ANNUAL REPORT 1976

2-4

FORESTS DEPARTMENT
WESTERN AUSTRALIA
PRODUCTION
PROTECTION
RECREATION
CONSERVATION

Forests Department
PERTH,
15*th November*, 1976

TO THE HONOURABLE THE MINISTER FOR FORESTS

Sir,

I have the honour to transmit herewith my report on the operations of the Department for the year ended 30*th June*, 1976.

Yours faithfully,
B. J. BEGGS,
Conservator of Forests

Front cover:
Numbat (Myrmecobius fasciatus) *from the Forests Department's Perup Fauna Priority Area near Manjimup.*

FOREST POLICY

In anticipation of future legislation that would emphasise the multiple-use of forests, the Government of Western Australia stated its forest policy in April, 1976 in which it was provided that:

The Forests Department will manage the State-owned forests and timber reserves in Western Australia according to a policy that will ensure provision for the optimum social and material needs of the people. At the same time the policy will provide for the environmental well-being of the forests themselves.

The policy involves the following objectives:

Water Supplies

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

Timber Production

To regulate the removal of produce from the native forests to a level that can be sustained by the forest growth.

Other Forest Products

Within the management guidelines for the forests, to ensure the future livelihood of those persons involved in less important forest industries.

Recreation and Tourism

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

Flora and Fauna

To conserve areas that provide the habitats for the many species of flora and fauna that exist in the forests of Western Australia.

Special Scientific Values

To set aside specific areas of forests for the purposes of education, reference, and scientific study.

Mining

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

Forest Protection

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

Private Forestry

To encourage and assist private owners to establish and manage commercial forests and to provide land-holders with advice for planting trees for their shelter and protective values in the rural areas.

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PRINCIPAL OFFICERS*

Conservator of Forests	B. J. Beggs, B.Sc. (For.), Dip. For. (Canb.)
Deputy Conservator of Forests	P. J. McNamara, M.A. (Oxon.)
Assistant Conservator of Forests	W. H. Eastman, B.Sc. (For.) Dip. For. (Canb.), Dip. For. (Oxon.)
Chief of Division	J. C. Meachem, D.F.C., B.Sc. (For.) Dip. For. (Canb.)
Chief of Division	J. B. Campbell, B.Sc. (For.), Dip. For. (Canb.)
Chief of Division	E. R. Hopkins, B.Sc. (W.A.), Dip. For. (Canb.), PhD. (Melb.)
Chief of Division	F. J. Campbell, B.Sc. (For.) Dip. For. (Canb.)
Chief of Division	S. J. Quain, B.Sc. (For.) Dip. For. (Canb.)
Superintendent	D. E. Grace, B.Sc. (For.) Dip. For. (Canb.)
Superintendent	C. J. Edwards, B.Sc. (For.) Dip. For.
Superintendent (Research)	J. J. Havel, M.Sc. (Q.) Dip. Ed. (W.A.), Dip. For. (Canb.)
Superintendent (Extension Services)	P. N. Hewett, B.A. (W.A.), B.Sc. (Adel.), Dip. For. (Canb.)
Superintendent (Plantation)	A. C. van Noort, B.Sc. (For.), Dip. For. (Canb.)
Chief Draftsman	R. M. Davis, E.D.
Secretary	R. H. Wilson, B.A. (Econ.) A.A.S.A.
Accountant	V. K. Combs, A.A.S.A., A.P.A.A., A.A.I.M.

*At 30th June, 1976

STATISTICAL SUMMARY OF MAJOR OPERATIONS

Sawnwood Production

Total Production of Sawn Timber .... 399 268 m³

Trends in Production and Consumption

Year ended 30th June	Production (cubic metres)				Total Export	Local Availability	Number of Sawmills	Monthly Average No. of Employees
	Hardwood	Softwood	Hewn Hardwood	Total				
1926	411 283	....	177 792	589 075	339 879	249 196	....	....
1938	331 928	....	72 883	404 811	213 695	191 116	134	3 112
1946	251 194	....	398	251 592	95 524	156 068	128	2 876
1951	356 029	....	33	356 062	66 339	289 723	256	4 047
1956	544 134	....	150	544 284	129 367	414 917	274	5 804
1960	470 833	....	....	470 833	174 643	296 180	265	5 037
1965	460 246	22 667	....	482 913	133 565	349 348	206	3 615
1966	475 642	16 499	....	492 141	68 885	423 256	203	3 518
1967	461 176	17 085	....	478 261	138 723	339 537	202	3 173
1968	469 818	16 531	....	486 349	84 569	401 779	188	3 209
1969	413 666	19 643	....	433 309	86 455	346 854	191	3 233
1970	425 295	16 893	....	442 188	96 275	345 914	163	2 869
1971	420 777	21 595	....	442 372	79 437	362 935	150	2 401
1972	379 006	21 733	....	400 739	101 191	299 548	154	2 533
1973	375 135	23 283	....	398 418	111 547	286 871	145	2 825
1974	374 899	26 534	....	401 433	98 200	303 233	140	2 215
1975	368 844	27 086	....	395 930	100 127	295 803	129	2 228
1976	383 010	16 258	....	399 268	N/A	N/A	129	2 211

Log Production* (m³)

	1976	1975
Jarrah	731 767	756 269
Karri	368 607	273 997
Wandoo	13 044	8 402
Pine	105 567	129 149
Other	87 443	16 496
	1 306 428	1 184 313

* Includes sawlogs and logs for plywood, veneer and reconstituted wood (particle board etc.), and chipwood.

Forest Area

Additions to State Forest	1 816 ha
Excisions from State Forest	862 ha
Land purchased for Pine Planting	781 ha
Total Area of State Forest	1 833 078 ha

Reforestation

Cut-over areas treated for regeneration	40 275 ha

Afforestation

Area planted with pines 1975		2 728 ha
Pinus radiata	1 429 ha	
Pinus pinaster	1 299 ha	
Other species	Nil	
Total area of pine plantation established to date		39 074 ha
Pinus radiata	17 689 ha	
Pinus pinaster and Other species	21 385 ha	
Total experimental areas (additional)		266 ha

Management

Area of assessment	31 600 ha
Engineering, new works—	
Roads and tracks	144 km
Houses	Nil

Protection

Prescribed burning area	289 372 ha
Fire outbreaks—	
Number of fires	183
Area burnt	3 891 ha

Nurseries (Hamel and Narrogin)

Trees produced for private buyers	207 186 (No.)
Trees produced for Forests Department	156 867 (No.)

Sandalwood

Quantity exported	1 206 tonnes

Chipwood (hardwood)

Quantity produced	98 370 m³

Source and Application of Funds

	1975/6 $	1974/5 $
Source—		
Royalties on timber, etc.	4 741 385	3 919 840
Departmental fees, sale of logs etc.	3 860 390	3 230 991
Sub Total	8 601 775	7 150 831
General Loan Fund	3 000 000	3 000 000
Commonwealth Aid Road Grant	270 173	339 514
Rents	164 851	145 356
Commonwealth Softwood Forestry Agreement	863 595	684 663
Increase or decrease in unexpended balance	38 587	360 176
Mining Compensation Grants	23 398	11 177
Employment Relief Schemes	217 486	69 596
	13 179 865	11 761 313
Application—		
1. Expended from Consolidated Revenue Fund—		
Pine and Hardwood Conversion	1 959 327	2 162 072
Administration and general expenses	2 123 651	1 764 412
Transfer to Treasury	456 572	312 685
2. Expenditure under Reforestation Fund—		
Division-Direct Operating costs	3 462 107	3 156 311
Head Office and General Expenses	5 178 208	4 365 833
	13 179 865	11 761 313

REVENUE AND EXPENDITURE

Revenue for the year from all sources amounted to $8 601 775 compared with $7 150 831 in the previous year.

After deduction of specified expenses, the nett revenue transferred to the Reforestation Fund was $4 062 225 ($2 911 662). Figures in brackets refer to the previous year. During the year this fund also received $3 000 000 ($3 000 000) from the General Loan Fund, advances totalling $863 595 ($684 663) under the Commonwealth Softwood Forestry Agreement and Commonwealth Aid Road Grants of $270 173 ($339 514).

Expenditure from the Reforestation Fund for the year amounted to $8 640 315 ($7 522 144).

THE FOREST AREA

State Forest (Forests Act 1918–1974)

The total area of State Forest at 30th June, 1976 was 1 833 078 hectares which is an increase of 954 hectares compared with the total area at 30th June, 1975.

Timber Reserves (Forests Act, 1918–1974)

The total area held under Timber Reserves at 30th June, 1976 was 117 064 hectares which is an increase of 34 380 hectares compared with the total area at 30th June, 1975.

The major portion of the increase occurred as a result of five areas of inland ecotypes in the Eastern Goldfields being approved as Timber Reserves.

Land Alienation, etc.

During the year 94 applications concerning forest land were received covering a total of 61 877 hectares.

The Government agreed to release as follows:

Alienations			Leases (Pastoral, Grazing etc)		
Timber Zone		Outside Timber Zone	Timber Zone		Outside Timber Zone
State Forest	Crown Land		State Forest	Crown Land	
hectares	hectares	hectares	hectares	hectares	hectares
708	16 041	9 957	212	129	65

No. of Alienations approved—24

No. of leases approved—14

The total freehold land held at 30th June, 1976 in the name of The Conservator of Forests was 25 054 hectares.

SAWMILLING, TIMBER INSPECTION AND FOREST PRODUCE

Timber Production

The production of 399 268 m³ of sawn timber was an increase of 3 338 m³ on last year's figure. Of the total output 38 884 m³ came from private property, an increase of 9 466 m³ on the 1974/75 figure.

At December 31, 1975 there were 129 sawmills registered of which 80 operated on Crown Land and 49 on private property. Details of the annual intake of mill logs and production of sawn timber are given in accompanying tables.

The annual intake of logs (1968–1976) is given in Appendix 5.

Roundwood production from Departmental pine plantations totalled 105 567 m³, a decrease of 23 519 m³ on the figure for 1974/75 (See Afforestation).

Local plywood factories obtained the following quantities of peeler logs—

	m³
Karri	2 581
Jarrah	515
Pine	1 600
	4 696

Timber Inspection

The total quantity of timber inspected during the year was 105 478 m³ made up as follows—

	m³
Railway Sleepers—	
Ex Crown Land	66 228
Ex Private Property	10 113
Re-inspected	39
	76 380
Other Sawn Timber	29 098

Sandalwood

The demand for Sandalwood increased during the year and it was possible to supply 1 206 tonnes compared with 1 051 tonnes for the previous year.

Sandalwood received at Spearwood during the year totalled 1 300 tonnes compared with 1 163 tonnes for the year 1974/75.

	Tonnes
Logwood (including Roots and Butts)	967
Pieces	328
Private property	5
	1 300

PRODUCTION OF LOG TIMBER FOR YEAR ENDED JUNE 30, 1976
EXCLUSIVE OF MINING TIMBER, FIREWOOD, POLES AND PILES

Tenure	Sawlog Volume by Species (1)								Total	Other Log Material (3)		Total	Grand Total
	Jarrah	Karri	Wandoo	Yarri	Sheoak	Marri	Pine (2)	Other		Hard-wood	Pine		
Crown Land m³	668 240	310 063	4 058	2 531	940	2 421	45 083	2 477	1 035 813	98 370	60 484	158 854	1 194 667
Private Property m³	63 527	37 832	8 986	1 032	71	58	....	255	111 761	....	....	....	111 761
	731 767	347 895	13 044	3 563	1 011	2 479	45 083	2 732	1 147 574	98 370	60 484	158 854	1 306 428

(1) Includes sawlogs and logs used in the production of plywood veneer.
(2) For log categories see Afforestation.
(3) Includes Chipwood.

QUANTITY OF SAWN TIMBER PRODUCED FROM CROWN LANDS
AND PRIVATE PROPERTY FOR THE PAST TWO YEARS

Year Ended June 30	From Crown Lands		From Private Property		Total Quantity
	Sawn Timber other than Sleepers	Sawn Sleepers	Sawn Timber other than Sleepers	Sawn Sleepers	
1975 m³	306 095	60 417	20 747	8 671	395 930
1976 m³	294 156	66 228	28 771	10 113	399 268

Timber Industry Regulation Act, 1926–1969

The number of mills registered under the provisions of the Act as at December 31, 1975 totalled 129 (80 Crown Land and 49 Private Property).

The average number of persons employed in the timber mills each month throughout the year was 2 211, a decrease of 17 on last year's figure of 2 228.

The District and Workmen's Inspectors made 839 inspections of timber holdings.

There were 219 notifiable accidents for the year ending June 30, 1976, three being fatal. The number of accidents per 100 persons employed was 9·91, an increase on last year's figure of 8·61.

The cost of administering the Timber Industry Regulation Act for the year ending June 30, 1976 was:

Salaries	$20 936
Mileage, Allowances, Office Rent, Plant Cost and Sundries	$11 008

Forest Offences

Fifteen breaches of the Forest Act and Regulations were reported during the year. Legal proceedings were instituted in one case and five cases were dealt with by charging royalty, confiscation and sale of timber illegally cut. The amount received by the Department in this way totalled $1 275.60. Warnings were issued in all other cases.

Employment in Forestry and the Timber Industry

The number of wage earners directly employed in Forestry and the Timber Industry was estimated at 3 498 made up as follows:

Forestry—		
Professional Officers	69	
General Field Staff	297	
Clerical and Drafting	86	
Wages employees	481	
Contractors and employees (estimated)	20	
		953
Timber Industry—		
*Sawmill employees including bush workers	2 211	
Firewood cutters and pole getters working under permits	130	
Sandalwood workers	72	
Apiarists, estimated (1 592 sites registered)	132	
		2 545
		3 498

* Includes employees of registered sawmills only and excludes persons employed in associated yards in the metropolitan area.

