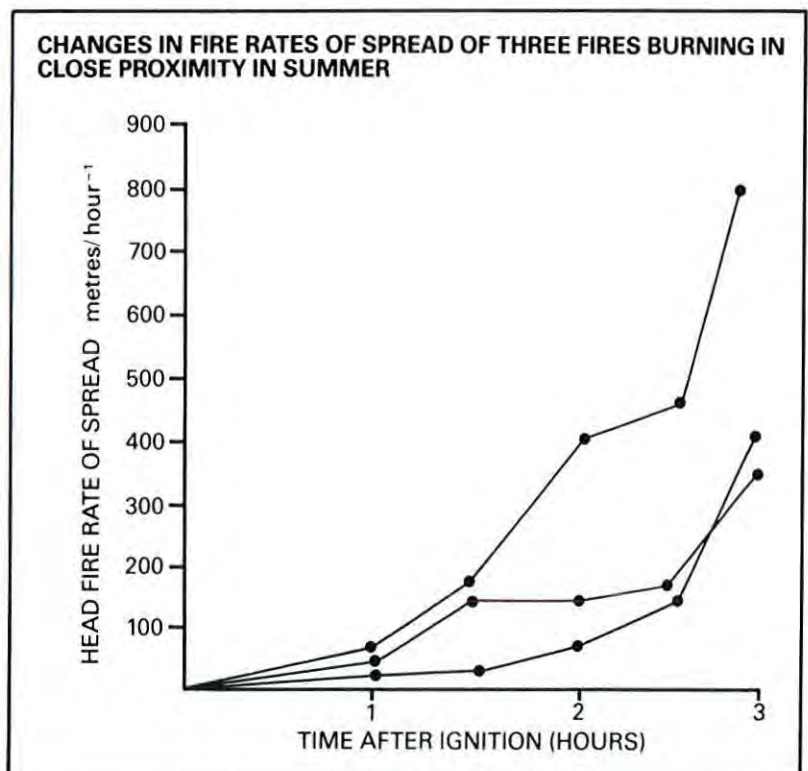
Considerable progress has also been made in refining the techniques of plantation establishment, weed control, pruning, and thinning.

The agroforestry research programme continued to expand. A trial at Esperance compared different soil and root treatments to improve the survival of pinaster pine planted on previously cropped or grazed land. The co-operative agroforestry trial with the Department of Agriculture in the Donnybrook Sunkland examined both timber production and grazing capacity. Assessment continued of the pines and eucalypts planted to control salinity on former farmland in the Collie river catchment bought by the Public Works Department. Involvement in agroforestry trials at Mundaring continued, in conjunction with CSIRO Division of Animal Production. The findings of the trials have formed the basis for an economic evaluation of agroforestry. There was greater involvement in advisory work brought about by increased interest in agroforestry by farmers and Shire representatives.

Manjimup

Fire behaviour data for the jarrah forest, gathered during Project Aquarius with CSIRO last year, is being analysed. At this stage, it appears that existing models used for prescribed burning, which are very effective in predicting the behaviour of mild prescribed burns, do not adequately describe the build-up, spread, and coalescence of massed fires burning under dry fuel conditions. Improved models to account for this, and for the behaviour of fires in fuel types which only burn in summer, are being developed.

The joint study has shown that low intensity prescribed burns are difficult to use safely during dry summer conditions. Slight changes in weather may cause pronounced changes in fire activity, and fire managers require more accurate weather forecasts to make management effective in these conditions. However, fuel removal and good legume regeneration without damaging trees was achieved by burning under calm night-time conditions in summer.



Investigations into prescribed burning of young karri regrowth continued, and several test fires were conducted on small areas. Considerable variation in the flammability of the fuels in different stands has been found. This variation is primarily related to the nature of the scrub understorey, and the development of the young karri. A comprehensive study of the fuels in a range of stands is being undertaken to determine how fuel types vary with age and site factors. Daily fuel moisture sampling during the summer confirmed that litter under young regrowth stands was slower to dry than that under mature karri or jarrah forest. Altogether, major progress has been made towards the development of a prescribed burning schedule for young karri regrowth.

The first phase of defining the relationship between site and vegetation in the southern jarrah forest was completed. These data will now be collated to achieve a preliminary site classification before further field work is done. The chief emphasis is on the silvicultural characteristics of the various site-vegetation types.

Infestations of the Gum Leaf Skeletoniser insect were monitored, and forest areas affected were mapped. The affected areas were similar to those recorded last year, except at north Walpole, where the insect has become more widespread, and now infestations extend as far as Lake Muir.

A large trial was initiated in high quality 12-year-old regeneration to test the response of young karri stands to various levels of thinning, subsequent fertilizer application, and coppice control. The purpose of the trial is to confirm and quantify gains in the growth of the crop trees produced by these treatments.

The first seed orchards to be situated on the wet winter, dry summer sites conducive to heavy seed production have been planted, and trial seed production areas have been established on a range of sites from the Donnybrook Sunklands to a rehabilitated bauxite pit near Dwellingup.

Two long-term studies aimed at determining the effect of forest operations on bird communities in the jarrah and karri forest are continuing. Study sites in both areas contain a high proportion of resident species. Results to date indicate that prior to operations, total numbers are higher and diversity lower in the karri forest sites than the jarrah forest sites.

Mardos (marsupial mice) were found to use nest boxes in 16-year-old karri forest for breeding between September and January. Boxes are used again during the dispersal phase of the young during March and April, but little use of the boxes is found during winter. Nest boxes have rarely been used to date in older or younger karri forest.

Relationships between fauna, vegetation, landscape, and fire are being studied to enable the production of management plans for individual flora, fauna, and landscape Management Priority Areas.

Data Processing

New data communications equipment was installed in Forests Department centres throughout the south-west of the State, allowing faster access to the Department's computer, and alternative access to the computer at the W.A. Regional Computer Centre. The new data network provides for future expansion at a much lower cost than was previously possible.

Research access to the computer was greatly improved. The statistical programme package (SPSS) was purchased, and is now used for analysis of many research projects in the Department.

The development of a hardwood logging monitoring system was commenced during the year. This system will be used to plan and control operations, as well as for administration.

Forester Bill Tame checks progress during this season's planting operation in the Donnybrook Sunkland.



Renovations to the computer centre, which provide a more suitable site for the computer, were completed. Air-conditioning, detection equipment to protect the computer in case of an emergency, and a new room layout to improve the working conditions of the computer operators were incorporated. A seven day per week computer service was then provided for the weather forecasting and fire behaviour systems.

Staff shortages in the first part of the year curtailed the development of new computer systems. These problems were overcome with the creation of four new positions and the appointment of new staff.

Inventory and Planning

The Inventory and Planning branch is concerned with the preparation of management information and management plans, and with the collection of the data on which the plans are based. Economic data, and resource measurement data on the distribution of diseases, particularly dieback disease, all contribute to the development of management plans.

A four-year integrated hardwood logging plan and a one-year regeneration plan were prepared for the southern region. Logging plans for harvesting pine in four central region divisions were also completed.

A report was prepared: Future Timber Supplies for Western Australia; and a review of the State softwood plantation programme was undertaken. A submission was also prepared for the Commonwealth Grants Commission, which is currently reviewing tax sharing arrangements between the Commonwealth and the States.

Temporary staff, available through employment schemes funded by the Federal Government, have enabled the computer based Forest Management Information System (FMIS) to be developed in the northern and central regions. Data are being keyed-in to support management planning, and new methods for incorporating information on maps have been developed using computer graphics equipment.

Large scale, shadowless, aerial photographs for mapping jarrah dieback were taken, covering 41 800 hectares of forest. Ninety-four hours flying time, using departmental spotter aircraft, were also allocated to monitor logging operations and research trials. These photographs were also used to plan forest recreation area development.

During the year specialist staff used 70 mm film to interpret 43 000 ha of forest. These interpretations were checked in the field, and a variety of

maps were produced. They include: dieback free areas, hygiene areas, dieback impact areas, and distribution of the pathogenic wood fungus *Armillaria*. Interpreters also assisted divisional staff with identifying dieback infected areas and delineating the boundaries of the infection, as well as monitoring a logging trial.

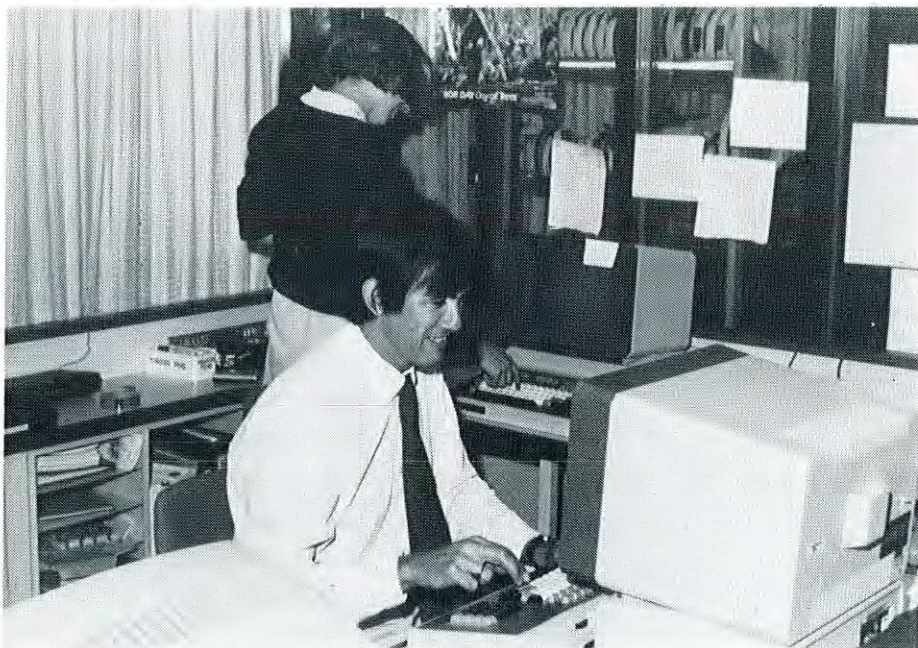
A detailed inventory of forest resources on a sample area of 1530 ha was carried out. From this estimates were then derived for 72 000 ha of hardwood forest. An additional 800 ha were assessed to provide estimates of the SEC pole resource in the central region.

Pine forest resource information was updated by the measurement of 724 permanent pine plots.

At Jarrahdale 80 permanent sample plots were established on rehabilitated minesites. Sample plots have now been established that cover 535 ha of mined and rehabilitated State forest. Dieback graveyard sites that require rehabilitation were also identified.

In the southern region, soil surveys on 50 private property locations were carried out to determine their suitability for growing pines. Ten thousand hectares of karri forest, which was selectively cut prior to 1965, was also mapped.

Glyn Courtice (facing) and Julie Anderson at work in the computer module at State Headquarters, Como.



Mapping

The revision of the Department's standard lithographs continued with the publishing of 2nd editions of AVON VALLEY, MUNDARING, JARRAHDAL, DWELLINGUP and TALLANALLA. These maps are now available with or without contours.

Project work is increasingly concerned with the provision of maps for tourism and recreation in the forest. Several recreation site plans were produced and a recreation map for the northern jarrah forest published.

In addition to mapping plantations and clearing for bauxite mining from aerial photographs, the photogrammetric section prepared dieback maps for eleven cells, and hygiene maps for four cells.

The topographical section produced twenty-one new 1:25 000 Australian Map Grid (AMG) maps and revised the special surveillance maps used by the spotter pilots.

Nineteen new tenure maps were prepared on transparent plastic base for use by State Headquarters and divisional offices. Twenty-four plans for aerial burning operations were supplied to the divisional offices together with eight co-ordination boards, three tower boards, and ten wall plans.

Nineteen relief models, based on the standard 1:25 000 AMG maps, were completed and supplied to the divisional offices for use as a management and planning tool.

Information Branch

This year heralded a major change in emphasis and direction for the Department's public contact support services with the formation of an Information branch.

Divided into two areas of responsibility: Education and Advisory Services; and Publicity and Information; the new branch has been established to streamline departmental community relations, and to co-ordinate information dissemination and publicity.

Education and Advisory Services

Education and Advisory services is now responsible for extension work; environmental education and liaison with schools; recreation planning and liaison with interested groups; and arboreta establishment and maintenance.

The urban and rural advisory service offered by the Department continues to be well patronized.

Rural advisory officers gave talks at seminars and tree-planting workshops throughout the State. In the wheatbelt, field days on the subject of tree establishment and maintenance were organized and conducted with Department of Agriculture officers.

Advisory officers continued to extend their contact with farmers wishing to plant trees by delivering trees on order to many farms personally.

Direct drilling tree-seed, as a cheaper alternative to planting seedlings, gained rapidly in popularity, and this subject generated a significant number of rural enquiries.

Demonstrations of the uses of trees on farms were expanded this year, with particular emphasis on tree windbreaks and tree fodder crops.

Among tree fodder crops, tree lucerne, or tagasaste appeared the most promising species, being both highly palatable and easily digestible by stock. Systems of managing tree lucerne crops were investigated, and a number of promising leads established.

Officers in the Pilbara and Kimberley provided a comprehensive advisory service for householders, communities, local government, and mining companies.

A significant extension of the rural advisory service took place on 30 May, 1984 when a full-time departmental advisory officer was posted to Esperance.

Over 90 requests were received for information and advice on the establishment and management of privately-owned plantations in the south-west and south-coastal regions. Although radiata pine remained the most popular species, there was a marked increase in interest in eucalypt plantations. Site inspections were made, when necessary, to satisfy enquiries. In many cases private proposals for radiata plantations were for totally unsuitable sites, and other species were recommended.

Arboreta

Routine maintenance and inspection was made on the 68 Departmental arboreta in the wheatbelt and goldfields.

Further plantings were carried out at Grasspatch in an arboretum established jointly with the local community.

A guide to the extensive Helm's Arboretum, near Esperance, was published. This will aid local farmers who wish to see the performance of trees at first hand.

Karratha arboretum, which had been without sufficient rain since March, 1982, received four significant falls in the first four months of 1984. The water harvesting banks, constructed to collect water around planted trees, proved most effective. A rainfall of only 19 mm yielded over 100 mm of water in the collection area. The design of these banks is based on the Limanim System, used extensively in Israel.

Also at Karratha, a provenance trial of the salt-tolerant river redgum was established near the Public Works Department sewage treatment site. These trees are being irrigated with effluent.

Arboreta at Broome and Kununurra were extended to include exotic, timber-producing tree species from monsoonal areas of Asia, and a species of tropical walnut (*Juglans neotropica*) from Ecuador.

Geoff Wheeler has been working on terrain models of the Northern Jarrah Forest Reserve. The coloured relief models (1:25,000) are highly valued as a management tool.





Kerry Mather, a youth education officer with the Department of Education, is taught the art of ascending a rope at an expedition skills training camp conducted by the Forests Department.



Education

Public interest in forests and forest management during the year was reflected in the large number of requests from community groups for talks, tours, and other presentations of information.

This year plans were prepared for upgrading the field study centres at Mundaring and Jarrahdale to demonstrate forest management and its effects on the forest. Courses in ecological study methods were started at the new Perup field study centre near Manjimup. Course participants included school teachers and National Parks rangers.

A lease was secured on the former Donnelly river school for its development as a forest education centre.

Liaison was developed with other education authorities. A 'forest-pack' of information on trees and forests was prepared jointly with the Curriculum Branch of the Education Department for use in primary schools. Museum staff were provided with departmental publications for inclusion in their forest ecology materials collection for loan to the public.

Departmental officers continued to act as leaders in the expedition skills courses run by the Education Department. The course participants: teachers and trainee teachers, are taught navigation, safety in the forest, planning forest recreation, and forest ecology.

Arbor Day celebrations took place on 8 June, 1984. Forests Department officers throughout the State visited schools to assist in Arbor Day projects, show films, and talk to children.

In an effort to further publicize Arbor Day, the Forests Department visited eleven primary schools around Perth to give away posters and seedlings. Many of the resulting photographs were used later by the community newspapers.

Greening Australia Campaign

The Department continued to actively support the Greening Australia Campaign. The Greening Australia (W.A.) Committee was chaired by the Assistant Conservator of Forests until May 1984, when a non-government chairman was appointed. The Department also provided a secretariat until May when the Committee received a federal employment scheme grant which permitted the employment of a State co-ordinator and a clerk/typist.

Two "tree people" continued to be employed part-time by the Committee for the promotion of tree conservation projects.

During the year \$21 000 was made available by the Federal Government, under the National Tree Programme, and was disbursed throughout the State in the form of grants for tree establishment and maintenance.

The Committee's activities during the year included the promotion of major tree projects in metropolitan and country areas, and the submission of three country projects as contenders for the Australian Broadcasting Corporation (ABC) Tree Care Awards.

Publicity and Information

This branch is now responsible for all Departmental publications, exhibition and show displays, media liaison, and publicity needs.

Publications

In addition to traditional areas of involvement, publications adopted a wider set of responsibilities which reflect the purposes and concerns of the new branch.

The launch of *Bush Telegraph*, a bi-monthly newsletter and forum for discussion for all employees of the Department, marked a significant advance in intra-departmental communication.

Writing services were provided for Education and Advisory Services, to assist in producing published support material for recreation development. The project culminated in the production and extensive distribution of the first *Recreation Directory* for State forest areas, describing recreation opportunities that currently exist in the forest areas near the Murray valley, Dwellingup, and Harvey.

A course in writing skills and technical writing was conducted for Manjimup Research branch.

A new spectrum of brochures, aimed at providing information on Departmental activities and concerns to the public in an attractive, easy-to-read format was also commenced with the production of the first in a fauna, and a native trees series.

Research publications included seven Research Papers and four Technical Papers.

Only one issue of *Forest Focus* appeared this year, in line with Government policy on the reduction of expenditure on glossy, high-cost publications.

Appendix 6 provides a complete list of Departmental publications produced this year, as well as those articles prepared by Departmental officers for publication in external journals.

Publicity

Displays were prepared and presented at nine country shows, as well as the Perth Royal Show and Perth Garden Week.

In the north-west considerable effort was made to publicize services provided by the Forests Department. Displays were mounted at the Cossack Festival and the Pannawonica Show. A water conservation seminar for Dampier residents was well attended. In the Kimberley displays were mounted at Kununurra, Halls Creek, Derby and Broome.

Media Liaison

An entirely new area of communication for the Department has been the development of officers responsible for liaison with the news media.

Eugene Herbert (landscape architect) and Maxine Copeman (recreational planner) examine the new map and directory for the Northern Jarrah forest reserve near Dwellingup.



Organized on a regional basis, the officers encourage regular media contact, and assist with the flow of up-to-date information on forest management.

Library

The library continued to acquire and circulate books, pamphlets and periodicals to officers of the Department, and acted as a reference centre for members of the public seeking information on forestry.

An increase in the number of requests for items not held in the library meant a greater reliance on

inter-library loans, and is a reflection of an increasing diversity in reader interests.

Engineering

This branch provides engineering services appropriate to Departmental needs.

Regional workshops are located at Manjimup, Collie, and Gwangara where major plant repair, development, and fabrication of special equipment is carried out for forest operations. There are 15 tradesmen and 8 apprentices employed in these centres.

To support regional workshops, 11 maintenance workshops are located at: Yanchep, Walpole, Nannup, Pemberton, Harvey, Jarrahdale, Grimwade, Dwellingup, Mundaring, Margaret River, and Ludlow. Nineteen tradesmen and 10 apprentices are employed in these facilities.

Apprentice training schools were run during the year.

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 radio communications network, including the establishment and maintenance of repeater stations, fixed radio stations, and mobile radios in aircraft and vehicles.

A new repeater site was selected on the Whicher range, and developed in co-operation with the Busselton division. Six other repeater stations were provided with upgraded antennae and solar battery charging systems.