Firewood Production

	Crown Land Tonnes	Private Property Tonnes	Total Tonnes
Sawmills			
General Purpose and Sleeper			
For Sale	52 722	....	52 722
Own Use	18 115	....	18 115
Private Property Annual			
For Sale	....	7 672	7 672
Own Use	....	57	57
Domestic			
Local Firewood License	6 215	....	6 215
Forest Produce License	11 005	....	11 005
Bartons	47	....	47
Kalgoorlie	1 500	....	1 500
Industry			
Wundowie	129 945	....	129 945
Kalgoorlie			
Mines	....	....	....
Industrial	2 920	....	2 920
	222 469	7 729	230 198

Other Forest Produce

Poles and piles obtained from Crown Land during the year amounted to 379 849 metres, compared with 391 721 metres for the previous year. Supplies of piles and poles from private property are dwindling and accurate production figures are not available.

Fence posts and strainers cut from Crown Lands totalled 263 653. Records received show that 38 000 posts and strainers were obtained from private property, but this was only a small percentage of the total production from this source.

FOREST PRODUCE NOT ELSEWHERE INCLUDED IN PRODUCTION TABLES

Description		South-west Division and Agricultural Areas		Goldfields Area	Total
		Other Crown Land	Private Property		
Mining Timber South-West	m^3	2 781	....	....	2 781
Mining Timber Goldfields Areas	m	....	....	88 636	88 636
Piles, Poles and Bridge Timber	m	379 381	....	468	379 849
Fence Posts and Rails	No.	170 645	38 000	64 924	273 569
Strainers	No.	21 618	....	6 466	28 084
Boronia	Kg	4 085	330	....	4 415
Gravel and Stone	m^3	450 497	....	....	450 497
Sand	m^3	16 153	....	....	16 153
Sawdust as fuel	Tonnes	53 552	....	....	53 522

Woodchip Industry

The production of woodchips from reject marri and karri logs began at the Diamond Mill, Manjimup in September.

A total of 98 370 m^3 of timber was received at the mill.

The areas cut-over to provide woodchips are proving to be smaller than was predicted due to a number of factors, including:

- recovery of chips per unit volume of solid timber is higher than originally estimated.
- acceptance of lower quality logs not included in the original assessment.

If this trend is maintained the area of forest cut for chips will be materially reduced at least for the first five years of operation. Environmental monitoring is being continued. (See Research section of this report). Any karri or marri logs of millable quality are diverted to an appropriate sawmill, either from the bush or from the chip mill landing.

Unemployment Relief

The Department continued to participate in the Regional Employment Development Scheme and in the Commonwealth Non-Metropolitan Relief Scheme resulting in the employment of 38 men at Kirup, Harvey and Busselton and Collie Divisions until the projects terminated on the 24th December, 1975 and 12th November, 1975 respectively.

Approximately $90 000 was used from the former and a further $15 000 from the latter scheme to provide employment at a time when jobs were difficult to acquire. As was the case in preceding years, these additional funds enabled worthwhile work to be done which otherwise could not have been funded, including silvicultural treatment, roadside improvement work and recreational projects.

Working plans

Hardwood Inventory

Sixty four plots were established to relate assessors' estimates to actual log recoveries from the forest.

In the marri chip license area, 831 hectares of management level assessment provided information on 57 cutting coupes covering 28 000 hectares.

In Busselton, Dwellingup and Harvey Divisions, 60 hectares of management-level assessment provided information covering 3 600 hectares.

A further 117 permanent increment plots were established and 15 remeasured in the northern jarrah forest. All trees on 183 hardwood increment plots had their component logs classified for marketability.

A marri stocking assessment was developed for dieback areas in Harvey Division.

Seed tree assessment was carried on 46 hectares in cut over jarrah and karri forests in the southern region.

Softwood Inventory

New information on the growth and yield of all major plantations was provided from the re-measurement of 514 permanent plots and the establishment of 1 842 new ones.

Twenty one plots were remeasured in Harvey and Collie Divisions to monitor the progress of stands non-commercially thinned at age five years.

General Working Plan Revision

Detailed statements of area and volume have been prepared for over 400 forest blocks and each major sawmill permit or license. A comprehensive study was made of Western Australia's historical and future forest product demand trends.

Special Management Priority Areas

Area statements and volume estimates were completed for 50 of these areas, and for the 52 000 hectare Shannon River basin.

Karri Chip Yield

An inventory of areas suitable for thinning was carried out in Treen Brook and Big Brook to determine available volumes and to provide information on karri stand development. The results indicated that by removing large cull trees at the time of establishment and so ensuring full stocking, thinning yield could be improved by 120 per cent.

Photodendrometer

The upper stem diameters of a further 160 trees on 20 plots were measured, using photos taken at ground level. This will enable a new karri volume table to be produced without felling the trees used for measurement. The volume table prepared in this way will be less expensive and more representative than previous ones.

Projects

Species distribution: worksheets were prepared showing the distribution of wandoo and tuart on State Forest and Forests Act Timber Reserves.

Hardwood volume tables: the existing jarrah, karri and marri volume tables were converted to metric measurements.

Dieback maps: all maps showing the extent of dieback, and dieback risk categories were revised.

Large scale aerial photographs for dieback mapping

The potential for 70 mm format large scale colour transparency photographs for detecting dieback infection in the understorey species is being evaluated.

From the initial trials in 1969, the aerial photographic equipment and technique have now been developed to an operational standard. This should be especially valuable in connection with the mapping of dieback areas in the quarantine zone.

The Forests Department's 70 mm Vinten camera is used in a Britten-Norman Islander aircraft and operated with a custom-built intervalometer to ensure that the correct overlap for stereoscopic viewing is achieved.

A recently developed transponder navigation system enables the very precise flight patterns necessary for complete coverage to be obtained.

Since understorey species are obsured by tree shadows in clear weather, the best detection conditions occur under stratified cloud which provides uniform light conditions without shadows. The occurrence of such suitable weather is the main operational constraint encountered so far. Investigations are under way to determine the best interpretation and mapping procedures. Estimates of operational cost will be available from 7 000 hectare trials carried out in autumn 1976 in both northern and southern jarrah forests.

Automatic Data Processing (A.D.P.)

A direct link to the CYBER 73 computer at the Western Australian Regional Computing Centre was established in July 1975 with the installation of a visual display terminal at the Como Working Plans Office. Two major effects of the installation have been, a 20 to 30 per cent. increase in throughput of processing jobs and, the redevelopment of some computer programs for implementation in interactive mode.

The terminal permits instant access to the computer making it possible to recover very quickly from error conditions arising from incorrect data entries. The increased throughput has resulted from this effect and, to a lesser extent, from savings in travelling time.

The interactive computer program allows users to interrupt the flow of program commands in order to input data or introduce commands of their own. In this way the user and the program interact, combining the ability of the computer 'to make easy' decisions and perform arithmetic operations very rapidly with the superior human ability to make 'difficult' decisions. Interactive processing is particularly useful in applications where trial and error play an important part in solving a problem (e.g. model verification) and in the planning area where, very often, decisions are based on a multiplicity of criteria, many of which cannot be formulated precisely enough for computer implementations.

Several programs have been developed by the staff of A.D.P. section for the verification of hydrological and mensurational models. The thinning scheduling system for pine now includes an interactive program which carries out all the tedious calculations involved in the simulation of growth and thinning and makes many minor decisions but allows the user to make the difficult decisions involving silvicultural priorities and the disposal of thinning yields to the various market outlets.

Mapping

The first of the 1:50 000 scale series of thematic maps of forested areas were published during the year being four map sheets covering the eastern area of Walpole Division. A further 10 sheets in Collie and Kirup Divisions are in course of preparation for printing. It is necessary that the imperial scale series be maintained until adequate cover with the new maps is available and 10 sheets were reprinted as revised editions. A further 5 sheets are currently being revised.

The conversion of the aerial photographic interpretation (API) series to metric scales of 1:25 000 and 1:50 000 was completed and these maps are now in general use throughout the Department.

Detailed plantation mapping at the scale 1:12 500 was completed over Gorrie Group, Mundaring Division and Kirup Group Section G while a total of 23 000 hectares of plantations and surrounds were remapped to define new planting, site preparation and the redefinition of older planting. 12 000 hectares were mapped with 5 metre contours and overlays prepared.

Major projects such as the introduction of forest quarantine measures, the investigation of the effects of forest management on salinity, multiple-use management and the introduction of the hardwood operations control system combined with the performance of the routine functions of the Branch have fully extended the labour resources available.

Special projects carried out by this section included a plan of the Greenbushes Mining Area and a soil and vegetation map of the Reabold Hill area. Seven micro catchments were defined in the Dwellingup Division for research purposes. 103 TOPO and TYPE maps were converted to metric scale after being revised.

Forest Engineering

During the year, 144 kilometres of roads, tracks and fire-lines were constructed and 5 550 kilometres of existing roads were maintained.

Plant and Equipment

All items of vehicles and field equipment were maintained in good condition by a total of 62 workshop wages employees.

Six apprentices completed their training, one resigned and three were appointed, with the total number employed being seventeen.

Ten major items were fabricated plus other small items for field and research use.

Departmental Buildings

In addition to carrying out general maintenance, the Department's contractors removed and rebuilt two houses within each of the Manjimup and Pemberton Divisional Headquarters. Towards the close of the year, work began on the construction of new single officers' quarters at Manjimup.

Other major works included the erection of a new transportable office building adjacent to the Manjimup Divisional Headquarters. Sealing of roads at Dwellingup in conjunction with Bunning Bros. Pty. Ltd. was also completed.

Communications

Replacement of Radio Equipment

The "Talk Through" repeater stations installed at Mungalup, Wabling Hill, Sea View, Margaret River and East Kirup were replaced with transistorised solid-state sets. The new repeaters have the facility of instantaneous transmission without delay for warm up as with the old type.

The antenna systems of all the Department's eighteen repeater stations were upgraded to improve signal service area. V.H.F. Fleetmaster radios were installed at Collie, Busselton, Ludlow, Margaret River, Harvey, Manjimup, Walpole and Pemberton to replace the old valve type. This completes the replacement of the original systems installed in 1963/64.

Radio Telephones for Smoke Reporting

In line with the Forests Department policy to use "Spotter" aircraft for fire detection, Radiotelephone (R/T) equipment was installed at Grimwade, Ludlow, Gnangara, Gnangara tower and Jandakot to extend office-to-aircraft communications to all Divisions. A second R/T channel was allocated for use by aircraft south of Collie. The eight spotter aircraft used were all installed with two-way radios for use in contacting vehicles in the bush, and radio telephone for divisional office contact. Also installed was an intercommunication unit for pilot and observer designed and built by the Department's Radio Branch.

General

Fifty vehicles of various types were wired for V.H.F. radio. To complement the fire fighting organisation in the bush, two trailers used as mobile field headquarters were wired for V.H.F. and Radio-Telephone.

Five auxiliary generators at remote radio repeater sites were overhauled. It is intended to gradually phase out these generators in favour of solar cells.

The antenna systems of the vehicles used as radio beacons for the aerial burning programme were all replaced with 3·6 metre helical whip aerials. This helped to improve the speed of operation by the elimination of the 9 metre radiating mast used previously.

Recreation

Camps:

During the year, the former Myalup settlement near Harvey was leased to the Community Recreation Council.

There are now five holiday camps in use and negotiations have commenced for a further lease. Existing camps are leased to Lions International, Youth Hostels Association and Community Recreation Council.

For the first time an area of forest near Dwellingup was used by a caravan touring club. The trial of this camping activity was successful and may be extended in the coming year.

Bibbulmum Track:

Further adjustment has been undertaken and the track is almost ready for general use. Short sections of the track have been used by many Duke of Edinburgh candidates, and by walking clubs and scouts.

Quarantine:

The establishment of quarantine areas in State Forest has been shown to cause no serious disadvantage to recreation activity.

Recreation Vehicles:

Trail bikes and four wheel drive vehicles have caused some localised problems of plant and soil stability. Rationalisation of the use of these vehicles is required in order to reduce damage to the forest and prevent interference with the enjoyment of other forest users.

REFORESTATION

Hardwood Logging

During the year 40 275 hectares of hardwood forest were logged and treated for regeneration.

Forest Type	Maiden Bush	Cut-over Bush	Total Area
	hectares	hectares	hectares
Jarrah	5 573	30 377	35 950
Karri	1 552	1 741	3 293
Marri	9	....	9
Wandoo	....	631	631
Blackbutt	....	....	....
Yellow Tingle	....	....	....
Jarrah and Wandoo	392	....	392
TOTAL	7 526	32 749	40 275

Jarrah Forest

No silivcultural treatment was carried out within the area recently proclaimed as a forest disease risk area.

Outside the disease risk area, 258 hectares of dieback affected forest was prepared for regeneration. Some of this area has already been regenerated from seed trees and hand planting of the balance will be delayed to July 1976 after sufficient winter rains have fallen.

Five hundred and eighty six hectares of wandoo forest have been regenerated successfully under a prescription specifying cull felling and creation of ash beds.

Karri Forest

Boranup

Cull felling for regeneration has been carried out over 179 hectares and 17 hectares of regenerated forest have been thinned.

Southern Karri Forest

More than 2 000 hectares of cut-over karri forest were successfully regenerated. A similar programme is planned for the 1976–77 summer. Regeneration was achieved by burning logging slash and ground cover beneath a seed tree canopy. Seed supply was adequate and will be so until January, 1977.

A number of new techniques were introduced in the regeneration burning programme, including a simple and accurate fuel moisture prediction system, the use of locally developed "aerial-oblique" photographs as an aid to burn planning and control, and the use of pre-set electrical incendiary devices.

To provide sufficient seed stocks for artificial planting when required, a new seed extraction kiln has been constructed and is operating satisfactorily.

Reforestation after Bauxite Mining

Due to delays in winter rains, the 162 hectares of bauxite mined areas at Jarrahdale and Dwellingup will not be planted until July 1976.

Fifty six hectares at Jarrahdale will be planted by the Forests Department using trees raised at the Hamel nursery. One hundred and six hectares will be planted at Dwellingup by Alcoa using trees raised at their nursery in Jarrahdale.

Six West Australian species and four Eastern States species will be planted over the bulk of the area though a significant area has been set aside for a multi species trial involving thirty three species.

A Working Group consisting of officers from the Forests Department, Soil Conservation Service, and Metropolitan Water Board assisted by staff from Alcoa have continued to visit the two mines during the year to determine methods of erosion control and revegetation.

Reforestation after Mining Gravel

Site preparation has been completed for the reforestation of gravel pits scattered over a wide area of State Forest but planting will be delayed to July 1976 in some instances due to lack of winter rains.

Seventeen hectares of the area comprises pits formerly used by the Main Roads Department, and the expenditure incurred on revegetating the area is recouped from that Department. The continued interest of the Main Roads Department in reforestation is acknowledged.

Coal Mining Rehabilitation

The Department continued to participate in the combined working group in which the Mines Department, the Department of Agriculture, the Department of Industrial Development and the coal mining companies are also represented, with the object of establishing guidelines for rehabilitation of State Forest after coal mining.

AFFORESTATION

Softwood Planting Programme

An area of 2 727·6 hectares of new pine plantation was established in 1975. This is well short of the 4 000 hectares programme which is recommended to supplement the State's timber needs of the future.

During the year the Department finalised purchase for pine planting of three properties totalling 781 hectares in the Blackwood Valley.

Current Departmental Plantation Areas

The distribution of plantation areas by Divisions as at December 1975 was as follows:

AREAS OF PLANTATIONS
(Hectares)

Division	*P. radiata*	*P. pinaster* and other species	Total
Wanneroo	692·0	15 401·4	16 093·4
Metropolitan	10·6	396·4	407·0
Mundaring	677·3	710·4	1 387·7
Kelmscott	384·4	1 132·0	1 516·4
Dwellingup	576·5	67·5	644·0
Harvey Hills	1 904·8	25·9	1 930·7
Harvey Coast	852·1	2 171·8	3 023·9
Collie	2 259·7	85·3	2 345·0
Kirup	4 669·1	84·1	4 753·2
Nannup	4 477·7	110·2	4 587·9
Busselton	762·7	1 155·9	1 918·6
Manjimup	207·9	....	207·9
Pemberton	213·8	44·4	258·2
Totals	17 688·6	21 385·3	39 073·9
Experimental Planting	219·3	46·3	265·6
Grand Total	17 907·9	21 431·6	39 339·5

Areas planted in 1975 totalling 2 728 hectares are shown below:

1975 PLANTING
(Hectares)

Division	*P. radiata*	*P. pinaster*	Other Species	Total
Wanneroo	39·0	1 239·8	....	1 278·8
Mundaring	....	....	....	....
Kelmscott	....	....	....	....
Harvey Hills	....	....	....	....
Harvey Coast	227·8	58·7	....	286·5
Busselton	67·2	....	....	67·2
Collie	111·6	....	....	111·6
Kirup	589·4	....	....	589·4
Nannup	394·1	....	....	394·1
	1 429·1	1 298·5	....	2 727·6

400 hectares of mature plantation were clear felled.

Private Forestry

Private interests advised that they planted 944 hectares of pine in 1975, bringing the total area of privately owned pine forest in the State to approximately 7 614 hectares as at March 1976.

During the year the Department answered 82 queries on commercial pine planting and carried out 9 site inspections

A report on pine forestry investment companies in Western Australia, compiled by the Bureau of Consumer Affairs with assistance from the Forests Department, was tabled on the 11th May, 1976, in the Western Australian Parliament.

Roundwood Production

Roundwood production from Departmental plantations, mainly in the form of thinnings amounted to 105 567 m³ which was a decrease of 23 519 m³ or 18·22 per cent on last year's figure. The following figures show the trend in pine log removals in recent years:

Year ended June 30	m³ (U.B.)
1950	8 440
1955	20 131
1960	28 394
1965	48 766
1970	81 281
1971	86 245
1972	90 761
1973	100 420
1974	123 393
1975	129 086
1976	105 567

Removals by category and by species were as follows:—

Category	Total m³
Sawlogs and Peeler Logs	45 083
Other Log Material	60 484
	105 567

Roundwood removals from the various plantations were as follows:—

	m³
Wanneroo (Gnangara)	35 600
Metropolitan (Collier and Somerville)	15 278
Mundaring	8 014
Gleneagle	462
Harvey	10 180
Collie	4 374
Kirup (Grimwade)	19 791
Nannup	....
Busselton—	
Ludlow	1 831
Keenan	6 243
Pemberton	3 064
Miscellaneous	730
	105 567

Sawn production from all sources was 16 258 m³ which is a decrease of 10 828 m³ on 1974/75 production.

Tree Nurseries

For many years the Forests Department has actively encouraged and fostered the planting of trees for shelter and amenity purposes throughout the rural areas of the state by means of advice and by provision of trees at minimum cost. Last year Hamel and Narrogin nurseries sold 207 186 trees for farm and town improvement and for roadside beautification.

These nurseries also produce eucalypt seedlings for rehabilitation and amenity planting in State Forests.

Nursery production for the year is summarised in the following table.

	Number of Plants Sold				Departmental Use				Total Plants	
Nursery	Pots	Trays	Open Rooted	Total	Pines	Eucalypts	Other	Total	No. of Species	Total
Hamel	60 184	16 400	52 024	128 608	9 000	130 050	....	139 050	166	267 658
Narrogin	76 118	2 460	....	78 578	820	16 997	....	17 817	104	96 395
TOTAL	136 302	18 860	52 024	207 186	9 820	147 047	....	156 867	....	364 053

Departmental pine nurseries raised some 3·9 million tree seedlings for the afforestation programme. About 3·4 million of these were used in departmental planting and 534 000 were sold for private projects.

Seed Supplies

The Departmental seed store continued its important role in the collection and supply of seed of Western Australian trees. Demand for seed of the eucalypts of the dry interior continued both from overseas and Australian interests. The value of sales during the year amounted to $11 273.

PROTECTION: FIRE

Area Protected

	hectares
State Forest under protection	1 833 078
Indigenous forest	1 785 438
Pine plantation	39 339
Mallet plantation	8 301
Forest Act Timber Reserves	117 064

A further 800 000 hectares of other public lands and private property were afforded some measure of protection due to their strategic importance relative to State Forest or their forest value.

The Fire Season

The rainfall in the forest area during winter 1975 and extending through spring to early summer was below normal.

Rainfall in January and February 1976 was well above normal due to the influence of tropical cyclones "Wally" and "Vanessa".

March rainfall was below normal and April above normal. May and June were well below normal rainfall.

Daily maximum temperatures between October and January were close to normal. In late summer and autumn temperatures remained well above normal which combined with dry conditions in March and May to protract the fire season.

The data below were recorded for forest weather stations at Dwellingup (jarrah) and Pemberton (karri).

	Jarrah		Karri	
	Average	1975/76	Average	1975/76
Rainfall—				
Annual (mm)	1 306	1 186	1 256	1 187
October to April inclusive	280	305	318	372
Number of Wet Days—				
Annual	146	119	183·8	161
October to April inclusive	48	40	72·3	60
Temperature—				
Mean Maximum October to April °C	25·2	25·8	23·0	23·3
Days of 38° or over (No.)	3·8	4·0	1·3	....
Days of 32° or over (No.)	28·5	27·0	14·0	20·0
Relative Humidity—				
Days of 10% minimum or less (No.)	1·5	1·0	0·3	....
Days between 11% and 15% (No.)	6·0	4·0	1·7	....
Days between 16% and 25% (No.)	30·2	24·0	9·1	2·0
Fire Hazard—				
Number of Dangerous Days	10·2	14·0	1·5	....
Number of Severe Days	22·0	32·0	6·5	13·0
Mean Hazard	5·8	6·5	4·8	5·2

Prescribed Burning

The area of prescribed burning for the past five fire seasons is shown in the table below:—

	Season				
	1971/72	1972/73	1973/74	1974/75	1975/76
	hectares	hectares	hectares	hectares	hectares
State Forest—					
Hand burning	88 734	114 822	74 716	78 686	64 497
Aircraft burning	137 562	190 438	253 699	287 925	215 513
Total	226 305	305 260	328 415	366 611	280 010
Advance, Top disposal and Regeneration Burns	9 583	5 314	12 035	2 378	4 532
Plantations—					
Clearing burns	2 569	2 520	1 139	3 088	2 872
Burning under pine canopy	1 168	687	1 028	2 494	1 958
Total	3 737	3 207	2 167	5 582	4 830

Aerial and hand prescribed burning was below the past three seasons due to deferment of a number of areas in the dieback quarantine area to permit photography of diseased forest, and emphasis on completing a record area of karri regeneration burning.

Additional aerial prescribed burning was completed for the Army at the Bindoon Training Area (4 000 ha.) and for the Avon Valley Protection Committee (1 800 ha.). Prescribed burning was also undertaken for the Bush Fires Board, the National Park Authority, the Fisheries and Wildlife Department and the Public Works Department.

Detection

The period between first and last watch for wildfires was longer for pine plantations than for indigenous forest.

	Karri	Jarrah	Pine
First Watch	10/11/75	1/11/75	1/11/75
Last Watch	11/4/76	11/4/76	9/5/76

Following the success of spotter aircraft for fire detection in 1974/75 season, aircraft surveillance was expanded to include most State forest outside the Blackwood Valley and Wanneroo pine plantations. Seven aircraft replaced 23 towers which previously covered this area. Aircraft continued to provide earlier detection of smokes than towers, and rapid reconnaissance information which improved the efficiency of fire attack.

Aerial detection trials were carried out over pine plantations in the Blackwood Valley and achieved improved area coverage and earlier location of smoke.

Wildfire

The table below shows number of fires attended and area burnt during the past five fire seasons:—

	Season				
	1971/72	1972/73	1973/74	1974/75	1975/76
Number of fires attended—					
Indigenous State Forest	134	211	104	139	99
Adjacent private property and Crown Land	59	105	86	79	64
Pine plantation	56	61	76	36	20
Total Number	249	377	266	254	183
Area of State Forest fires (hectares)—					
Indigenous Forest	5 140	7 684	1 017	8 850	3 883
Pine plantation	3	21	19	40	8
Total area	5 143	7 705	1 036	8 890	3 891

The total number of fires attended was the lowest since 1948. Forty per cent of fires in State Forest and adjacent private property resulted from carelessness or suspected deliberate lighting by the public. Twenty seven per cent started from escapes from burning operations and twelve per cent started from lightning strikes.

The Department's forces participated in the suppression of a major private property fire at Charlie's Creek, east of Donnybrook. The value of spotter aircraft in reconnaissance and co-ordination between the Bushfire Brigade and Forests Department was well demonstrated at this fire. Notable saves of private property were also achieved at Northcliffe, Collie, Wanneroo and Harvey in co-operation with local brigades.

General

Significant advances were achieved for a number of fire control techniques.

The Department has developed a water-borne retardant chemical at considerably less cost than proprietary brands. This retardant is fully operational for tankers where effectiveness was well demonstrated in improved mop-up of fire's edge and a significant reduction in escapes from prescribed burning and wildfires.

Prescribed burning in the southern forest has been markedly improved by the development of new tables and aids for prediction of fire behaviour, and an electrical ignition device for karri regeneration burning.

The aerial burning technique has been adapted for karri regeneration burning and for plantation clearing burns.

Fire equipment was improved. Nine 3 000 litre tankers and retardant mixing equipment were designed and constructed within the Department. Cheaper and lighter hose fittings were developed.

Trials in relay pumping were carried out to develop techniques and equipment for rapid transport of water to the fire face, primarily for plantation fires.

Instruction in fire control was provided for 45 Departmental officers and twelve Bushfires Board officers during three, week-long courses.

Departmental officers attended Shire bushfire advisory meetings, participated in Bushfires Board seminars and provided demonstrations in use of fire retardant chemicals. Assistance was provided to the Australian National University in the fire control course.

PROTECTION: DISEASE

Following the passing of the Forests Act Amendment Act by State Parliament in December, 1974, and proclamation of Regulations in 1975, an area of 507 600 hectares was declared a disease risk area and placed under quarantine to allow detection of dieback disease in January, 1976.

This disease risk area covered forest between Kirup and Mundaring (see plan) and includes high quality susceptible jarrah forest not yet heavily infected with disease.

The delay which took place between the time of proclamation of the amendment Act and proclamation of the Regulations was deliberate. It enabled a public relations programme to be carried out in which the co-operation of the considerable number of organisations, institutions and private persons was canvassed.

The outcome of the programme was most gratifying and the eventful declaration of the quarantine areas was accepted by the great majority then being fully aware of the reasons for such drastic yet necessary action.

Quarantine restrictions will be maintained until disease areas are mapped, permitting implementation of hygiene measures to avoid spreading disease.

The Department's administrative capacity was fully extended in initiating quarantine on such a large scale but it is now possible to extend quarantine into susceptible southern forest. Investigations and action will proceed during the coming year.

Implementation of Quarantine

Implementation of quarantine required vehicular access to be restricted to essential services using only safe routes to avoid spreading disease, and demarcation of public access routes.

Establishment of the disease risk area required the signposting of roads and the boundary. A total of 4 000 signs were erected for this purpose. Gates were constructed at entrances to restricted access routes.