Two Very High Frequency (VHF) radios, and an intercommunication system for aircrew were installed in the twin-engine aircraft used for aerial prescribed burning and dieback photography. The nine Piper Cub fire-spotting aircraft had their radio systems modified to enable the pilot to listen to both Forests Department and Department of Aviation information.

As part of an improvement in mobile radio communications, radios in the Pemberton and Manjimup divisions were replaced. Three other divisions had their radios modified to allow direct vehicle-to-vehicle communication.

A total of 447 vehicle radio installations were checked and serviced in the field, and 124 vehicles were wired for VHF radio.

A subsection of the Radio Communications branch was created by the transfer of one Assistant Forester (Tech.) to Manjimup to service the southern forest area. This position was established to provide radio repairs and assistance during emergencies such as large fires.



Greater awareness of the need to improve the Department's public image has seen an increase in media interest in the day to day work of the Forests Department.

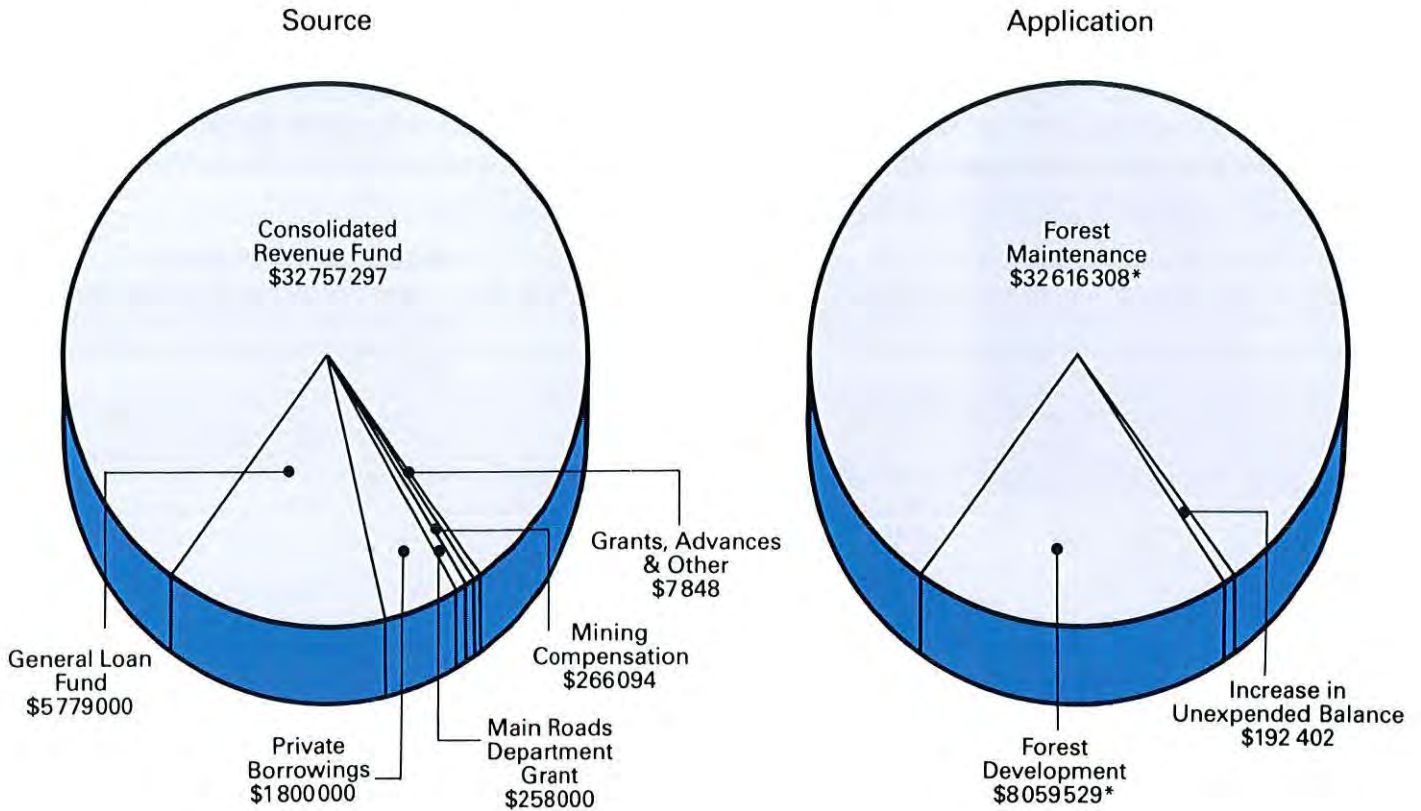


A senior pilot at Manjimup Greg Simpson prepares his Super Piper Cub for another aerial patrol of the forests.

10 ADMINISTRATION

FINANCE

Total Finance 1983/84 : \$40868239



* Note: Application of Funds figures for Forest Maintenance and Forest Development have been proportionately adjusted to account for the credit of \$163 159 in Plant Hire Recoveries during 1983/84, which is carried forward as part of the Forestry Fund Opening Balance for 1984/85.

Finance

All Territorial and Department 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

Public Service Act

Mr G.J. Coffey Manager Computer Branch seconded to Crown Law Department.
 Mr T.J. Morgan appointed Data Processing Manager.
 Mr G.W. Heberle promoted to Inspector.
 Mr J.W. Kaye seconded to Department of Premier and Cabinet.
 Mr F.J. Campbell Acting Deputy Conservator, was seconded for two months to be Acting Commissioner of the Public Service Board.
 Mr N.G. Ashcroft seconded to the Public Service Board.
 Mr L.D. Cooper promoted to Computer Systems Officer.
 Messrs P.D. Stirling, P.A. Beatty, C.J. Schuster, J.D. Clarke, and C. Muller were reclassified as Senior Divisional Forest Officers.

Forests Act

Retirements
 Mr W.G. Brennan.
 Mr R.D. Nightingale.

Promotions

Mr M.F. Deadman to District Forester.
 Mr A. Rynasewycz to District Forester.
 Mr K.J. White to District Forester.
 Mr A.J. Brandis to District Forester.
 Mr B.M. Beer to Senior Forester.
 Mr D.J. Donnelly to Senior Forester.
 Mr J.C. Gilchrist to Regional Forester.

Training

Field Cadets

Twelve cadets commenced the first year of their training at the Bunbury Technical College in February 1984. A further twelve cadets successfully completed their first year, and commenced the final year of the course in January.

Twelve field cadets also graduated in December 1983, and a graduation ceremony was held on May 4th, 1984 at the Department's Regional Office in Bunbury. Mr David Smith, the MLA for Mitchell, presented the certificates and prizes on behalf of the Minister Assisting the Minister for Forests, Mr H.D. Evans.

The Keynes Memorial Prize for the best student on the course was won by Miss Kylie Kau. The Conservator's Prize for runner-up was won by Mr Timothy Foley.

Professional Cadets

One cadet, Robert Germantse, commenced duty following graduation from the Australian National University.

Currently nine cadets are studying at the Australian National University, and one at Melbourne University.



Forest Ranger Kylie Kau was presented with the Keynes Memorial Prize by Acting Conservator Pat McNamara. Kylie was the first woman to complete the course (1982-84), and showed the greatest merit.



While employed under the CEP scheme Karen Bell organized the Department's photographic Library.

General Training

During the year most staff and employees received training in areas relevant to Forest Management. Some of the courses arranged included: Safety; Use of Chemicals; Chainsaw and Falling Operations; Use of Explosives; Management Courses; Courses on Computers; Letter Writing; Fire Management; Silviculture; Recreation; and Ecology.

The annual staff promotional examinations were held in August 1983 and 45 candidates were successful.

Conferences, Study Tours and Awards

Twenty-four officers attended interstate and overseas conferences or courses covering a wide range of subjects including pine logging in New Zealand, forest safety in Finland, various research working groups in a number of States, Farm Tree Conference NSW, and the International Savannah Symposium in Queensland.

Employment in Forestry and Forest-Based Industries

The number of salary and wage earners employed in forestry, or in forest-based industries was estimated at 6288 people, made up as follows:

Forestry	
Administration.....	4
Professional Officers.....	100
General Field Staff.....	355
Clerical & Drafting.....	110
Professional Cadets.....	10
Field Cadets.....	12
Full Time Wages Employees.....	490
*Contract Personnel (est.).....	150
	<hr/>
	1 231
Forestry	
† Sawmilling employees, including bush workers.....	1 764
‡ Other wood reprocessing industries (est.).....	3 000
Firewood, mining timber, and pole cutters working under licenses (est.).....	55
Sandalwood workers.....	60
Apiarists est. (2220 sites registered).....	178
	<hr/>
	5 057
Total	<hr/>
	6 288

* 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

New housing for staff was provided at Kirup and Jarrahdale, and offices at Dwellingup, Manjimup and Narrogin were extended.

Minor improvements to staff housing were undertaken at Jarrahdale and Nannup.

Forest Offences

Twenty-four breaches of the Forest Disease Regulations, under the Forests Act, were reported. In three cases offenders were prosecuted, and fines amounting to \$310.00 were imposed.

Eighteen other breaches of the Forests Act and Regulations were reported. Two cases involved the unauthorised use of firearms on State forest, and legal proceedings were instituted. In one case the offender was prosecuted and fined \$50.00. The second has not yet been brought before the Court.

There were also seven cases involving the illegal removal of forest produce, for which royalty amounting to \$1017.17 was recovered.

Warnings were issued to all other offenders.

Timber Industry Regulation Act, 1926-1969

A total of 135 mills was registered under the provisions of the Act at 31 December 1983: 63 mills on Crown land, and 72 mills on private property.

The average number of persons employed in the timber mills each month throughout the year was 1764. The 1982/83 figure was 1760.

The District and Workmen's Inspectors made 1036 mill inspections and 913 bush inspections.

There were 89 notifiable accidents during the year. Three 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 5.05. The 1982/83 figure was 5.57. This is equivalent to a frequency rate of approximately 27. (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	67 411
Travel allowances, plant costs and sundries	19 460
TOTAL	86 871

Safety, Health and Welfare

The conclusion of the 1983/84 year marked 18 years of a sustained accident prevention programme in the Forests Department. During these years there has been a steady reduction in the accident rate.