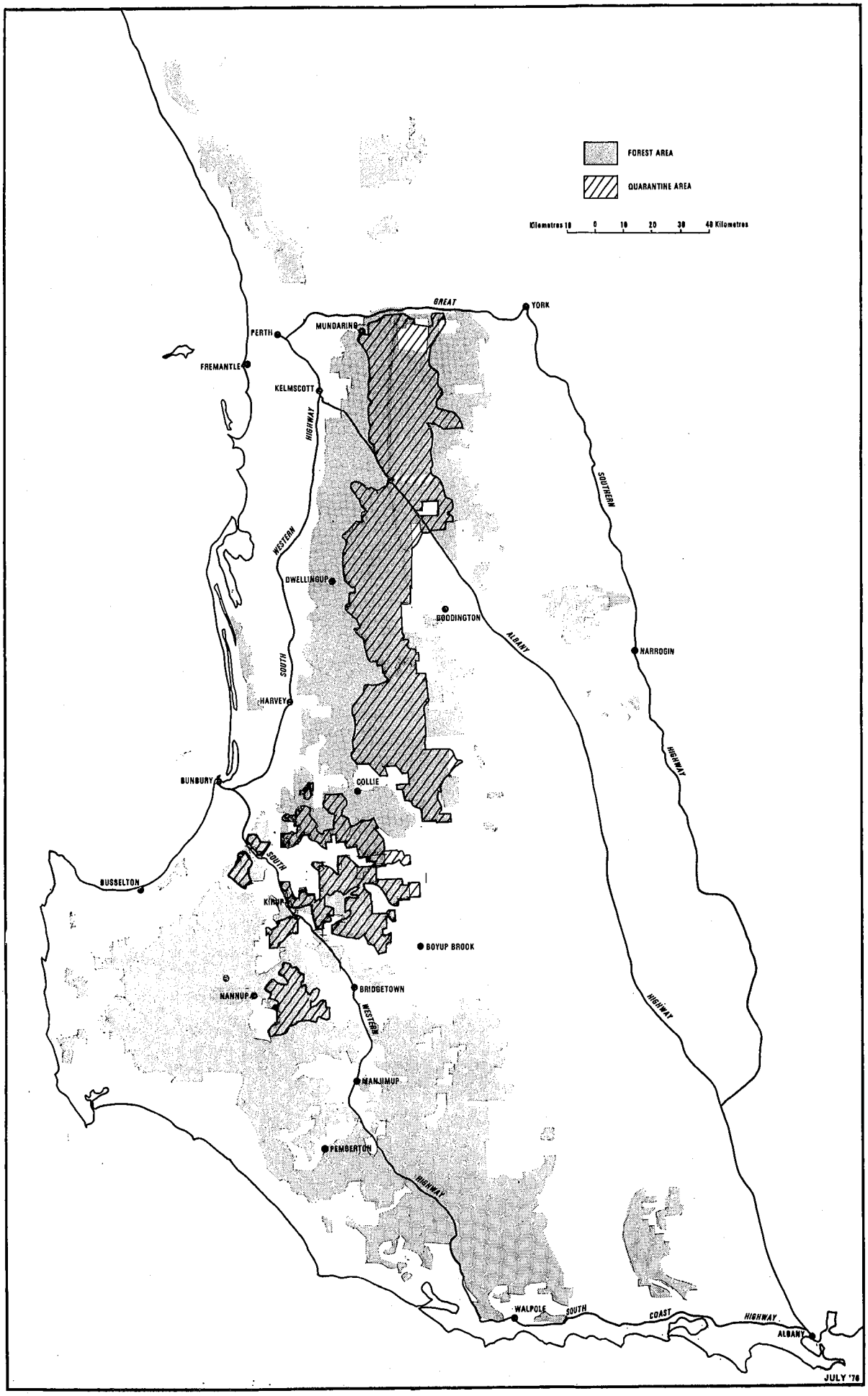
A permit system was evolved for essential services specifying conditions of entry and approved routes and wash-down facilities were developed to ensure cleanliness of vehicles.

An instructional programme for acquainting permit holders and forest personnel with quarantine requirements was implemented.

Control Procedures

All vehicular entry into the quarantined areas is by permit issued by a forest officer under the Regulations of the Forest Act Amendment Act. In addition to specifying routes, permits lay down stringent requirements governing vehicle cleanliness and road conditions.

Boundary roads have been regularly patrolled on the ground and supported by surveillance from aircraft to detect and deter illegal entry into quarantine. The number of breaches has been relatively few, indicating public awareness and co-operation with quarantine regulations. To date


FOREST AREA
QUARANTINE AREA
Kilometres 10 0 10 20 30 40 Kilometres
GREAT
YORK
MUNDARING
PERTH
FREMANTLE
KELMSCOTT
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SOUTHERN
WESTERN
DWELLINGUP
BODDINGTON
ALBANY
NARROGIN
SOUTH
HARVEY
HIGHWAY
BUNBURY
COLLIE
SOUTH
BUSSELTON
KIRUP
BOYUP BROOK
MANNUP
BRIDGETOWN
WESTERN
HIGHWAY
NANNUP
PEMBERTON
HIGHWAY
WALPOLE
SOUTH
COAST
HIGHWAY
ALBANY
JULY '76

Examples of the sign-posting used in association with forest quarantine.

seven illegal entries have been confirmed. Enquiries revealed breaches were due to ignorance of regulations and offenders were cautioned.

Essential forest management practices in quarantine areas have been modified for dieback hygiene e.g. fire suppression and prescribed burning.

RESEARCH

The work of the research branch covers all four aspects of forestry proclaimed by the departmental motto—protection, production, conservation and recreation. The studies are carried out at five centres—the central Institute of Forest Research and Protection at Como, the two large regional research centres at Dwellingup and Manjimup, and two small centres at Wanneroo and Busselton. Although the research emphasis varies from centre to centre, they all cover both the productive and the protective functions of forestry.

Como Institute

At the central Institute, the two chief functions are administration and support of regional centres. This support takes the following forms:

(a) chemical analysis of soils, plant material and water samples

(b) statistical analysis of experimental results, and advice on the design of experiments

(c) identification of plants, in conjunction with the State Herbarium

(d) editing of completed research reports, and their processing for publication

(e) liaison with other research organisations.

In addition, the staff of the Institute is also involved in land use planning, and in delineation of special management areas for the conservation of flora and fauna. A considerable amount of hydrological research is also carried out in the Helena catchment, the nearest one to the Institute.

Chemical Analysis

As part of the analytical work qualitative relationships have been worked out between electrical conductivity of water samples (EC) and such parameters as total soluble salts (TDS), sum of cations and chloride concentration. This has been made possible by the fact that the ionic composition of all streams of the south-west is very similar. The main cations represented are, on the average, Ca (6 per cent.), Mg (21 per cent.), and Na (72 per cent.). The main anions are Cl (86 per cent.), H CO3 (9 per cent.) and SO 4 (five per cent.). The composition of local waters is thus markedly different from inland water elsewhere, where the dominant ions are Ca and SO 4.

Detailed analysis of soil samples obtained from deep bores has shown that electrical conductivity of 1:5 soil-water suspensions is closely related to soluble salts and chlorides present in the soil, and regression equations expressing this relationship quantitatively have been calculated.

Hydrology of Helena Catchment

Hydrological studies of the Helena catchment indicated that no part of the catchment is free from potential salt problems. Base flow salinity, that is the salinity corresponding to late flow prior to drying up of the streams, was found to underestimate the salinity of adjacent aquifers considerably. Nevertheless, it has been possible to relate increase in salinity to the change in land use which caused it. On this basis, farm clearing has been found to have by far the greatest effect, followed, in decreasing order, by establishment of exotic plantations, ring barking, jarrah dieback and logging.

Chemical analysis of deep cores from a pair of catchments indicated that the storage of salt within the soil is related to site-vegetation types. There was a tendency for salt to be accumulated above groundwater level but below surface in fine textured soils, and to be absent from coarse-textured soils. The salinity of perched groundwater tables was found to be markedly different from that of the underlying semi-confined aquifers, which is generally much higher.

Dwellingup

The Dwellingup regional research centre is primarily concerned with the protection and management of the northern jarrah forest, which, among other things, includes the bulk of currently utilized catchments supplying the southern half of the State.

Jarrah Dieback

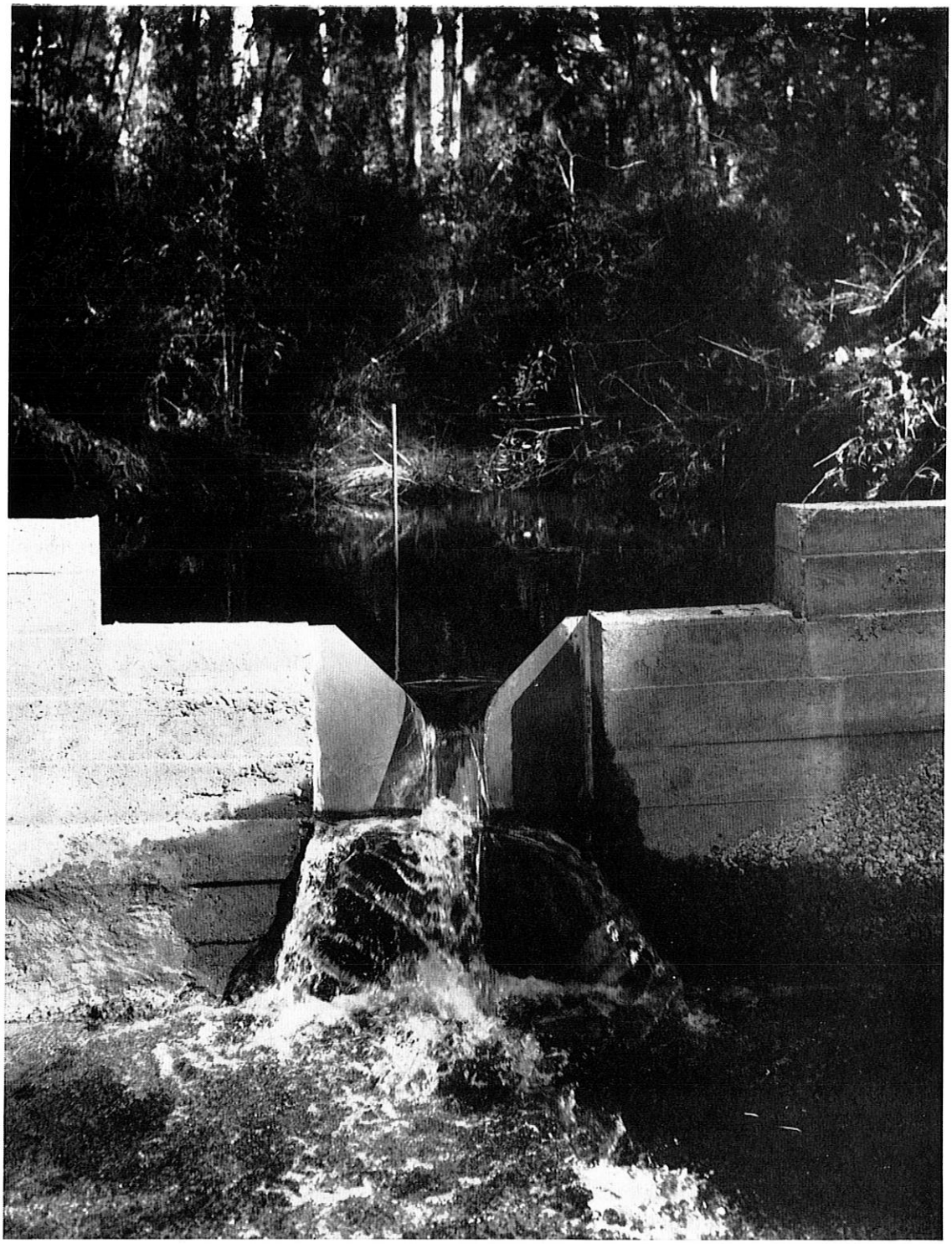
The chief accent is on the jarrah dieback disease. The thrust of dieback research is currently the fostering of environmental and biological conditions which inhibit or reduce the destructive effect of the pathogen, the root rot fungus *Phytophthora cinnamomi.* The most promising lead under investigation is the modification of the soil environment by changes in vegetation. There is increasing evidence that dense stands of leguminous fireweeds, particularly acacias, produce environmental conditions which adversely affect the pathogen. The dense shrub layer and the associated thick litter layer, which they create, speed up moisture withdrawal and slow down warming up of the soil, thus reducing the period during which the pathogen is active. In addition, glasshouse studies have shown that the seedlings of the main timber species, jarrah, are far less susceptible to the attack by the pathogen when grown in association with the acacias, than when grown in association with *Banksia grandis*, the main understorey species in jarrah forests. Two acacia species—*A. pulchella* and *A. extensa* were shown not only to be completely resistant to the disease, but even capable of suppressing propagules and mycelium of the pathogen within their rhizosphere (root zone).

Experimental fires have been used to stimulate the germination of these species in the field, where an obstacle to their growth has arisen in the form of heavy grazing by kangaroos and wallabies.

Hydrology

The second major thrust is in the field of forest hydrology, where the aim is to relate the quantity and quality of water yield to climate, topography, soils and vegetation. Of particular importance is the effect of modification of these factors by dieback and human activity. The study comprises 40 stream stations, 25 rain gauges and 45 bores. The studies are mainly carried out in the South Dandalup River and Yarragil Brook catchments, which are readily accessible from the research centre and cover a wide environmental range. The data from the first full year of measurement have now been analysed.

The results indicated that there are marked variations in the yield of both salt and water within the catchments. For example, water yield per unit area from a western sub-catchment of the South Dandalup catchment was 20 times greater than that from an eastern sub-catchment. Weighted average salinity of stream flow was also variable. Within the South Dandalup catchment weighted average stream salinity varied from 95 ppm to 705 ppm. Although both the South Dandalup and Yarragil catchments currently yield water of acceptable quality, surveys of the salinity of ground water indicate that disturbance of the vegetation in some sub-catchments could cause a marked increase in stream and consequently reservoir salinity. It is estimated that over 50 per cent of the South Dandalup catchment has a ground water salinity exceeding 500 ppm. The potentially saline area of the catchment is currently yielding only a small quantity of water but disturbance of the vegetation could cause significant discharges of salt into the reservoir. The preliminary results from these studies also suggest that there is a large potential to increase water yield in non-saline sub-catchments by deliberately reducing canopy cover.



Notch-weir stream gauge south-east of Manjimup.

These studies form part of a research programme which is aimed at developing practical catchment management techniques which will maximise water yield and minimize salt flow in northern jarrah forest catchments.

Rehabilitation of Land Mined for Bauxite

The Dwellingup research team actively participates within the programme set up by the Hunt Steering Committee to study the effects of bauxite mining.

A major project initiated in the current year is a field trial aimed at quantifying the effect of different ground cover species on the turbidity of water which could run off bauxite mine sites. Preliminary results indicate that heavy mulching is the only method by which water quality can be maintained during the initial autumn and early winter period. However, it is possible to achieve complete ground cover, and hence stabilization of the mine pit surface by the second year following min-

ing, by direct seeding of native legume species. If techniques can be designed to reduce water turbidity to acceptable levels, it will be possible to discharge water, which is currently contained within the mine pits, directly into the surrounding forest. In saline areas the ability to discharge water from the surface of the pits will reduce the potential for salination. In non-saline areas reduced engineering costs for impoundment could be significant.