The number of lost time accidents increased this year to 43 compared with 27 the previous year. There was a corresponding increase in the accident frequency rate from 14 to 20

A major contributory cause of the increase was the large number of people unskilled in forestry work employed as a result of job creation programmes. The accidents occurred despite special safety schools for most employees.

The figures again indicate that safety awareness must be reinforced by an ongoing training programme which may only consistently achieve the desired results after an extensive period of time.

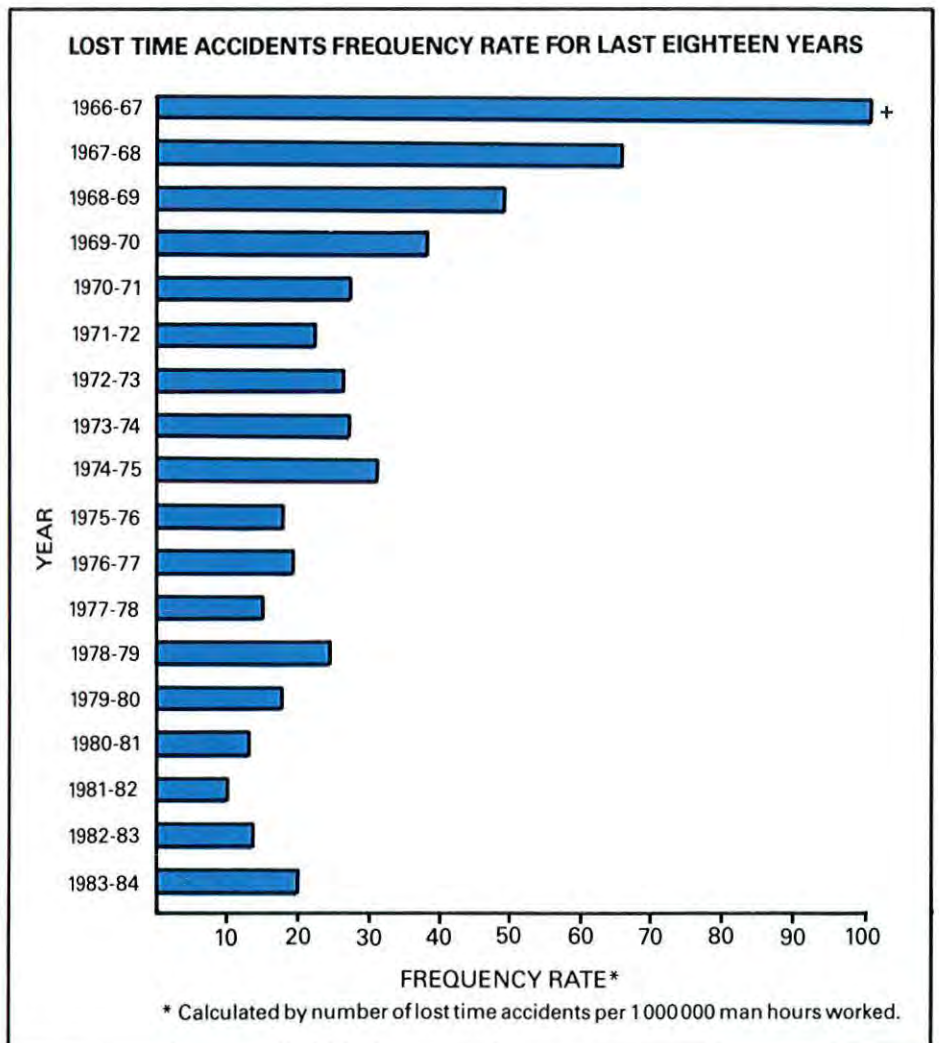
Thirty-five per cent of all lost time accidents were caused by the natural environment, e.g. insects, dense undergrowth, uneven ground, etc. There was a significant decrease in accidents resulting in back injuries; these fell from 41 per cent the previous year to 23 per cent this year.

The Jarrahdale, Narrogin, Kirup, Pemberton, Busselton, Kalgoorlie, Karratha, and Walpole divisions, together with the Bunbury regional staff and a number of sections at State Headquarters all achieved a twelve month accident free period. The personnel of the Manjimup regional workshop have worked for 10 years without a lost time accident.

Five general safety training schools, lasting two days each, were

conducted for 88 personnel. Nominated staff attended specialist courses in noise abatement, shotfiring, first aid, manual handling, chainsaw operation and tree felling. Twenty-two officers from all divisions involved in the use of chemicals attended a three-day course on herbicide and insecticide operations, which was especially arranged with and conducted by the Technical Education Division of the Education Department. Seventeen spotter aircraft pilots attended a special induction course before the start of the fire season.

Two employees were nominated for the Tortoise Club, and one for the Intactoes Club. These clubs, conducted under the auspices of the National Safety Council of Australia, accept for membership workers who



have been saved from serious injury or death by wearing personal protective equipment, e.g. safety helmets and safety footwear.

During the year the Department's chemicals committee met a number of times to deal with matters related to the usage of various herbicides, insecticides, and other chemicals in forest operations. Following a direction from the Premier the Departmental Safety Officer was appointed as the "designated officer" responsible for the handling of all chemicals in the Forests Department. In turn, a Chemicals Officer has been appointed to each division to supervise these activities at a local level.

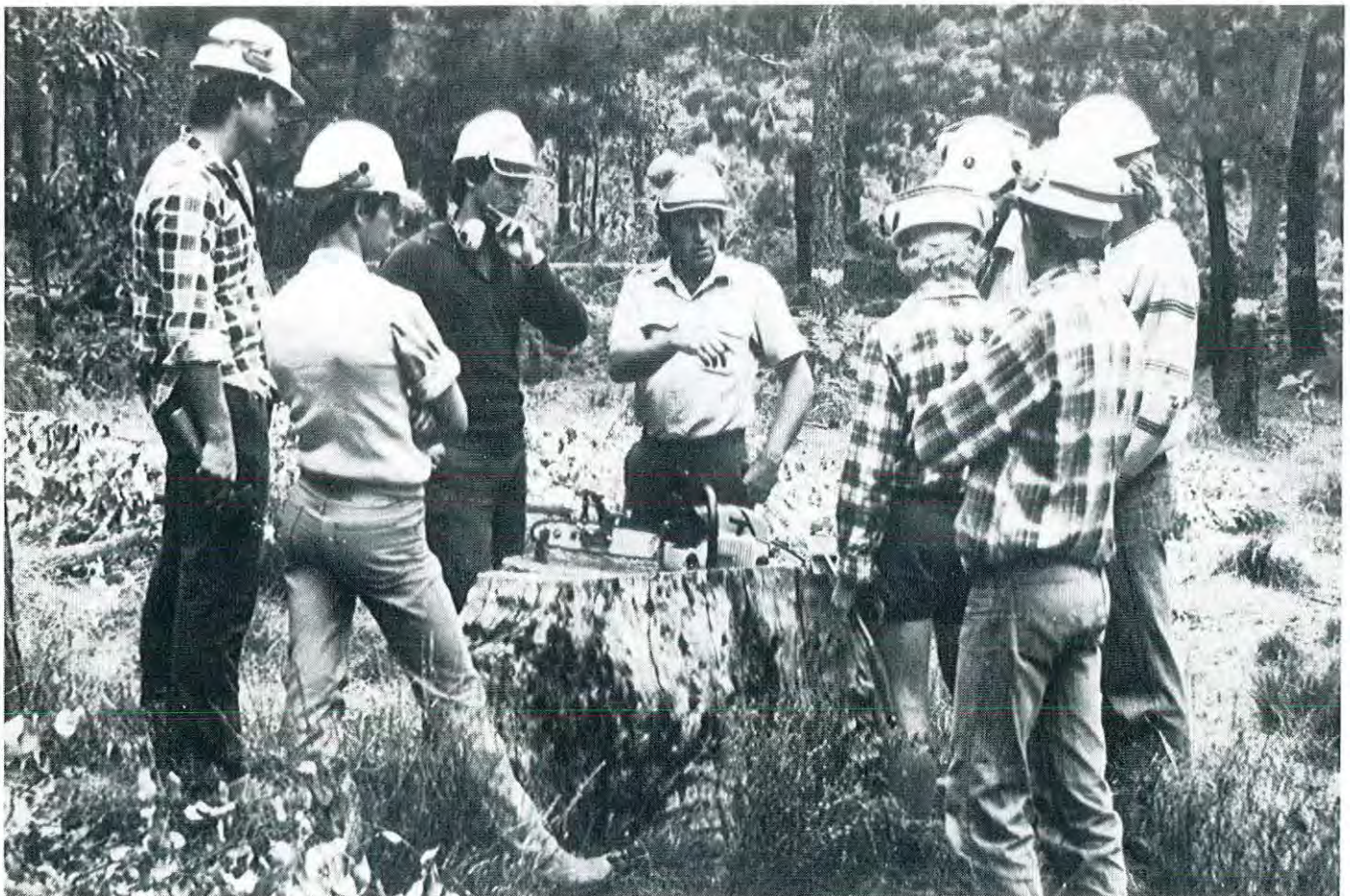
With the introduction of the Noise Abatement (Hearing Conservation in Workplaces) Regulations 1983, action to implement this legislation was commenced. A co-ordinator and a Noise Officer have been appointed, and noise surveys on all departmental workshops, sawmills, mobile machinery, power tools, and other noisy workplaces have been initiated to designate and record all noise hazards, and to determine appropriate counteraction.

Safety personnel from the South Australian and Tasmanian forest and timber industries visited the Forests Department during this year to familiarize themselves with the Forests Department's safety programme.



Safety Officer Tom Wood conducts a test of noise levels during chainsaw use.

Assistant Forester Paul Marsh (centre, facing) was in charge of chainsaw instruction for Second Year Forest Cadets at Dwellingup.



11 APPENDICES

APPENDIX 1(a)

Statement of Revenue Paid into Consolidated Revenue Fund for the year ended 30th June 1984

1982-83		1983-84
\$		\$
6 955 846	ROYALTIES	7 686 289
1 361 848	Logs	1 207 063
15 430	Chip Logs	18 352
437 975	Sleepers	573 178
32 797	Poles and Piles	26 441
8 067	Mining Timber	6 700
37 523	Firewood	37 233
65 348	Posts	74 355
131 413	Sandalwood	77 603
	Miscellaneous	
<u>9 046 247</u>		<u>9 707 214</u>
	PINE CONVERSION	
2 427 789	Pine Logs	3 147 013
81 697	Sawn Pine	149 921
<u>2 509 486</u>		<u>3 296 934</u>
	HARDWOOD CONVERSION	
3 597	Sawn Hardwood	—
286 872	Logs	556 595
23	Posts and Other	—
<u>290 492</u>		<u>556 595</u>
	OTHER SALES AND FEES	
384 188	Seeds and Trees	495 435
91 308	Inspection Fees	138 336
116 260	Rents and Leases	104 666
1 395 456	Miscellaneous	1 669 683
<u>1 987 212</u>		<u>2 408 120</u>
	RECOUPABLE PROJECTS	
1 106 158	Miscellaneous	976 473
	COMMONWEALTH RECOUPS	
30 648	Aboriginal Advancement Programme	16 907
89 732	Special Employment Relief Programme	2 403 849
—	Community Employment Programme	273 732
<u>120 380</u>		<u>2 694 488</u>
<u>15 059 975</u>		<u>19 639 824</u>

APPENDIX 1(b)

Forestry Fund Account for the year ended 30th June 1984

1982-83		1983-84
\$		\$
1 689 584	EXPENDITURE	1 731 798
4 067 864	Hardwood Forests — Establishment and Tending	4 247 760
366 759	Softwood Forests — Establishment and Tending	435 340
9 814	Access Road Construction	638 792
	Land Purchase	

1982-83				1983-84
\$		EXPENDITURE		\$
474 003		Plant and Equipment		493 904
584 216		Housing and Buildings		543 501
2 129		Sawmilling and Seasoning Plant		762
—		Plant Workshop		—163 158
3 494 116		Forest Protection		3 670 613
533 786		Access Road Maintenance		678 701
2 307 789		Research and Other Services		2 698 893
1 892 953		Commercial Operations		2 575 351
276 111		Trade Operations		313 837
1 325 346		Recoupable Projects		3 601 064
	12 005 119	Salaries	13 215 524	
10 905 119	1 100 000	Less Charged to Development	1 261 000	11 954 524
	7 331 108	Administration Expenses	8 067 314	
6 631 108	700 000	Less Charged to Development	803 000	7 264 314
—299 494		Cash Order Balance		—10 159
<u>34 261 203</u>				<u>40 675 837</u>
		SOURCE OF REVENUE		
123 894		Balance Brought Forward		844 601
266 800		Main Roads Department Grant		258 000
150 004		Commonwealth Softwood Agreement		—
292 460		Mining Compensation		266 094
27 366 328		C.R.F. Contribution		32 757 297
5 400 000		General Loan Fund		5 779 000
1 500 000		Private Borrowings		1 800 000
6 318		Sundry Revenue		7 848
<u>35 105 804</u>				<u>41 712 840</u>
844 601		Less Balance Carried Forward		1 037 003
<u>34 261 203</u>				<u>40 675 837</u>

APPENDIX 2(a)

EXPORTS FROM WESTERN AUSTRALIA OF TIMBER, TIMBER PRODUCTS AND ESSENTIAL OILS FOR THE YEAR ENDED 30th JUNE 1983

INTERSTATE

DESCRIPTION OF ITEMS	QUANTITY m ³	VALUE \$
Jarrah timber, sawn lengthwise, sliced or peeled, but not further prepared, of a thickness exceeding 5 mm	13 385	1 614 334
Karri timber, sawn lengthwise, sliced or peeled but not further prepared, of a thickness exceeding 5 mm	10 849	1 868 260
Cork and wood, n.e.i.	6 754	1 286 992
n.e.i. — not elsewhere included		

OVERSEAS

DESCRIPTION OF ITEMS AND COUNTRIES OF DESTINATION	m ³	
1. Wood in the rough or roughly squared	—	—
2. Sleepers	m ³	
Hong Kong	88	27 544
United Kingdom	11 022	2 906 060
TOTAL	11 110	2 933 604

ITEM AND DESTINATION	QUANTITY m ³	VALUE \$
3. Wood, planed, tongued, grooved, rebated, chamfered, v-jointed, centre v-jointed, headed, centre-headed or the like, but not further manufactured		
Conifer	—	—
Non-conifer		
Christmas Island	1	320
Cocos Islands	2	1 422
United Kingdom	57	18 134
TOTAL	60	19 876
4. Wood, sawn lengthwise, sliced or peeled but not further prepared of a thickness exceeding 5 mm		
Conifer	—	—
Non-conifer		
Jarrah		
Bahrain	108	35 946
Christmas Islands	18	600
Cocos Islands	99	38 052
Namibia	1	520
Netherlands	10	2 419
New Zealand	127	49 197
Singapore, Republic of	7	1 507
South Africa, Republic of	12	4 337
United Kingdom	361	133 651
United States of America	51	27 049
TOTAL	794	293 278
Karri		
Belgium-Luxembourg	1 023	226 631
Canada	111	53 219
Cocos Islands	2	284
Germany, Federal Republic of	270	82 303
New Zealand	228	66 701
South Africa, Republic of	745	222 878
United Kingdom	2 828	767 887
United States of America	331	143 066
TOTAL	5 537	1 562 969
Other		
Christmas Island	51	1 735
Cocos Islands	3	1 893
TOTAL	54	3 628
5. Wood sawn lengthwise, sliced or peeled but not further prepared, of a thickness not exceeding 5 mm; veneer sheets and sheets for plywood, of a thickness not exceeding 5 mm		
	m ²	
Christmas Island	360	1 810
Hong Kong	72	670
TOTAL	432	2 480
6. Plywood consisting solely of sheets of wood		
	m ²	
Christmas Island	531	1 429
Cocos Islands	289	2 455
Ships Stores	239	6 782
TOTAL	1 059	10 666
7. 'Improved' wood, in sheets, blocks or the like		
Ships Stores	—	287
TOTAL	—	287

ITEM AND DESTINATION	QUANTITY	VALUE
8. Wood-based panels, n.e.i.	m ²	\$
Blockboard, laminboard, battenboard and similar laminated wood products (including veneered panels and sheets)		
Christmas Island	2 000	1 419
TOTAL	2 000	1 419
Cellular wood panels, whether or not faced with base metal		
Christmas Island	1 500	2 640
TOTAL	1500	2 640
9. Wood, simply shaped, n.e.i.		
Hoopwood, split poles; piles; pickets and stakes of wood, pointed but not sawn lengthwise; chipwood; drawn wood; wood shavings of a kind suitable for use in the manufacture of vinegar or for the clarification of liquids; wooden sticks, roughly trimmed but not turned, bent nor otherwise worked, suitable for the manufacture of walking sticks, umbrella handles, tool handles or the like		
Christmas Island	—	619
Ships Stores	—	425
TOTAL	—	1 044
Wooden beadings and mouldings (including moulded skirting and other moulded boards)		
Christmas Island	—	2 752
TOTAL	—	2 752
10. Wood manufactures, n.e.i.		
Casks, barrels, vats, tubs, buckets and other coopers' products and parts thereof, of wood (including staves)	m ²	
Christmas Island	—	927
TOTAL	—	927
Builders' carpentry and joinery (including prefabricated and sectional buildings and assembled parquet flooring panels)		
Prefabricated buildings and fittings forming part thereof		
Bahrain	—	23 852
Christmas Island	—	3 776
United Arab Emirates	—	447
TOTAL	—	28 075
Doors	No.	
Bahrain	370	29 620
Cocos Islands	39	12 123
TOTAL	409	41 743
Other		
Christmas Island	—	2 233
TOTAL	—	2 233
Manufacturers of wood for domestic or decorative use (excluding furniture)		
Christmas Island	—	2 870
United Kingdom	—	500
United States of America	—	1 150
TOTAL	—	4 520

ITEM AND DESCRIPTION	QUANTITY	VALUE \$
Manufactured articles of wood, n.e.i.		
Bahrain	—	926
Christmas Island	—	1 804
Cocos Islands	—	8 315
United Kingdom	—	4 517
Ships Stores	—	3 220
TOTAL	—	18 782
11. Wood furniture, not elsewhere specified		
Bahrain	—	30 649
Christmas Island	—	721
Cocos Islands	—	2 000
Germany, Federal Republic of	—	10 000
Hong Kong	—	17 992
Malaysia	—	1 533
New Zealand	—	94 543
Saudi Arabia	—	42 995
Singapore, Republic of	—	9 996
Western Samoa	—	17 550
TOTAL	—	227 979
12. Matches, wood, in boxes (excluding Bengal matches)	,000	
Christmas Island	251 500	2 330
TOTAL	251 500	2 330
13. Essential oils, (terpeneless or not), concretes and absolutes; resinoids	kg	
Ships stores	120	300
TOTAL	120	300

APPENDIX 2(b)

IMPORTS INTO WESTERN AUSTRALIA OF TIMBER, TIMBER PRODUCTS, TANNING SUBSTANCES AND ESSENTIAL OILS FOR THE YEAR ENDED 30th JUNE 1983