Several alternatives to current rehabilitation techniques have been established on a semi-operational scale. Pits have been vegetated with a mixture of tree species planted at varying densities to form a woodland-type forest. The object of these trials is to provide examples of various types of rehabilitation for practical evaluation.

Currently, rehabilitation of mine sites is restricted to the mine pit surface. A study of the potential for total catchment rehabilitation has been carried out in the catchment of the Seldom Seen Brook which is located near Jarrahdale. Aerial and ground surveys were used to define the areas of the catchment disturbed by mining and jarrah dieback. From this study it was concluded that only 12 per cent. of the original forest would remain because of the combined effect of jarrah dieback and bauxite mining. The results of this pilot study indicate that rehabilitation of bauxite mine sites should be integrated with total catchment rehabilitation.

Other Aspects

There has been only low-level maintenance work carried out in the field of recreation and fauna conservation, as the officer responsible is currently on postgraduate study overseas.

Manjimup

The work of the Manjimup regional research station is centred on the management of the karri and southern jarrah forests. The aim of the research is primarily the development of silvicultural and protection techniques combining maximum efficiency with minimal adverse environmental impact.

Karri Silviculture

Studies of flowering and seeding of karri have continued to provide sound timing for key silvicultural operations such as seed collection and natural regeneration of logged over areas. The optimum period for these operations will be from spring of 1976 to autumn of 1977.

Various methods of seed collections from felling areas have been tested. These include collection of twigs and transport to a seed kiln, which offers the possibility of year round collection, and collection of seed in the field during hot weather by placing capsules on a tarpaulin to allow solar drying.

Due to the current requirements for storing large quantities of karri seed it is necessary to reduce the bulk of the seed to acceptable levels by removing as much chaff and twig material from the seed lots as is possible. To this end experiments have been conducted into various techniques of seed cleaning, and these basically revolve around winnowing in an air stream.

Trials of direct seeding methods have been established in several localities, which between them cover the full range of karri forest soil types. In all the trials, the regeneration stocking is well above minimum acceptable levels. New research includes a replicated study of the effects of soil type, sowing time and sowing rate on the success of direct seeding operations. Approximately 25 hectares are now included in new direct seeding trials.

There is also a range of species planting trials. These include karri espacement trials, karri/marri mixed planting trials, marri planting trials and a test to determine the most satisfactory time for karri to be planted.

Hydrology

The impact of log harvesting and subsequent silvicultural operations is studied by a combination of broadscale stream sampling and more localized, but more intensive coupe monitoring.

Sampling of a further 44 streams in the Donnelly and Shannon drainage basins was begun in 1975 with the object of determining both the actual salinity levels and the possible source of the stream salination. Further deep drilling, soil coring and analysis was carried out by the C.S.I.R.O. Division of Land Resources Management, to enable a more accurate definition of the salt sensitive areas.

Of the original 5 coupes in the project planned by the Kelsall Steering Committee to investigate the effects of the woodchip project, one has been relinquished to the Water Resources Section of the Public Works Department for use in paired catchment studies. Concrete streamflow measuring weirs were constructed in two more coupes thus completing the construction programme for all coupes. Rainfall, stream flow, stream salinity and stream sediment load were checked thrice weekly until November, then once weekly until April when intensive measurement recommenced to correspond with the winter rainfall.

A system of deep bores and neutron probe access holes in all coupes was monitored monthly to measure movements in soil moisture levels, depth to water table and soil water salinity. A topographical survey of all coupes was completed to map access tracks, weirs, bore holes and catchment boundaries. In addition to this, Public Works Department surveyors levelled all bore holes.

Soil and vegetation surveys have been completed for all coupes to allow monitoring of vegetation changes after logging.

Assistance has been given to the Public Works Department Water Resources Section in the selection and preparation of sites for use in paired catchment studies.

Conservation of Flora and Fauna

In a study of the ecological effects of a hot fire in the karri forest, faunal trapping and bird surveys are being continued on a three monthly basis. In the burnt areas the bush rat population appears to achieve the pre-burn equilibrium phase approximately 5 years after burning, following a large increase in numbers at 3 years.

Studies involving holes in felled trees indicate that less than 4 per cent. of the holes are occupied by fauna.

Bird surveys were initiated in jarrah-marri forest to determine changes in population following a woodchip operation. To complement this study further studies in karri-marri forest are being initiated.

New research includes a project to study the effect of logging operations on fauna (in particular mardos and bush rats).

Studies of life cycles of indigenous scrub species continued throughout the year. In most fire-weed acacias, signs of decadence and mortality appear at the age of nine years. The karri wattle (*Acacia pentadenia*) is an exception, being larger and longer lived. The field studies are complemented by germination studies in the laboratory, which include many wildflower species as well as the main shrubs of the region.

All studies completed so far show that although the log harvest and the subsequent silvicultural treatments strongly disturb the ecosystem, both the fauna and flora immediately begin to return toward a new equilibrium. These changes closely parallel the disturbance caused by wildfires, to which the entire ecosystem is fully adjusted.

Fire Protection

Although the fire protection unit is situated at Manjimup, its research is not confined to the karri region alone.

Research work during the year has been directed toward:

- refinement of Fire Behaviour Tables
- appraisal of karri regeneration burning techniques
- study of *Pinus radiata* fire behaviour in the Blackwood Valley.

Development of a comprehensive fire behaviour and fuel moisture prediction system for W.A. forests has now been finalized. The tables will be available for distribution before the next burning season. The tables have been explained to all officers and have been successfully implemented during last fire season by a number of Divisions. A computer program has been written which permits prediction of daily moisture contents of litter within all major fuel types. The program can be readily accessed through the terminal facility at Como and requires only the normal morning weather details as inputs. This system was satisfactorily implemented during the past fire season by the three southern divisions. The tables have undergone various field tests including a series of hot, fast fires lit in 10-year-old dense karri scrub at Solai, near Manjimup. Ten fires were lit under extremely hot and dry conditions in 0·7 hectare plots isolated within a large recently burnt area. Observed fire spread rates ranged from 35 to 1 000 metres/hour, flame heights ranged from 1·6 to 15 metres, and scorch heights ranged between 25 and 45 metres. Fire behaviour predictions compare satisfactorily with observed values. The fire behaviour in a number of southern forest prescribed burns was observed and measured as a further test of the prediction performance of the fire behaviour tables.

1975/76 saw the refinement of electrical ignition of logging slash and its operational acceptability with the successful completion of four field trials. The field trials took place in summer and autumn in areas of pure karri cut to seed trees and a mixed marri/karri stand cut to karri seed trees. All areas combined heavy fuel accumulations with poor accessibility making them ideal to exploit the principal advantage of the electrical ignition system, i.e. high crew safety.

A summary of the burns appears below—

Coupe No.	Area (ha)	No. Circuits and length (m)	Incendiary spacing (m)	No. of incendiaries	Time to set up (man hrs)	Cost/ha $
Poole 4	40	2 x 3 000	75 x 25	200	13	5
Swarbrick 4	15	3 x 1 500	100 x 25	70	7	7
Grey 1	60	4 x 1 200	75 x 50	125	16	3
Frankland 8	30	3 x 1 300	100 x 50	60	11	4

Next burning season electrical ignition should be used on a routine basis in suitable areas.

Fuel quantity consumption and seedbed production were measured as indicators of burn quality on fourteen burns conducted in spring and autumn in the 1975/76 program. All burns produced excellent results. Two interesting trends have been observed. Seedbed production is largely independent of burn intensity as measured by fuel removal. Autumn burns were however marginally better than spring ones. Fuel removal is largely independent of heavy fuel moisture content as measured by Byram Drought Index. This means that there is no dominating reason why burns should be conducted in spring or autumn, nor why they be conducted on days of extreme hazard to achieve satisfactory results.

A study of fire behaviour, lighting techniques and fire effects in *Pinus radiata* stands on steep, drought prone sites carrying heavy fuel has been initiated at Nannup. The study is being conducted on a large scale basis in order to observe the effects of multiple fire behaviour and scorch damage, and to develop safe and productive methods of burning such difficult fuels. To date, 44 hectares of deep needlebed fuels have been burnt and 37 separate fires have been measured during May and June. Future burning trials will include tops disposal and advance logging burns in compartments in the Blackwood Valley.

Busselton

The bulk of the research carried out at Busselton field station is associated with the Sunkland pine plantation project. The project itself is now at the pilot plantation stage, about 150 hectares being planted each year to enable further developmental research to be carried out and to provide facilities for monitoring environmental impacts.

Hydrology

A large research project is concerned with monitoring the impact of the plantation project on hydrological values. During the past year two new stream gauging stations were constructed and one older gauging weir was replaced. Close attention has been given to instrumentation, one Stevens A 71 continuous water level recorder being installed on the largest weir on Apostles Brook, and three smaller Stevens Type F recorders being installed on the sub-catchment weirs. The pilot plantation area is located almost entirely within the Apostles Brook catchment. In association with the Public Works Department a paired catchment study is in progress, comparing the hydrological regime in the Apostles Brook catchment with the adjacent St. Paul's Brook catchment. No planting will take place for several years. A further bore-drilling programme was completed in the Apostles Brook catchment during the 1976 summer. There are now 20 bores in this catchment, ranging in depth from 7 metres to 20 metres. These will provide valuable data for the interpretation of catchment behaviour. Monitoring of salinity (TDS) levels in a large number of streams in the Sunkland continued and the results of three years' research on this aspect have been written up for publication. Streams arising within the Sunkland have very low levels of TDS, weighted average figures generally not exceeding 200 mg/litre, and all available data support the hypothesis that within the Sunkland sedimentary plateau, changes in the land use will not lead to a significant rise in salinity of the runoff.

Pine Nutrition

A large number of field trials are in progress to provide information on the nutritional requirements of *Pinus radiata*, *Pinus pinaster* and several eucalypt species in the Sunkland. The first diameter measurements of a 1971 experiment comparing various levels of initial phosphate application in the Sunkland have shown that higher initial applications are associated with markedly increased growth responses. The table below presents pooled data for four replicates of this experiment established in 1971 on four Sunkland experimental plots.

Treatment 1971 (gm/tree superphosphate)	Mean Diameter 1976
57	5·42
114	5·99
227	6·28
454	7·01
908	7·02

These results are in marked contrast to those coming from replicates of the same experiment on deep coastal sands near Harvey, where there was no growth response above the lowest level of phosphate application.

Nutritional research since 1971 has lead to the following tentative fertiliser regime for the Sunkland area:

Year 1 (at planting)	150 gm/tree superphoshpate, spot treatment.
Year 1 (spring)	first foliar spray 5 per cent zinc sulphate, 5 per cent. manganese suplhate and 0·2 per cent. copper sulphate applied in about 500 litres/hectare water.
Year 3	400 kg/hectare superphosphate broadcast.
Year 3	second foliar spray as above.
Year 8	400 kg/hectare superphosphate broadcast.

It is possible the fertilizer to be applied at age 8 will be a nitrogen and phosphate mixture rather than phosphate alone, as marked responses to NP fertilizer have been obtained on similar soils in the Collie coal basin.

Trials with foliar spraying to correct zinc deficiency emphasized the requirement for early application. Pines planted in June 1975 and sprayed in November are healthy. Later spraying in January or April failed to prevent symptoms of deficiency.

In the Sunkland, where active growth commences very soon after planting and continues for most of the first summer, there appears to be a high demand for zinc in the first growing season. It is likely a similar situation prevails in *Pinus radiata* planted on the west coastal plain near Harvey. Other field experiments in that area have indicated that, although superphosphate is necessary for successful pine establishment, it is not the main factor limiting growth. Neither high levels of phosphate application at planting nor refertilisation at age 7 or 15 have produced worthwhile growth responses, although there is strong evidence that a combined nitrogen-phosphate fertiliser will give a marked growth response at age 15. There are indications that availability of the minor elements zinc and manganese requires further study during the early years of the crop rotation.

Integration of Agriculture and Forestry

Research into various aspects of the integration of livestock grazing and pine silviculture have continued. The Wonnerup grazing trial continued to yield valuable data on the change with age in grazing potential of pasture under pines. At a plantation age of 6 years the grazing capacity of the grass under the pines was about 50 per cent of that for open pasture and at age 8 it was still 40 per cent.

Further experimental areas of clover dominated pasture have been established in the Sunkland pilot plantation area near Jarrahwood. A special wide-spacing experiment was established on former farmland to study the possibility of inter-row cropping between the pines in the early years of an agriculture/forestry enterprise.

Thinning

An assessment of wind damage in a thinning experiment in 17 year old plantation at Mungalup has provided a useful illustration of the value of heavy thinning in reducing the incidence of wind damage. Damage in this case was defined as wind bent or broken main stems.

Mean Stocking (stems per hectare)	Wind Damaged (total number)
964	111
708	78
544	42
494	7
371	16
239	0

In areas prone to wind damage it is clearly important to thin heavily to maintain tree stability.

Wanneroo

The work of the Wanneroo station is centred on the silviculture and genetic improvement of the maritime pine, *Pinus pinaster*. However, some experimental work involving *Pinus radiata* is also undertaken. Finally there is a considerable research programme aimed at relating pine silviculture to hydrology, as the coastal plantations are currently utilized for the pumping of water from both shallow and deep aquifers, for use in the nearby metropolitan area.