INTERSTATE

DESCRIPTION OF ITEMS	QUANTITY	VALUE \$
Cork and wood	13 081 m ³	3 964 118
Plywood, consisting solely of sheets of wood (including core)	—	757 767
Reconstituted and 'improved' wood (e.g. particleboard, chipboard, etc.) in sheets, blocks or the like	858 255 m ²	3 595 512
Other wood, worked, n.e.i. (including wood-based panels, veneers, wood wool, wood-flour, wooden beadings and mouldings etc.)	—	1 164 528
Wooden doors, whether or not incorporating locks, hinges, or similar fittings	—	936 646
Other wood manufactures, n.e.i. (including tool handles, brush and broom handles and the like, assembled parquet, flooring panels, boxes, picture frames, travel goods, clothes pegs, match splints, etc., excluding furniture)	—	2 169 789
TOTAL		12 588 360

n.e.i. — not elsewhere included

OVERSEAS

DESCRIPTION OF ITEMS AND COUNTRIES OF ORIGIN	QUANTITY m ³	VALUE \$
1. Wood in the rough or roughly squared Sawlogs, veneer logs in the rough, whether or not stripped of their bark or merely roughed down — of non-coniferous species		
Malaysia	45	328
TOTAL	45	328
Sawlogs and veneer logs, roughly squared or half squared, but not further manufactured — of non-coniferous species		
United Kingdom	1	120
TOTAL	1	120
Pitprops, poles, piling posts and other wood in the rough, n.e.s. — non-conifer		
Malaysia	4	988
TOTAL	4	988
n.e.s. — not elsewhere specified		
2. Wood of coniferous species, sawn lengthwise, sliced or peeled, but not further prepared, of a thickness exceeding 5 mm		
Douglas fir		
United States of America	1 298	283 085
TOTAL	1 298	283 085
Radiata pine		
New Zealand	44	7 373
TOTAL	44	7 373
Western red cedar		
Canada	136	58 857
United States of America	222	52 619
TOTAL	358	111 477
Other		
United States of America	116	49 790
TOTAL	116	49 790
3. Wood of coniferous species (including blocks, strips and friezes for parquet or wood block flooring, not assembled, planed, tongued, grooved, rebated, chamfered, v-jointed, centre v-jointed, beaded, centre-beaded or the like, but not further manufactured		
Radiata pine		
Germany, Federal Republic of	21	2 828
New Zealand	54	11 661
TOTAL	75	14 489
Douglas fir		
United States of America	339	58 872
TOTAL	339	58 872

ITEM AND ORIGIN	QUANTITY m ³	VALUE \$
Other		
Germany, Federal Republic of	—	464
United States of America	668	131 772
TOTAL	668	132 236
4. Wood of non-coniferous species, sawn lengthwise sliced or peeled, but not further prepared, of a thickness exceeding 5 mm		
Cut to size for making staves; dunnage		
Malaysia	—	1 991
TOTAL	—	1 991
Meranti		
Malaysia	2 504	584 691
Singapore, Republic of	44	12 428
TOTAL	2 548	597 119
Rammin		
Indonesia	39	10 969
Malaysia	467	143 492
Singapore, Republic of	513	163 310
TOTAL	1 019	317 771
Teak		
Burma, Socialist Republic	24	32 933
Singapore, Republic of	9	13 238
TOTAL	33	46 171
Kapur		
Malaysia	4 023	677 290
TOTAL	4 023	677 290
Keruing		
Malaysia	343	31 487
TOTAL	343	31 487
Merbau		
Malaysia	161	27 231
TOTAL	161	27 231
Nyatoh		
Indonesia	291	58 423
Malaysia	5 392	1 095 587
Singapore, Republic of	576	120 848
TOTAL	6 258	1 274 858
Other		
Indonesia	70	21 601
Malaysia	1 410	237 009
Philippines	—	12
Singapore, Republic of	14	3 657
United Kingdom	—	124
United States of America	43	7 634
TOTAL	1 537	270 036

ITEM AND ORIGIN	QUANTITY m ³	VALUE \$
5. Wood of non-coniferous species (including blocks, strips and friezes for parquet or wood block flooring, not assembled), planed, tongued, grooved, rebated, chamfered, v-jointed, centre v-jointed, beaded, centre beaded or the like, but not further manufactured		
Meranti		
Malaysia	1 507	297 018
Singapore, Republic of	72	20 136
TOTAL	1 579	317 154
Other		
Canada	21	12 037
Ecuador	6	6 545
Malaysia	44	19 222
Singapore, Republic of	15	4 938
TOTAL	86	42 743
6. Veneers, plywood, 'improved' or reconstituted wood, and other wood, worked, n.e.s.		
Wood sawn lengthwise, sliced or peeled but not further prepared of a thickness not exceeding 5 mm; veneer sheets and sheets for plywood of a thickness not exceeding 5 mm		
Veneer	m ²	
Rotary, exceeding 1 mm in thickness		
Singapore, Republic of	16 012	10 147
TOTAL	16 012	10 147
Sliced		
Italy	9 238	11 133
Malaysia	28 119	30 719
Singapore, Republic of	119 803	411 963
South Africa, Republic of	185 840	161 323
Thailand	33 533	27 474
United States of America	11	181
TOTAL	456 545	642 792
Other than veneer		
Germany, Federal Republic of	12 798	15 370
Singapore, Republic of	9 039	15 844
TOTAL	21 837	31 214
Plywood consisting solely of sheets of wood, not exceeding 23 mm in thickness		
Door skin not exceeding 4 mm (including grooved and/or prefinished), interior glueline		
Rotary		
China-Taiwan Province only	362 818	166 572
Singapore	29 722	10 904
TOTAL	392 539	177 475
Sliced		
China-Taiwan Province only	172 184	121 780
Singapore, Republic of	8 138	8 761
TOTAL	180 323	130 541

ITEM AND ORIGIN	QUANTITY m ²	VALUE \$
Grooved, interior glueline		
China-Taiwan Province only	505 306	269 540
Indonesia	25 720	7 492
Papua New Guinea	9 329	21 108
Singapore, Republic of	170 758	77 314
TOTAL	711 113	375 454
Other, interior glueline		
Sliced		
China-Taiwan Province only	132 226	80 705
Papua New Guinea	107 209	68 358
Singapore, Republic of	21 351	7 249
United States of America	12	10
TOTAL	260 798	156 321
Other		
China-Taiwan Province only	334 291	178 957
Indonesia	75 900	23 193
Malaysia	176 216	55 899
Papua New Guinea	26 955	29 923
Singapore, Republic of	231 485	113 758
TOTAL	844 847	401 730
Exterior glueline		
New Zealand	395 543	161 768
Singapore, Republic of	74 649	24 534
United States of America	14 405	3 939
TOTAL	484 597	190 241
Exceeding 23 mm in thickness		
Germany, Federal Republic of	950	495
TOTAL	950	495
7. Blockboard, laminboard, battenboard and similar laminated wood products (including veneered panels and sheets)		
China-Taiwan Province only	5 413	35 188
France	8	25
Singapore, Republic of	1 516	6 811
TOTAL	6 938	42 023
8. Hoopwood; split poles; piles, pickets and stakes of wood, painted but not sawn lengthwise; chipwood; sawn wood; wood shavings of a kind suitable for use in the manufacture of vinegar or for the clarification of liquids; wooden sticks, roughly trimmed but not turned, bent or otherwise worked, suitable for the manufacture of walking sticks, umbrella handles, tool handles or the like		
Malaysia	—	13 172
Switzerland	—	24
United States of America	—	3 149
TOTAL	—	16 346

ITEM AND ORIGIN	QUANTITY m ²	VALUE \$
9. Wooden beadings and mouldings		
Canada	—	9 158
China-Taiwan Province only	—	15 956
France	—	645
Japan	—	8 557
Malaysia	—	13 099
New Zealand	—	1 030
South Africa, Republic of	—	2 133
United Kingdom	—	5 910
United States of America	—	301
TOTAL	—	56 789
10. Wood wool and wood flour	kg	
United Kingdom	712	75
TOTAL	712	75
11. Wooden packing cases, boxes, crates, drums and similar packings, complete		
France	—	6 720
United States of America	—	305
Australia — re-imported	—	10
TOTAL	—	7 035
12. Casks, barrels, vats, tubs, buckets and other cooper's products and parts thereof, of wood		
France	—	70 584
New Zealand	—	181
United Kingdom	—	220
TOTAL	—	70 985
13. Doors, not incorporating locks, hinges or similar fittings	No.	
China-Taiwan Province only	3 295	64 109
Hong Kong	2	720
India	1	127
Singapore, Republic of	3 990	38 063
TOTAL	7 288	103 019
14. Assembled parquet flooring panels		
Malaysia	335	2 983
Singapore, Republic of	465	5 277
United States of America	83	7 803
TOTAL	882	16 063
15. Builders' carpentry and joinery, n.e.i.		
China-Taiwan Province only	—	9 834
France	—	1 255
Hong Kong	—	870
Italy	—	5 624
Malaysia	—	2 079
New Zealand	—	11 548
Singapore, Republic of	—	9 647
Sweden	—	26
United States of America	—	10 179
TOTAL	—	51 062

ITEM AND ORIGIN	QUANTITY No.	VALUE \$
16. Wooden picture frames, photograph frames, mirror frames and the like		
China, excl. Taiwan Province	—	7 825
China-Taiwan Province only	—	1 333
Germany, Federal Republic of	—	8
Hong Kong	—	951
India	—	292
Italy	—	1 751
Japan	—	1 578
Malaysia	—	944
Philippines	—	1 184
Singapore, Republic of	—	168
Thailand	—	3 562
United Kingdom	—	13 439
TOTAL	—	33 035
17. Household utensils of wood		
China — excl. Taiwan Province	—	50 125
China-Taiwan Province only	—	38 857
Denmark	—	7 905
France	—	986
Germany, Federal Republic of	—	508
Hong Kong	—	1 661
Italy	—	3 634
Japan	—	32 356
Malaysia	—	72 677
New Zealand	—	101
Philippines	—	6 970
Singapore, Republic of	—	2 321
Thailand	—	405
United Kingdom	—	163
United States of America	—	163
TOTAL	—	218 833
18. Wooden figures of the type ordinarily used as ornaments in the household		
China — excl. Taiwan Province	—	108
China-Taiwan Province only	—	1 678
France	—	5
India	—	5 011
Indonesia	—	72
Japan	—	29
Korea, Republic of	—	170
New Zealand	—	424
Philippines	—	12 994
Singapore, Republic of	—	2 617
Thailand	—	760
Turkey	—	90
United Kingdom	—	10
United States of America	—	97
TOTAL	—	24 065