Choice of Species on North Coast Plain

Large 'pilot' plantings, totalling 100 hectares, of *Pinus radiata* were established at Wabling, Pinjar and Moore River in 1972. These are adjacent to 'pilot' plots of *Pinus pinaster*, planted in 1967 to define the management limits for the species. The radiata planting was the precursor of several years planting with this species on the best soil types available. Fertilisation with Superphosphate and zinc manganese trace elements at planting has resulted in excellent early growth of *P. radiata* on the deep, moist yellow sands. Because of the vigorous early growth, this species was favoured on the best site types, but such comparisons were drawn with unimproved *P. pinaster*, and not with the pedigree source that has been used in general afforestation since 1972. Young *P. radiata* makes the better initial height growth, but this difference becomes insignificant at an age of 6 years. Comparisons of diameter, at this age, greatly favour the improved *P. pinaster* where differences in excess of 10 per cent are expected. A similar difference was noted in a ten years old comparison. It is of interest to note that unimproved *P. pinaster* had a similar diameter, at age of 14 years to an adjacent *P. radiata* plot. Although it has now been shown that the improved seed source of *P. pinaster* is the better yield proposition on all soil types at the Swan coastal plain, the main obstacle to any future planting of *P. radiata* is the high incidence of drought cracks in the tree bole. More than 50 per cent of trees in the 10 and 14 year old pines were seen to be affected. No corresponding damage was observed on the *P. pinaster stems.*

Bore-hole water sampling in the Jarrahwood area.

Pinus pinaster seed supply

The annual afforestation programme for *Pinus pinaster* is 1 200 hectares. This requires approxmately 130 kg of improved seed. 45 bags of cones, equivalent to 68 kg of clean seed, were collected from the younger, genetically superior Mullaloo orchard in May, 1976. One half the area of the Joondalup orchard was harvested yielding 99 bags of cones. This will give sufficient seed reserve for one year's planting as a guarantee against future low seed production, or possible losses at the orchards through cockatoo depredations. In addition, seed was collected from parents E33 and E40 in the remainder of the Joondalup orchard. These cones are dominant for the stem straightness character. This special seed will be used to plant up small areas for short rotation fence post crops.

Fertilization of Pinus pinaster on grey sands

On the Bassendean grey sands *P. pinaster* receives 55 gm superphosphate at planting for successful establishment and good early growth. The timing of the first refertilization is important. It appears to be affected by the depth of the groundwater table, and by the amount of humus incor-

porated in the surface soil. Pine growth on deep, dry grey sands requires the addition of superphosphate by the third growing season to be acceptable. The problem of this site is its extreme leaching. If re-treatment at an early age is undesirable, similar height growth can be maintained by the once only application, at planting, of 110 gms superphosphate-calcined rock phosphate mixture. This soil type would not now be planted. On moist soils, with dark grey humusoid surface, it has been shown that growth can be increased by one third with superphosphate application in the fourth growing season. However, because of the practice of early cleaning and pruning, refertilization is delayed until after this is completed, usually at age 6 or 7 years. Fertilization with 0·5 tonnes per hectare superphosphate increases diameter growth 25 per cent. Doubling of the superphosphate increases growth only moderately. However, if 0·25 tonnes per hectare urea is combined with the low level of superphosphate, diameter growth increases by 50 per cent. When fertilization is associated with a release thinning, it is possible to increase individual tree growth by as much as 125 per cent.

Data pertaining to the 2·5 Year Period Following Release Thinning and Fertilization.

(*a*) *Stand Thinned to* 740 *stems per hectare at age* 6 *years*

Fertilzier treatment	nil	P	2P	P+N	2P+N
B.A.O.B. c.a.i.	2·12	2·82	2·96	3·53	3·32 m^2ha^{-1}
dbhob c.a.i.	1·64	2·09	2·20	2·58	2·44 cms
needle length	14	18	19	21	20 cms
foliar P	0·08	0·21	0·31	0·24	0·32 %
foliar N	0·91	0·95	0·95	1·33	1·13 %

(*b*) *Unthinned stand* 1 780 *stems per hectare*

B.A.O.B. c.a.i.	3·12	3·86	4·29	4·60	4·82 m^2ha^{-1}
dbhob c.a.i.	1·16	1·48	1·58	1·73	1·72 cms
needle length	13	16	17	19	18 cms
foliar P	0·09	0·18	0·24	0·19	0·28 %
foliar N	0·80	0·85	0·75	0·93	1·04 %

Hydrology

The hydrological research carried out on the deep sands of the coastal plain has now amply demonstrated that the moisture withdrawal by the pine stands is determined by their density. It is therefore feasible to regulate the stand density so as to ensure adequate replenishment of the shallow aquifers, at rates comparable with the original Banksia woodland. At the lower stocking densities, the increment is concentrated on final crop trees, resulting in markedly greater diameter increment, and hence in potentially shorter rotation. In wet years, this is partly offset by a loss in total volume increment, but in years of below average rainfall, thinned or unthinned stands produce comparable total volume. Withdrawal of water from beneath unthinned stands appears to have resulted in drought losses during the current dry season.

Publications

Research Papers numbered 15, 17 and 18 were published during the year, and number 19, 20, 21, 22 and 23 were in press at the year's end. Similarly, Bulletin number 85 was published and number 86, 87 and 88 were in press.

In anticipation of an increased demand, Research Paper number 18 "The Wildflower Industry of Western Australia" and Bulletin number 76 "The Potential of the Northern Swan Coastal Plan for *Pinus pinaster* Ait. Plantations" were being reprinted at the year's end.

UTILISATION

Hardwoods

The hardwood industry, subject only to labour shortages affecting some mills operated strongly throughout the year. Domestic construction recovered well bringing a strong demand for scantling to the extent that framing was imported from Malaysia to supplement local supplies. Local demand for rail sleepers tapered off in the latter part of the year after being well above average earlier. Now that most of the traditional sleeper mills have closed, the sleeper commitment falls heavily on the major general purpose mills with consequent reduction in supply potential.

Departmental hardwood conversion operations continued satisfactorily at established levels.

Softwoods

The year was one of difficult trading in sawn pine to the extent that production was curtailed at some mills. A number of changes are occurring in the market place, including—

- wider use of particle board in the cabinet trade
- increasing use of pine in furniture, including high quality suites imported mainly from Eastern States, but increasingly available from local industry.
- expanding interest in pine framing.

Consistent with its role in pine product development the Department is marketing pine framing as a seasoned, accurately dimensioned, graded and branded product.

Technical

In recognition of the need for an experimental programme for high temperature drying of soft-woods the Department commenced construction of a high temperature kiln at Harvey, adopting the "Wickett" ferro-cement concept which is aimed to eliminate long standing kiln problems of heat absorption, heat loss, corrosion and structural failure.

A Marketing Information Sheet was produced to detail basic information on WAPINE. Further Information Sheets are in preparation

Normal assistance was extended to industry on technical matters and numerous enquiries from the public received attention.

EDUCATION AND PUBLICITY

Publicity

10 new information sheets and 3 issues of "Forest Focus" were published during the year. One information sheet (No. 4 on jarrah dieback) and one issue of Forest Focus (No. 14 on jarrah dieback) were reprinted.

The first sheet in a planned series of marketing information sheets was produced, and the first 3 series of self-guiding motor tours were printed.

A special publication dealing with regeneration in the karri forest was also produced.

Displays were staged in the country and metropolitan area, and included the Royal Show, Fire Prevention Week and the Housing Industry Association Centre.

Education

Senior high school students from metropolitan schools were invited to take part in World Forestry Day activities on March 21st. Activity included a field inspection of multiple use of forests and a film evening. The response from both state and private schools totalled some 80 students.

Jarrahdale Field Study Centre: In conjunction with the Department of Education, facilities have been provided for a field study centre to enable high school students to study land use in close contact with the environment as part of their academic course. The centre has been frequently used to date and its development will be watched with interest.

Twelve new cadets were selected to undertake forestry training at Mt. Lawley Technical College.

Cadets in their second year of study at Dwellingup and Manjimup centres made up an additional seventeen foresters in training.

Two cadetships leading to a degree in forestry at the Australian National University were awarded during the year. In addition the Department awarded two scholarships for completion of the same course.

Public Enquiries

The flow of enquiries from public sources, government departments, special interest groups and industry showed an increase on previous years.

Many enquiries related to choice of species and tree diseases but there were significant increases in questions about forest quarantine and the use of recreation facilities.

More than 30 talks were given to schools, societies and institutions with particular emphasis on dieback, quarantine and recreational use of forests.

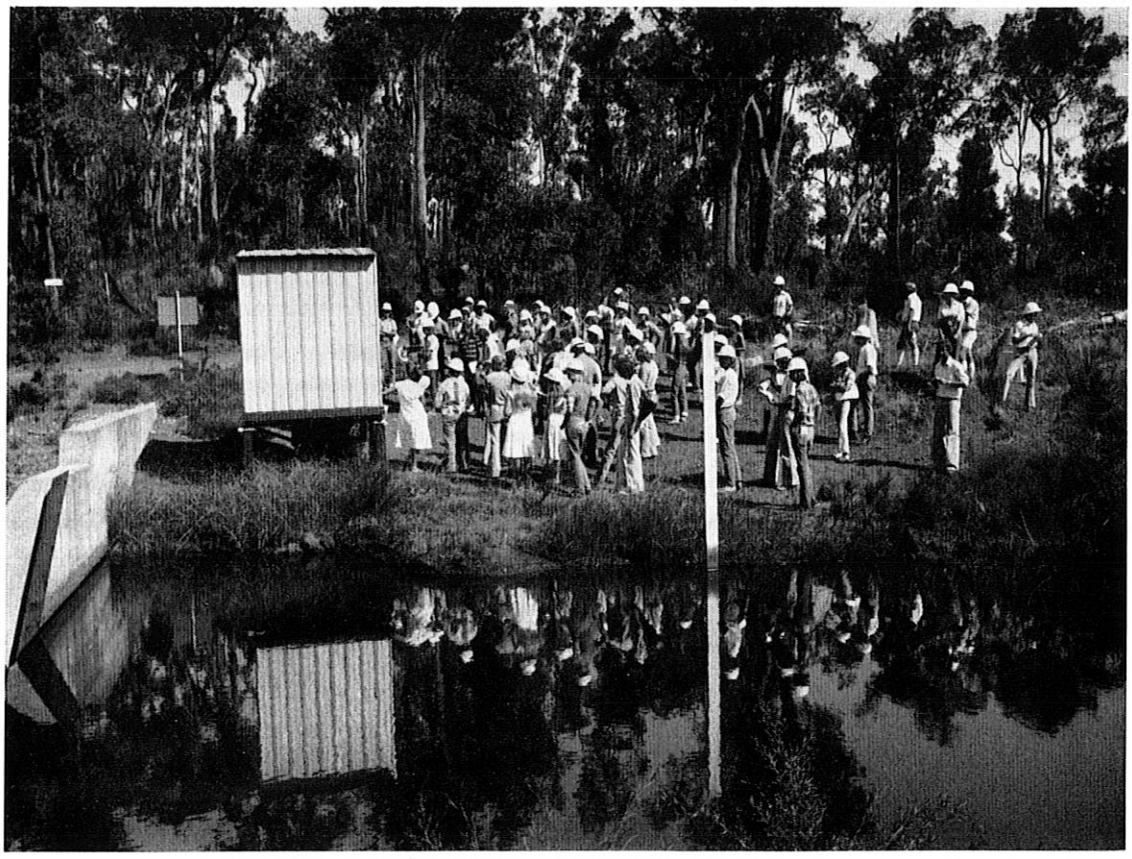
A wider interest in forests was shown by the greater variety of public enquiries received.

Library

There was an increase in the number of journals circulated and the number of enquiries and requests for information received by the Library. One accession list was published during the year which accounts for the decrease in accession list requests.

	1974/75	1975/76
Journal titles circulated	161	163
Journal circulation	9 270	11 129
Accessions	430	117
Requests from accession lists	2 612	706
Loans	2 900	2 271
Loans from other libraries	380	354
Enquiries	873	1 154

World Forestry Day: Forests Department officers and high school students discussing various aspects of silviculture (above) and hydrology, during the World Forestry Day 1976 visit to the Jarrahdale forest area.



ACCIDENT PREVENTION (SAFETY)

Outstanding success was achieved during the year in reducing total compensable injury accidents to an all-time low.

The total workforce of 939 staff and employees worked 1 762 693 manhours during the year, and sustained 31 disabling injury accidents, for the loss of 383 man-days. This excellent safety performance has resulted in a drop in the frequency rate to the record low of 17·5. An additional 113 serious injury accidents were recorded as compared with 127 last year, which has resulted in the achievement of the lowest ever total compensable injury frequency rate of 82.

It is notable that of the 31 D.I.A. recorded, 2 were recurrences of serious injury accidents sustained last year, which necessitated further medical treatment and loss of time. Of the 383 man-days lost, 83 were the result of recurrences of disabling injuries sustained during 1974/1975, and 29 resulted from injuries sustained by employees involved in accidents travelling to work.

The following summary, covering the past nine years, illustrates the success that has been achieved in the reduction of work-caused injuries. However, it also reveals that in 1971/1972 the previous record low frequency rate of 23 was achieved, but was followed by an adverse trend which resulted in a rise in the frequency rate to 31 in 1974/1975. The present record low frequency rate of 17·5 will only be maintained through continued efforts by staff at all levels.

Year	M.H.W.	D.I.A.	S.I.A.	Total Accidents	Frequency Rate			Man Days Lost	Duration Rate	Severity
					D.I.A.	S.I.A.	D.I.A.+ S.I.A.			
1967/68	1 895 600	124	312	436	65	164	230	1 701	14	900
1968/69	2 019 568	96	155	251	48	76	124	1 738	18	860
1969/70	1 901 020	70	129	199	37	67	104	721	10	379
1970/71	1 808 406	48	158	206	27	76	110	458	9	253
1971/72	1 759 888	40	128	168	23	72	95	275	6	156
1972/73	1 728 577	45	112	157	26	64	90	414	9	239
1973/74	1 651 621	45	119	164	27	72	99	359	8	217
1974/75	1 748 219	55	127	182	31	72	104	634	11	362
1975/76	1 762 693	31	113	144	17·5	64	82	383	12	217

During the year under review, further accident prevention training sessions for supervisory staff were conducted by the Departmental Safety Officer, and these have been consolidated by sessions for divisional staff on safety management and procedures and personal field employee contact by the Chief of Division and the Inspector responsible for Safety.

Whilst it is acknowledged that all divisions and specialist sections have contributed to the overall success of the accident-prevention programme, there are several who have not only achieved the coveted safety goal of a zero frequency rate but have also maintained an excellent level of safety performance over remarkably long periods.

It is fitting that special mention be made of Walpole, Working Plans and Kelmscott, who have achieved accident free periods of 5 years, 4 years and 3½ years respectively.

During the year, a number of divisions, Working Plans and Research qualified for the Departmental individual awards for achieving accident-free periods of twelve months. The introduction of this award was designed as an incentive to motivate the workforce in continued safe work habits, and co-operation in the accident-prevention programme. Although it is difficult at this stage to evaluate the success of this move, the fact that a record safety year has followed indicates that it has proved of value in maintaining the interest and co-operation of the workforce, which is essential in an accident-prevention programme.

STAFF MATTERS

Public Service Act

Mr. P. J. McNamara was promoted to the position of Deputy Conservator.

Mr. W. H. Eastman was appointed to the position of Assistant Conservator which was vacated by Mr. P. J. McNamara.

Mr. S. J. Quain was promoted to the position of Chief of Division.

Mr. C. J. Edwards was promoted to Superintendent.

Mr. L. F. Hammond was appointed to the position of Inspector.

Dr. S. R. Shea and Mr. K. Kelers were reclassified as Senior Divisional Forest Officers.

Mr. H. C. Wickett retired from the position of Utilisation Officer in September, 1975.

Mr. W. J. Shepherd was promoted to the position of Assistant Administrative Officer.

During the year 19 officers were appointed under the Public Service Act to fill vacancies arising from resignations, retirements and transfers.

Forest Act

Mr. P. D. Staley was reclassified to Senior Forester.

Mr. J. C. Gilchrist and Mr. P. C. Richmond were reclassified as Forest Officers.

The following officers were promoted to District Foresters:—

Mr. D. J. Donnelly, Mr. F. H. Vince and Mr. A. W. R. Holland.

Mr. G. P. Nicoll was appointed to the new position of Project Development Officer.

Mr. W. J. Forrest retired from the position of District Forester in February, 1976.

Mr. V. Baughan-Pollard resigned from the position of Plant Inspector in November, 1975.

During the year there were 14 resignation and 7 retirements.

Visits

This year there were 11 interstate conferences and one officer travelled overseas to attend the International Union of Forestry Research Organisations Conference held in Oslo, Norway from June 20 to July 2, 1976.

Courses, study meetings and Forestry Council meetings were also held during the year and altogether 11 officers attended such meetings which covered a range of topics which included chipwood operations, softwoods, disaster planning, hydrology and harvesting research.

APPENDIX 1A

Statement of Revenue and Expenditure of the Consolidated Revenue Fund for the year ended June 30, 1976

1974/75	Revenue	1975/76	1974/75	Expenditure	1975/76
	Royalties				
3 566 770	Logs	4 341 185	1 161 833	Salaries	1 388 747
44 886	Sleepers	26 316	165 124	Incidentals	203 024
555	Sawn Timber	99	27 155	Timber Industry Regulations Act	31 944
212 621	Poles and Piles	258 366	259 697	Hardwood Conversion	287 654
8 841	Mining Timber	11 008	1 902 375	Pine Conversion	1 671 673
16 773	Firewood	20 987	99 167	Recoupable Projects	152 420
19 445	Posts	32 698	80 806	Tree Nurseries	64 394
18 444	Sandalwood	22 948	17 901	Arboreta	19 468
31 505	Miscellaneous	27 778	15 501	Printing and Stationery	20 138
			3 902	Metric Conversion	1 816
3 919 840		4 741 385	11 177	Transfer of Mining Compensation	23 398
			87	Road Verges Committee	....
	Pine Conversion		46 101	Timber Industry Promotion	62 961
1 019 232	Pine Logs	1 246 618	6 653	Share of Revenue from Somerville Plantation paid to University	6 510
1 223 708	Sawn Pine	1 181 291			
			58 503	Payroll Tax	66 673
2 242 940		2 427 909	70 503	Special Research Grant	82 158
	Hardwood Conversion			Excess of Revenue over Expenditure distributed as follows—	
156 546	Sawn Hardwood	212 109	2 911 662	9/10 to Reforestation Fund	4 062 225
184 665	Logs	198 644	312 685	Transferred to Treasury	456 572
978	Posts and Other	5 024			
342 189		415 777			
	Other Sales and Fees				
58 101	Seeds and Trees	83 744			
66 513	Inspections Fee	90 341			
28 900	Rents and Leases	35 616			
281 540	Miscellaneous	399 048			
111 792	Compensation—Mining and Other	234 518			
546 846		843 267			
	Recoupable Projects				
....	Specific Roads	....			
99 016	Other	173 437			
99 016		173 437			
7 150 831		8 601 775	7 150 831		8 601 775

APPENDIX 1B

Forest Improvement and Reforestation Fund Account and General Loan Funds for the year ended June 30, 1976

1974/75	Revenue	1975/76	1974/75	Expenditure	1975/76
				Divisional	
1 413 581	Balance as at 1st July	1 053 405	3 156 311	Wages, materials, etc. excluding Plant	3 462 107
2 911 662	9/10 Revenue	4 062 225			
145 356	Rents	164 851		*Head Office*	
339 514	Commonwealth Aid Road Grant	270 173	2 424 964	Salaries and Allowances	2 846 221
684 663	Commonwealth Government Softwood Forestry Agreement	863 595	120 022	Incidentals	149 480
			341 584	Plant and Vehicles	407 129
3 000 000	General Loan Fund	3 000 000	1 053 319	Plant Operations	985 280
11 177	Mining Compensation Grant	23 398	1 356	Purchase of Land	209 617
69 596	Employment Relief Scheme	217 486	243 614	Fire Equipment	343 976
			45 854	Head Office Housing and Building	70 503
			69 077	Como Headquarters	84 456
			101 905	Communications	82 070
			57 213	Research	78 946
			20 492	Drafting	17 214
			23 839	Surveys	29 021
			17 309	Training of Staff	27 374
			125 366	Insurances	111 509
			284 144	Pay Roll Tax	331 207
			35 925	Utilisation	13 974
			3 707	Aboriginal Training Scheme	....
			152 162	Employment Relief Schemes	177 403
			5 121 852		5 965 380
			8 278 163	TOTAL	9 427 487
			756 019	*Less* Recoups	787 172
			7 522 144		8 640 315
			1 053 405	Balance Working account	1 014 818
8 575 549		9 655 133	8 575 549		9 655 133

APPENDIX 1C

Statement showing distribution of Forests Department Expenditure

	$
Consolidated Revenue Fund	4 082 978
Reforestation Fund	5 640 315
General Loan Fund	3 000 000
	12 723 293
Distribution of Expenditure—	
1 Busselton	885 101
2 Mundaring	350 174
3 Dwellingup	890 048
4 Collie	537 226
5 Kirup	961 362
6 Manjimup	987 099
7 Narrogin	107 731
8 Kelmscott	294 408
9 Collier	41 437
10 Harvey	1 043 871
11 Pemberton	644 682
12 Nannup	641 646
13 Walpole	310 668
14 Kalgoorlie, Esperance	67 694
15 Wanneroo	1 177 846
16 Somerville	170 838
Head Office	3 611 462
	12 723 293

APPENDIX 2A

Exports *from Western Australia of Timber, Tanning Substances and Essential Oils for the Year ended June* 30, 1975

	Item and Destination	Quantity	Value
		m^3	$
1	Sawlogs and veneer logs, in the rough or roughly squared-conifer	....	....
2	Sawlogs and veneer logs, in the rough or roughly squared, non-conifer (including poles, piling, posts and other wood in the rough)—		
	Interstate—		
	Victoria	1 589	101 469
	South Australia	168	9 963
	Total	1 757	111 432
	Overseas—		
	Malaysia	....	50
	Total	....	50
3	Sleepers—		
	Interstate—		
	South Australia	5 833	544 592
	Total	5 833	544 592
	Overseas—		
	Hong Kong	1 881	163 987
	Israel	3 088	242 012
	Jordan	8 605	786 653
	New Zealand	9	1 104
	South Africa, Republic of	15	1 461
	United Kingdom	24 477	2 305 239
	U.S.A.	1	200
	Zambia	45	5 857
	Total	38 121	3 506 513
	Timber sawn lengthwise, sliced or peeled but not further prepared, of a thickness exceeding 5 mm—Non-conifer.		
4	Jarrah (*a*)—		
	Interstate—		
	New South Wales	211	20 288
	Victoria	5 339	385 876
	South Australia	11 785	1 012 493
	Northern Territory	917	64 042
	Total	18 252	1 482 699
	Overseas—		
	Bahrain	79	11 326
	Christmas Island	1	122
	Greece	95	15 881
	Iran	345	56 976
	Italy	32	6 257
	Japan	21	3 478
	Mauritius	50	6 279
	New Zealand	558	52 528
	South Africa, Republic of	124	16 023
	United Kingdom	1 206	159 286
	U.S.A.	173	16 193
	Total	2 684	344 349
5	Karri (*a*)—		
	Interstate—		
	New South Wales	6 416	486 726
	Victoria	743	62 977
	South Australia	14 003	1 122 792
	Northern Territory	1 316	85 194
	Total	22 478	1 757 689
	Overseas—		
	Canada	32	4 955
	Germany, Fed. Rep. of	641	73 971
	Italy	16	2 671
	New Zealand	2 125	190 752
	South Africa, Republic of	1 412	149 389
	United Kingdom	351	48 347
	U.S.A.	700	117 114
	Total	5 277	587 199
6	Other (*b*)—		
	Interstate—		
	Northern Territory	33	5 890
	Total	33	5 890
	Overseas—		
	Bahrain	13	2 380
	Libyan Arab Republic	130	28 795
	South Africa, Republic of	16	2 974
	Total	159	34 149
	Timber (including blocks, strips and friezes for parquet or wood block flooring, not assembled), planed, tongued, grooved, rebated, chamfered, V-jointed, beaded, centre beaded, or the like, but not further manufactured—	m^3	$
7	Flooring—		
	Interstate—		
	New South Wales	2 204	260 970
	Victoria	1 156	145 750
	South Australia	755	61 850
	Northern Territory	704	95 382
	Total	4 819	563 952
	Overseas—		
	Christmas Island	6	1 532
	U.S.A.	13	1 587
	Total	19	3 119
8	Other (*e*)—		
	Interstate—		
	Northern Territory	9	1 013
	Total	9	1 013
	Overseas—		
	Greece	60	7 199
	Italy	113	20 263
	Libyan Arab Republic	319	78 045
	United Kingdom	49	6 641
	U.S.A.	145	25 298
	Total	686	137 446
	Total Timber Item 1-8	100 127	9 080 092
9	Wood, sawn lengthwise, sliced or peeled, but not further prepared, veneer sheets and sheets for plywood, of a thickness not exceeding 5 mm—plywood, blockboard, laminboard and the like; inlaid wood, cellular wood panels, whether or not faced with base metal	(*f*)	(*f*)
10	Reconstituted wood (also known as particle board, chip board, sliver board, shaving board, flake board, residue board and wood waste board)	(*f*)	(*f*)
11	Casks, vats, barrels, etc., Empty (*g*)—		
	Overseas—		
	United Kingdom	....	5 544
	Total	....	5 544
12	Manufacturers of wood (except furniture), N.E.I. (*h*) (*i*)—		
	Interstate—		
	New South Wales	....	955
	Victoria	....	76 599
	Queensland	....	22 573
	South Australia	....	83
	Northern Territory	....	1 714
	Total	....	101 924
	Overseas—		
	Bahrain	....	332
	Christmas Island	....	1 947
	Japan	....	25
	Kuwait	....	22 013
	Singapore	....	468
	U.S.A.	....	25
	Total	....	24 810

APPENDIX 2A—*continued*

Exports *from Western Australia of Timber, Tanning Substances and Essential Oils for the Year ended June* 30, 1975

	Item and Destination	Quantity	Value		Item and Destination	Quantity	Value
		m³	$			m³	$
13	Tanning Substances of Natural Origin	N.R.S.	N.R.S.		Overseas—		
					Belgium-Luxembourg	100	870
					France	102	9 686
					Germany, Fed. Rep. of	2 625	11 212
					Hong Kong	61	1 820
		kg	$		Italy	2 000	43 780
14	Essential Oils; concretes and absolutes; resinoids—				Netherlands	6 650	28 864
	Interstate—				Singapore	4 088	11 480
	New South Wales	7 781	72 354		Switzerland	525	2 320
	Victoria	10 746	134 931		United Kingdom	14 738	76 300
	South Australia	2 691	40 097		U.S.A.	10 860	45 305
	Total	21 218	247 382		Total	41 749	231 637
					Total value of exports on this return	....	9 691 389

(*a*) Excludes timber cut to size for making boxes or staves (Included in Item 6).
(*b*) See Footnote (*a*).
(*c*) Relates to interstate exports of non-conifer flooring only. Overseas exports of conifer flooring included in Item 8.
(*d*) Relates to overseas exports of conifer flooring only. Overseas exports of non-conifer flooring included in Item 8.
(*e*) See Footnotes (*c*) and (*d*). Item also includes conifer timber, sawn lengthwise, sliced or peeled, but not further prepared of a thickness exceeding 5 mm.
(*f*) Details not available for publication.
(*g*) Interstate exports included in Item 12.
(*h*) Includes cork manufacturers.
(*i*) Some details not available for publication.