ITEM AND ORIGIN	QUANTITY No.	VALUE \$
19. Boxes, cases, caskets and similar containers, cases and similar receptacles for violins and other musical instruments; pen or pencil cases, of wood		
Canada	—	126
China — excl. Taiwan Province	—	457
China-Taiwan Province only	—	107 850
Germany, Federal Republic of	—	674
Hong Kong	—	104
India	—	3 900
Italy	—	1 187
Japan	—	2 268
Philippines	—	293
Spain	—	54
Sweden	—	94
Thailand	—	169
United Kingdom	—	287
United States of America	—	23
TOTAL	—	117 486
20. Standard lamps, table lamps and other light fittings of wood		
China-Taiwan Province only	—	19 338
Germany, Federal Republic of	—	33 992
India	—	1 027
Italy	—	3 454
New Zealand	—	7 556
Philippines	—	13 092
Thailand	—	68
United Kingdom	—	205
United States of America	—	417
TOTAL	—	79 148
21. Wooden trays, bowls	No.	
China-Taiwan Province only	481	2 030
India	2 180	1 324
Italy	60	257
Japan	6 302	29 054
Malaysia	391	3 645
Philippines	1 286	1 766
Singapore, Republic of	2	14
Sweden	3 860	12 399
Turkey	4	65
United Kingdom	9	217
United States of America	1	10
TOTAL	14 576	50 782
22. Wooden tools		
China-Taiwan Province only	—	3 709
France	—	54
Singapore, Republic of	—	250
United Kingdom	—	2 395
United States of America	—	112
TOTAL	—	6 521
23. Wooden handles		
China-Taiwan Province only	32 000	8 533
Germany, Federal Republic of	80	20
Japan	48	95
Malaysia	138 870	41 011
Singapore, Republic of	110	95
Thailand	1 356	484
United Kingdom	310	585
United States of America	3 900	7 618
TOTAL	176 674	58 442

ITEM AND ORIGIN	QUANTITY No.	VALUE \$
24. Broom and brush bodies and boot and shoe lasts and trees of wood		
United States of America	—	72
TOTAL	—	72
25. Spools, caps, bobbins, sewing thread reels and the like of turned wood		
New Zealand	—	249
TOTAL	—	249
26. Match splints; wooden pegs or pins for footwear		
Japan	—	416
TOTAL	—	416
27. Spring rollers for blinds, including parts, of wood		
Canada	—	4 578
China-Taiwan Province only	—	566
Germany, Federal Republic of	—	90
Japan	—	2 137
United Kingdom	—	19
TOTAL	—	7 391
28. Articles of wood, n.e.i.		
Belgium Luxembourg	—	1 122
Canada	—	45
China — excl. Taiwan Province	—	5 828
China-Taiwan Province only	—	186 111
Denmark	—	286
France	—	2 634
Germany, Federal Republic of	—	1 507
Hong Kong	—	10 202
India	—	3 642
Indonesia	—	1 896
Ireland	—	724
Italy	—	8 985
Japan	—	14 844
Korea, Republic of	—	3 761
Malaysia	—	21 367
Mauritius	—	1 374
Netherlands	—	749
New Zealand	—	8 620
Philippines	—	5 398
Portugal	—	53
Singapore, Republic of	—	1 916
Spain	—	5 545
Sweden	—	112
Switzerland	—	6 066
Thailand	—	2 124
United Kingdom	—	2 052
United States of America	—	113 659
Vietnam, Socialist Republic of	—	3 595
TOTAL	—	414 218

ITEM AND ORIGIN	QUANTITY No.	VALUE \$
29. Wood or wooden-framed chairs and other seats with seats or backs of any material		
Belgium-Luxembourg	3	105
Brazil	124	33 349
China — excl. Taiwan Province	182	1 314
China-Taiwan Province only	11 348	201 503
Denmark	34	2 302
Finland	137	7 101
France	10	1 578
Germany, Federal Republic of	82	6 706
Hong Kong	30	2 148
India	40	5 681
Italy	4 950	590 289
Japan	2	32
Malaysia	634	9 071
Netherlands	277	35 989
New Zealand	9 040	71 042
Norway	4	1 071
Philippines	470	5 785
Singapore, Republic of	11 505	228 748
Thailand	14	2 389
United Kingdom	1 151	142 402
United States of America	198	28 606
Yugoslavia	64	3 519
TOTAL	40 299	1 380 730

30. Furniture of wood, not elsewhere specified

Tables complete assembled or unassembled and table tops without legs

	No.	
Belgium-Luxembourg	4	604
Brazil	40	3 067
China — excl. Taiwan Province	25	300
China-Taiwan Province only	9 949	250 513
Denmark	27	914
Finland	17	2 304
Germany, Federal Republic of	10	2 225
Hong Kong	198	11 069
India	23	1 039
Italy	1 215	215 624
Malaysia	20	1 030
Netherlands	43	3 098
New Zealand	1	991
Philippines	298	4 155
Singapore, Republic of	1 876	115 673
Sweden	2	99
Thailand	48	2 656
United Kingdom	530	50 274
United States of America	615	41 153
TOTAL	14 941	706 789

Chests and boxes, carved

China — excl. Taiwan Province	38	2 199
China-Taiwan Province only	15	3 095
Hong Kong	127	21 292
India	4	1 422
Macao	36	2 450
Philippines	4	899
Singapore, Republic of	3	536
Thailand	1	408
United Kingdom	3	266
United States of America	18	3 448
TOTAL	249	36 016

ITEM AND ORIGIN	QUANTITY No.	VALUE \$
Wooden office furniture		
China-Taiwan Province only	491	7 778
Germany, Federal Republic of	2	77
India	20	3 584
Italy	21	6 408
Norway	1	78
Singapore, Republic of	24	775
Sweden	1	219
Thailand	1	888
United Kingdom	3	1 072
United States of America	4	1 584
TOTAL	568	22 463
Music stands		
China-Taiwan Province only	4	114
TOTAL	4	114
Articles of wood, in an assembled, partly assembled or unassembled condition		
Belgium-Luxembourg	231	30 942
China — excl. Taiwan Province	368	2 435
China-Taiwan Province only	15 772	244 597
Denmark	162	6 613
France	18	1 115
Germany, Federal Republic of	7 803	18 365
Hong Kong	292	11 133
India	94	8 142
Italy	1 761	408 114
Japan	202	122
Korea, Republic of	3	258
Malaysia	79	7 730
Netherlands	275	20 166
New Zealand	651	16 785
Philippines	718	13 772
Singapore, Republic of	1 888	131 504
Spain	1	50
Sweden	15	1 197
Switzerland	1	633
Thailand	54	6 974
United Kingdom	973	129 252
United States of America	336	117 609
TOTAL	31 697	1 177 509
31. Miscellaneous manufactured articles of wood	Gross Boxes	
Matches		
China-Taiwan Province only	35	1 820
Denmark	—	5
Germany, Federal Republic of	7	775
Japan	11 477	5 977
Korea, Republic of	18 410	64 370
Portugal	4	7
TOTAL	29 934	72 953
Wooden smoking pipes	No.	
United Kingdom	1	2
United States of America	1	60
TOTAL	2	62
32. Tanning extracts of vegetable origin		
Wattle bark extract	kg	
South Africa, Republic of	234 800 ^a	184 441
TOTAL	234 800	184 441

ITEM AND ORIGIN	QUANTITY kg	VALUE \$
Other		
Argentina	16 000	17 114
Italy	5 000	4 317
TOTAL	21 000	21 432
33. Tannins, including water extracted gall-nut tannin, and their salts, ethers, esters and other derivatives		
Belgium-Luxembourg	4 000	32 110
Italy	2 248	6 510
United States of America	2	238
TOTAL	6 250	38 858
34. Synthetic organic tanning substances, and inorganic tanning substances, tanning preparations, whether or not containing natural tanning materials; enzymatic preparations for pre-tanning		
Belgium-Luxembourg	4 000	26 544
Germany, Federal Republic of	50 300	33 805
New Zealand	72 000	34 618
United Kingdom	2 000	1 440
TOTAL	128 300	96 407
35. Essential oils, concretes and absolutes		
France	—	937
Malaysia	—	25
New Zealand	—	20
Singapore, Republic of	—	71
Thailand	—	57
United Kingdom	—	27
TOTAL	—	1 138

APPENDIX 3
SUMMARY OF EXPORTS OF FOREST PRODUCE — SINCE 1968

Year	Timber		Wood Manufacture	Essential Oils and Tanning Material*
	m ³	Value \$	Value \$	Material* \$
Brought forward	13 081 830	177 786 912	8 536 935	17 386 964
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	48 448	9 599 222	1 671 328	Nil
1983	41 789	8 295 949	1 634 839	300
1984	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	26 068 548	571 183	1 446
1983	23 738 070	341 138	1 138
1984	N/A	N/A	N/A

APPENDIX 5(a)
SUMMARY OF LOG PRODUCTION — SINCE 1970

Year	Crown Land m ³	Private Property m ³	Total m ³
Brought forward	6 821 873	15 844 520	81 469 989*
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
1983	1 225 798	102 942	1 328 740
1984	1 333 037	134 922	1 467 959

* Includes 18 783 746 m³ 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 and Pulp Company.

5(b)
TREND IN PINE LOG OUTPUT IN RECENT YEARS
(Including Particleboard Logs)

	Crown Land m ³	Private Property m ³	Total m ³
1970	81 283	1 514	82 797
1971	86 246	1 594	87 840
1972	90 161	1 306	92 067
1973	100 419	1 015	101 434
1974	123 393	1 167	124 560
1975	129 086	63	129 149
1976	105 567	—	105 567
1977	120 859	335	121 194
1978	125 548	1 677	127 225
1979	176 944	6 127	183 071
1980	191 363	4 827	196 190
1981	201 552	2 988	204 540
1982	173 474	14 834	188 308
1983	176 618	5 468	182 086
1984	198 281	3 559	201 840

5(c)
TRENDS IN THE PRODUCTION AND USE OF SAWN WESTERN AUSTRALIAN TIMBER

Year Ended 30 June	Sawn Production (m ³)			Export	Local Use
	Hardwood	Softwood	total		
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	410 433	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	48 448	294 657
1983	252 124	13 216	265 340	41 789	223 551
1984	258 861	14 723	273 333	N/A	N/A

APPENDIX 6
FORESTS DEPARTMENT PUBLICATIONS PRODUCED DURING
THE YEAR ENDED 30th JUNE 1984

Annual Report 1983

Forest Focus 30

- 'Sustaining the Yield'
- 'Street Trees of Perth'
- 'Wooden Gold — Early Days of the Sandalwood Industry'

Bush Telegraph
INDAT

- Bi-monthly Staff Journal
- Newsletter for Department of Conservation and Land Management

RESEARCH PUBLICATIONS

Technical Paper No. 5

- Aboriginal Names for Plant Species in South-Western Australia by Dr I. Abbott

Technical Paper No. 6

- A Photogrammetrical Inventory of Karri (*Eucalyptus diversicolor*) Regrowth in the South-west of Western Australia by R. Armstrong.

Technical Paper No. 7

- Mechanical properties of Timbers commonly used in Western Australia by P.N. Shedley and D.J. Challis.

Technical Paper No. 8

- A survey of building materials used in house construction in Western Australia 1983 by J. Glass and P. Shedley.

Research Paper No. 73

- The effect of two methods of zinc application on the growth of *Pinus radiata* D. Don on sands of the Swan Coastal Plain by H. Chevis.

Research Paper No. 74

- Results of preliminary screening of clover cultivars as potential hosts for *Phytophthora cinnamomi* in the Donnybrook Sunkland by T. Boughton.

Research Paper No. 75

- Some effects of site and season and the proximity of an oat crop on the survival and growth of *Pinus* and *Eucalyptus* seedlings by G.W. Anderson and F.E. Batini.

Research Paper No. 76

- Seed production and survival of some legumes in the forests of Western Australia by P.R. Skinner.

Research Paper No. 77

- Assessment of *Phytophthora* disease risk at the Nannup nursery by T.J. Boughton and C.E. Crane.

Research Paper No. 78

- The effects of exposure on the stability of heart-in studs of *Pinus pinaster* by G.R. Siemon and D.J. Donnelly.

Research Paper No. 79

- *Pinus radiata* death rates associated with *Phytophthora* species on different soil types in the Donnybrook Sunkland of Western Australia by H. Chevis.

SPECIAL REPORTS AND MANUALS

Future Timber Supplies for Western Australia.

A feasibility study concerning the lease of Manjimup farmland for pine forests.

Fire Protection Handbook.

Recreation Operations Manual.

Forest Recreation Framework Plan — Northern Region.

Guidelines for slash burning in the karri forest.
Forester's Manual — part 17 and amendments.
Chemical User's Manual — amendments.

PUBLICITY AND ADVISORY BROCHURES

Publicity	— Farming and Pines. Foresters at Work. Urban Forestry. Helm's Arboretum.
Forestry in action series	— Forests of Western Australia.
Fauna series	— The Numbat.
Native trees of W.A.	— Boabs
Tree Care Series	— Pines for private investors.
Forest Recreation	— Recreation Directory and guidebook: The Northern Jarrah forest. Common birds of the Shannon. Checklist of birds of the Shannon.

EXTERNAL PUBLICATIONS

Abbott, I. and Loneragan, O.	Growth rate of Jarrah (<i>Eucalyptus marginata</i>) Coppice. Australian Forest Research, 13, 67-73 (1982).
Abbott, I. and Loneragan, O.	Influence of fire on growth rate, mortality, and butt damage in Mediterranean forest of Western Australia. Forest Ecology and Management, 6, 139-153 (1983).
Abbott, I. and Loneragan, O.	Growth rate of Jarrah (<i>Eucalyptus marginata</i>) in relation to site quality in cut-over forest, Western Australia. Australian Forestry, Vol. 46, No. 2 (1983).
Batini, F.E., Anderson, G.W. and Moore, R.	The practice of agroforestry in Australia. In "Foothills for food and forests", Oregon State University Symposium Series No. 2. Oregon, U.S.A. 233-246 (1983).
Batini, F.E.	The place of agroforestry and woodlots on farms. In "Trees in the rural landscape". Proceedings of Conference held in Perth, October 1981. 208-215 (1983).
Batini, F.E.	Co-ordination of Land Use and Management of the Darling Scarp. In "Scarp Symposium, Perth, October 14, 1983". WAIT Environmental Studies Group Report No. 10, 71-77 (1983).
Batini, F.E.	Forest and Catchment Management in Western Australia. Research needs, viewed from an operational perspective. In J.J. Landsberg and W. Parsons, "Research for Forest Management". CSIRO. Melbourne (1984).
Butcher, T.B., Stukely, M.J.C. and Chester, G.W.	Genetic variation in resistance of <i>Pinus radiata</i> to <i>Phytophthora cinnamomi</i> . Forest Ecology and Management, 8, 197-220. (1984).
Christensen, P., Maisey, K. and Perry, D.H.	Radiotracking the numbat, <i>Myrmecobius fasciatus</i> , in the Perup forest of Western Australia. Australian Wildlife Research, 11, 275-88. (1984).

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- Dell, B., Bartle, J.R. and Tacy, W.H. Root occupation and root channels of jarrah forest subsoils. *Australian Journal of Botany*, 31, 615-17. (1983).
- McCaw, W.L. Wood defect associated with fire scars on Jarrah (*Eucalyptus marginata* Sm.). *Australian Forest Research*, 13, 3/4, 261-266. (1983).
- Muir, D. Mapping dieback in the Jarrah forest of Western Australia. *Cartography*, vol. 13, 3, 174-184. (1984).
- Schmidt, W. Changes to scarp landscape: Implications for Management. In "Scarp Symposium, Perth, October 14, 1983". WAIT Environmental Studies Group Report No. 10, 29-33. (1983).
- Shea, S.R., Shearer, B.L., Tippett, J.T., Deegan, P.M. Distribution, reproduction and movement of *Phytophthora cinnamomi* on sites highly conducive to Jarrah Dieback in South Western Australia. *Plant Disease*, Vol. 67, No. 9, September 1983.
- Siemon, G.R. Proofgrading in Western Australia. *Australian Forest Industries Journal*, 49, 8, 22-3. (1983).
- Tippett, J. and Hill, T. The relationship between bark moisture and invasion of *Eucalyptus marginata* by *Phytophthora*. *Australian Plant Pathology*, Vol. 12, No. 3 (1983).
- Tippett, J. and Hill, T. Junction Complexes between Sieve Tubes in the Secondary Phloem of Myrtaceae. *Annals of Botany*, 53, 421-429. (1984).
- Underwood, R. and Murch, J. Hygienic logging in the Northern Jarrah forest. *Australian Forestry*, Vol. 47, 1, 39-44. (1984).

APPENDIX 7

THE DEPARTMENT'S SAFETY RECORD OVER THE LAST 18 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
1982-83	1 931 192	27	134	161	14	69	83	849*	†22
1983-84	2 144 995	43	198	241	20	92	112	819*	†14

M.H.W. — Man Hours Worked

L.T.A. — Lost Time Accidents

M.T.A. — Medical Treatment Accidents

* Of the 819 days lost 226 were carried over from accidents sustained during the previous year.

† The Duration Rate for the 43 L.T.A. this year is 14 days. If the 226 days lost from the 2 carry over accidents are taken into account, the Duration Rate is 18 days.

APPENDIX 8

Common and Scientific Names of Plants and Animals mentioned in this report

PLANTS

Common Name	Scientific Name
Blackbutt	<i>Eucalyptus patens</i>
Brown mallet	<i>Eucalyptus astringens</i>
Bull banksia	<i>Banksia grandis</i>
Bullich	<i>Eucalyptus megacarpa</i>
Cleland's blackbutt	<i>Eucalyptus clelandii</i>
Dundas mahogany	<i>Eucalyptus brockwayi</i>
Flooded gum	<i>Eucalyptus rudis</i>
Gimlet	<i>Eucalyptus salubris</i>
Goldfields blackbutt	<i>Eucalyptus le souefii</i>
Jarrah	<i>Eucalyptus marginata</i>
Jam	<i>Acacia acuminata</i>
Karri	<i>Eucalyptus diversicolor</i>
Mallet	<i>Eucalyptus astringens</i>
Marri	<i>Eucalyptus calophylla</i>
Millstream palm	<i>Livistona alfredii</i>
Pinaster pine	<i>Pinus pinaster</i>
Powderbark wandoo	<i>Eucalyptus accedens</i>
Radiata pine	<i>Pinus radiata</i>
Red Mahogany	<i>Eucalyptus resinifera</i>
River redgum	<i>Eucalyptus camaldulensis</i>
Salmon gum	<i>Eucalyptus salmonophloia</i>
Sandalwood	<i>Santalum spicatum</i>
Sheoak	<i>Casuarina fraserana</i>
Spotted gum	<i>Eucalyptus maculata</i>
Swamp mahogany	<i>Eucalyptus robusta</i>
Sydney blue gum	<i>Eucalyptus saligna</i>
Tasmanian blue gum	<i>Eucalyptus globulus</i>
Tingle, rate's yellow	<i>Eucalyptus brevistylis</i>
red	<i>Eucalyptus guilfoylei</i>
Tuart	<i>Eucalyptus jacksonii</i>
Walnut (tropical species)	<i>Eucalyptus gomphocephala</i>
Wandoo	<i>Juglans neotropica</i>
Yellow stringy-bark	<i>Eucalyptus wandoo</i> <i>Eucalyptus muellerana</i>

FUNGI

The cinnamon fungus	<i>Phytophthora cinnamomi</i>
—	<i>Armillaria spp.</i>

INSECTS

Gum leaf skeletonizer	<i>Uraba lugens</i>
Leaf miner	<i>Perthida glyphopa</i>

ANIMALS

Mardo	<i>Antechinus flavipes</i>
Numbat	<i>Myrmecobius fasciatus</i>
Red-tailed wambenger	<i>Phascogale calura</i>
Woylie	<i>Bettongia penicillata</i>