"N.E.I." means "not elsewhere included".
"N.R.S." means "not recorded separately".
Basis of Value—F.O.B. at point of final shipment.
(Information supplied by the Australian Burea of Statistics)

APPENDIX 2B

Imports *into Western Australia of Timber, Timber Products, Tanning Substances and Essential Oils for the Year ended June* 30, 1975

	Item and Origin	Quantity	Value
		m³	$
1	Sawlogs and veneer logs, in the rough or roughly squared, non-conifer, (including poles, piling, posts and other wood in the rough) (*a*)—		
	Overseas	(*b*)	(*b*)
2	Railway Sleepers—		
	Interstate—		
	Queensland	16	1 936
	Total	16	1 936
	Overseas—		
	Malaysia	11 230	1 621 785
	Singapore	1 701	240 798
	Total	12 931	1 862 583
	Timber, sawn lengthwise, sliced or peeled but not further prepared, of a thickness exceeding 5 mm—Conifer (*c*)—		
3	Douglas Fir (*d*)—		
	Overseas—		
	New Zealand	28	1 992
	U.S.A.	1 007	135 503
	Total	1 035	137 495
4	Other—		
	Interstate (*e*)—		
	New South Wales	184	11 112
	Victoria	79	4 905
	South Australia	80	6 278
	Total	343	22 295
	Overseas—		
	Germany, Fed. Rep. of	....	16
	Malaysia	15	2 506
	U.S.A.	210	42 141
	Total	225	44 663
	Timber sawn lengthwise, sliced or peeled, but not further prepared, of a thickness exceeding 5 mm—Non-Conifer (*c*)—		
5	Meranti (*f*)—		
	Overseas—		
	Malaysia	1 970	141 116
	Singapore	45	5 448
	Total	2 015	146 564
6	Ramin (*f*)—		
	Overseas—		
	Indonesia	1 245	75 367
	Malaysia	1 929	156 151
	Singapore	30	2 542
	Total	3 204	234 060
7	Teak (*f*)—		
	Overseas—		
	Thailand	357	117 768
	Total	357	117 768
8	Kapur (*f*)—		
	Overseas—		
	Indonesia	82	3 529
	Malaysia	1 427	119 361
	Singapore	66	5 537
	Total	1 575	128 427
9	Other (*g*)—		
	Interstate—		
	New South Wales	3	261
	South Australia	22	4 308
	Tasmania	109	15 899
	Total	134	20 468
	Overseas—		
	Germany, Fed. Rep. of	....	114
	Malaysia	8 310	782 447
	Singapore	167	14 081
	United Kingdom	2	588
	Total	8 479	797 230
10	Shooks and staves, sawn lengthwise, sliced or peeled, but not further prepared of a thickness exceeding 5 mm (*h*)—		
	Overseas	....	....

	Item and Origin	Quantity	Value
		m³	$
11	Wooden beadings and mouldings (including moulded skirting and other moulded boards) (*i*)—		
	Overseas—		
	Austria	....	959
	Belgium-Luxembourg	....	9 812
	Germany, Fed. Rep. of	....	5 387
	Italy	....	163
	Malaysia	....	7 090
	Netherlands	....	547
	Norway	....	479
	Singapore	....	367
	Spain	....	144
	Taiwan	....	382
	Thailand	....	252
	United Kingdom	....	29 510
	U.S.A.	....	270
	Total	....	55 362
	Timber (including blocks, strips and friezes for parquet or wood block flooring, not assembled), planed, tongued, grooved, rebated, chamfered, V-jointed, beaded, centre-beaded or the like, but not further manufactured—		
12	Flooring (*j*)	....	....
13	Other—		
	Interstate (*k*)—		
	South Australia	19	4 056
	Total	19	4 056
	Overseas—		
	Germany, Fed. Rep. of	1	1 086
	Malaysia	612	92 731
	New Zealand	11	3 623
	Singapore	76	8 014
	Total	700	105 454
	Total Timber Item 2-13	....	3 678 361
14	Wood, sawn lengthwise, sliced or peeled but not further prepared, veneer sheets and sheets for plywood, of a thickness not exceeding 5 mm, plywood, blockboard, laminboard, and the like; inlaid wood, cellular wood panels, whether or not faced with base metal—		
		m²	
	Interstate—		
	New South Wales	115 322	206 479
	Victoria	30 507	86 111
	Queensland	192 886	511 027
	South Australia	9 848	21 741
	Total	348 563	825 358
	Overseas (*l*)—		
	Germany, Fed. Rep. of	....	12
	Japan	5 851	2 976
	Korea, Republic of	32 676	6 009
	Papua New Guinea	47 062	6 446
	Philippines	78 774	16 892
	Singapore	2 871 696	297 570
	Taiwan	4 228 415	751 680
	U.S.A.	32 137	10 557
	Malaysia	749 412	126 113
	Total	8 046 023	1 218 255
15	Reconstituted wood (also known as particle board, chip board, sliver board, shaving board, flake board, residue board and wood waste board)—		
	Interstate (Separate State details not available for publication)		
	Total	787 055	2 165 621
	Overseas—		
	Finland	172	11 424
	South Africa, Republic of	342	23 037
	Sweden	366	24 894
	U.S.A.	46	2 391
	Total	926	61 746
	Total Timber Items 14, 15	....	4 270 980
	Total Timber Items 2-15	....	7 949 341
16	Match splints (*i*)—		
	Overseas—		
	Finland	....	116 467
	Total	....	116 467

APPENDIX 2B—*continued*

Imports *into Western Australia of Timber, Timber Products, Tanning Substances and Essential Oils for the Year ended June* 30, 1975

	Item and Origin	Quantity	Value
		m²	$
17	Rulers, wooden (*a*)—		
	Overseas—	Number	
	China, People's Republic of	300	118
	Germany, Fed. Rep. of	25	10
	Japan	12	11
	Netherlands	2 304	977
	United Kingdom	11 355	17 378
	Total	13 996	18 494
18	Table Mats, Wooden	N.R.S.	N.R.S.
19	Wood Flour (*m*)—		
	Overseas	....	....
20	Clothes Pegs, Wooden	N.R.S.	N.R.S.
21	Tool handles, wooden—		
	Interstate (*n*)—		
	New South Wales	....	243
	Victoria	....	348
	Queensland	....	109 822
	South Australia	....	118
	Tasmania	....	240
	Total	....	110 771
		Dozen	
	Overseas—		
	Germany, Fed. Rep. of	9	95
	Japan	37	278
	Switzerland	3	4
	United Kingdom	8	21
	U.S.A.	123	1 151
	Total	180	1 549
22	Doors not incorporating locks, hinges or similar fittings—	Number	
	Interstate—		
	New South Wales	39 722	520 299
	South Australia	23 543	297 491
	Total	63 265	817 790
	Overseas—		
	Malaysia	2	19
	Singapore	500	12 638
	South Africa, Republic of	109	8 140
	Taiwan	16 650	70 336
	Total	17 261	91 133
23	Manufacturers of wood (Except furniture, N.E.I.) (*o*)—		
	Interstate—		
	New South Wales	....	257 952
	Victoria	....	670 695
	Queensland	....	22 158
	South Australia	....	152 372
	Tasmania	....	115 276
	Total	....	1 218 453
	Overseas—		
	Australia (Re-imported)	....	4
	Austria	....	69
	Belgium-Luxembourg	....	8 494
	Canada	....	19 159
	China, People's Republic of	....	2 880
	Czechoslovakia	....	901
	Denmark	....	13 347
	Finland	....	1 059
	France	....	62
	Germany, Fed. Rep. of	....	24 221
	Hong Kong	....	9 560
	India	....	6 905
	Indonesia	....	1 853
	Italy	....	9 217
	Japan	....	45 679
	Korea, Republic of	....	453
	Malagasy, Republic of	....	10
	Malaysia	....	26 954
	Netherlands	....	5 875
	New Zealand	....	4 711
	Norway	....	3 370
	Pakistan, Islamic Rep. of	....	108
	Philippines	....	97 187
	Singapore	....	32 932
	South Africa, Republic of	....	2 957
	Spain	....	17 410
	Sri Lanka	....	4 490
	Sweden	....	63 714
	Switzerland	....	155
	Taiwan	....	125 854
	Thailand	....	67 783
	United Kingdom	....	46 747
	U.S.A.	....	60 017
	Origin Unknown	....	12
	Total	....	704 149
24	Furniture, wood or wood framed (*p*)—	Number	
	Interstate—		
	New South Wales	....	312 485
	Victoria	....	856 370
	Queensland	....	436
	South Australia	....	764 409
	Tasmania	....	913
	Total	....	1 934 613
	Overseas—		
	Belgium-Luxembourg	....	1 848
	Canada	....	1 398
	China, People's Republic of	....	15 878
	Denmark	....	30 291
	Finland	....	10 196
	France	....	279
	German Democratic Rep.	....	4
	Germany, Fed. Rep. of	....	4 515
	Hong Kong	....	33 918
	India	....	9 609
	Indonesia	....	4 651
	Italy	....	34 710
	Japan	....	20 018
	Korea, Republic of	....	1 153
	Malaysia	....	115 097
	Mexico	....	35
	Netherlands	....	5 458
	New Zealand	....	1 068
	Norway	....	20 474
	Pakistan, Islamic Rep. of	....	179
	Philippines	....	10 619
	Rumania	....	131
	Singapore	....	131 761
	Spain	....	30 486
	Sri Lanka	....	1 526
	Sweden	....	17 803
	Switzerland	....	50
	Taiwan	....	289 178
	Thailand	....	3 691
	Turkey	....	49
	United Kingdom	....	253 383
	U.S.A.	....	27 747
	Yugoslavia	....	13 698
	Zambia	....	90
	Total	....	1 090 991
	Tanning Extracts of Vegetable Origin		
25	Wattle Bark Extracts (*q*)—	kg	
	Overseas—		
	South Africa, Republic of	661 875	192 178
	Total	661 875	192 178
26	Other (*q*)—		
	Overseas—		
	France	55 000	13 729
	United Kingdom	1 250	871
	Total	56 250	14 600
27	Synthetic tanning substances, artificial bates for pre-tanning, tanning (Tannic acids) and their salts, esters and other derivatives—		
	Interstate—		
	New South Wales	57 095	78 310
	Victoria	70 538	50 052
	Queensland	8 881	4 605
	South Australia	418	536
	Total	136 932	133 503
	Overseas—		
	Belgium-Luxembourg	6 000	23 811
	France	4 000	14 962
	Germany, Fed. Rep. of	58 180	12 712
	Italy	200	62
	Japan	1 000	5 886
	United Kingdom	19 700	68 170
	Total	89 080	125 603

APPENDIX 2B—*continued*

Imports *into Western Australia of Timber, Timber Products, Tanning Substances and Essential Oils for the Year ended June* 30, 1975

	Item and Origin	Quantity	Value	Item and Origin	Quantity	Value
		m³	$		m³	$
28	Essential oils; concretes and absolutes; resinoids—			Overseas—		
				India	14	107
				Indonesia	9 840	48 664
				South Africa. Republic of	9 250	58 996
				Swaziland	95 834	426 203
				Taiwan	2 723	24 009
				U.S.A.	2 540	71 361
	Interstate—					
	New South Wales	44	267			
	Victoria	2 200	12 238			
	South Australia	1	14	Total	120 201	629 340
	Total	2 245	12 519	**Total Value of imports on this return**	....	15 161 494

(*a*) Interstate imports are not recorded separately.
(*b*) Not available for publication.
(*c*) Overseas imports exclude shooks and staves—see Item 10.
(*d*) Interstate imports included in Item 4.
(*e*) See Footnote (*d*), Item also includes imports of conifer timber, planed, tongued, grooved, or the like.
(*f*) Interstate imports included in Item 9.
(*g*) See Footnote (*f*).
(*h*) Interstate imports included in Item 4 (Conifer) and Item 9. (Non-Conifer).
(*i*) Interstate imports included in Item 23.
(*j*) Figures relate to overseas imports of conifer flooring only, interstate imports of flooring included in Item 4 (Conifer) and Item 13 (Non-Conifer).
(*k*) Relates to Non-Conifer timber only. All conifer timber, planed, tongued, grooved, etc., included in Item 4.
(*l*) Excludes wood, sawn lengthwise, sliced or peeled, but not further prepared, veneer sheets and sheets for plywood, details of which are not available for publication.
(*m*) Interstate imports included in Item 15.
(*n*) Includes brush and broom handles and the like.
(*o*) Includes imports of wooden packing cases, casks, domestic articles of wood, and similar products.
(*p*) Excludes imports, if any, of wooden medical, dental, surgical or veterinary furniture, non-domestic wooden chairs, and wooden legs imported separately as parts.
(*q*) Interstate imports included in Item 27.
(*r*) See Footnote (*q*).

"N.E.I." means "not elsewhere included".
"N.R.S." means "not recorded separately".
Basis of value: Overseas—F.O.B. at the point of final shipment.
Basis of value: Interstate—landed cost in Western Australia.
(Information supplied by the Australian Bureau of Statistics.)

APPENDIX 3

SUMMARY OF EXPORTS OF FOREST PRODUCE

Year	Timber		Wood Manufacture Value	Essential Oils and Tanning Material*
	m^3	value		
		$	$	$
Brought forward	13 081 830	177 786 912	8 536 935	17 368 964
1968	84 569	4 947 595	3 016 850	280 806
1969	86 455	4 984 098	3 802 927	267 565
1970	96 275	5 661 547	3 906 699	317 553
1971	79 362	4 803 842	2 110 802	343 512
1972	101 191	6 439 732	2 369 541	348 762
1973	111 547	7 036 637	2 604 116	377 736
1974	98 200	7 366 709	3 769 461	433 627
1975	100 127	9 080 092	132 278	479 019
1976†				

* Tanning materials not recorded separately since 1967.
† Not Available.

APPENDIX 4

SUMMARY OF IMPORTS OF FOREST PRODUCE

Year	Timber Woodware	Tanning Materials	Essential Oils
	$	$	$
Brought Forward	63 937 163	1 344 397	4 600 226
1968	8 135 532	75 657	143 696
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	11738 861	420 010	271 713
1975	14 053 751	465 884	641 859
1976†			

† Not available.

APPENDIX 5

SUMMARY OF LOG PRODUCTION

Year	Crown Land m^3	Private Property m^3	Total
Brought Forward	44 466 501	15 455 468	78 705 715*
1968	1 231 517	228 281	1 459 978
1969	1 143 705	160 771	1 304 476
1970	1 121 396	175 686	1 297 082
1971	1 145 161	161 990	1 307 151
1972	1 096 236	106 993	1 203 229
1973	1 060 359	102 992	1 163 351
1974	1 084 463	91 884	1 176 347
1975	1 096 356	87 957	1 184 313
1976	1 194 667	111 761	1 306 428

* Includes 18 783 746 cubic metres estimated cut prior to 1917.

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