

# *Annual Report*

JULY 1993 TO JUNE 1994



DEPARTMENT OF  
CONSERVATION AND  
LAND MANAGEMENT



## WHAT WE DO

### **CALM's mission:**

*We conserve and manage Western Australia's wildlife and the lands, waters and resources entrusted to the Department for the benefit of present and future generations.*

**W**estern Australia has a beautiful, diverse and supportive natural environment which provides material, aesthetic and spiritual benefits. It is an essential part of Western Australians' livelihood and quality of life.

In keeping with our mission, the Department of Conservation and Land Management has the following objectives.

**Conservation:** To conserve indigenous plants, animals and ecological processes in natural habitats throughout the State.

**Value and Use of Resources:** To optimise the value and economic return to the community of wildlife, lands, waters and resources entrusted to the Department without compromising conservation and other management objectives.

**Tourism and Recreation:** To identify, provide and maintain opportunities and services to the community which allow them to enjoy the wildlife, lands, waters and resources entrusted to the Department without compromising conservation and other management objectives.

**Knowledge:** To seek and provide an up-to-date and sound scientific and information basis for the Department's conservation and land management activities.

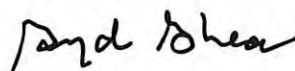
**Community Support:** To promote community awareness and appreciation of the values of the wildlife, lands, waters and resources entrusted to the Department, and to develop community understanding and support for the Department's conservation and land management activities.

**Human Resources:** To recruit, develop, reward and retain knowledgeable and talented staff, and to provide a stimulating, safe, productive and supportive work environment where staff can pursue individual goals consistent with those of the Department.

**Corporate Efficiency:** To optimise the efficiency, effectiveness and responsiveness of the Department in the achievement of conservation and other management objectives.

## **HON MINISTER FOR THE ENVIRONMENT**

*In accordance with Section 62 of the Financial Administration and Audit Act 1985, I submit for your information and presentation to Parliament the annual report of the Department of Conservation and Land Management.*



*Syd Shea*  
**EXECUTIVE DIRECTOR**  
**30 August 1994**

WHAT WE DO .....	<i>Inside front cover</i>
THE WAY AHEAD	
Executive Director's Message .....	ii
THAT WAS THE YEAR .....	1
NATURE CONSERVATION & WILDLIFE	
Management Program 1 .....	5
FOREST RESOURCES	
Management Program 2 .....	15
TOURISM & RECREATION	
Management Program 3 .....	23
FACTS & FIGURES .....	31
Organisation Chart .....	34
Corporate Executive .....	35
CALM-Managed Lands and Waters .....	37
(Map, p. 36)	
Emergency Assistance .....	39
Corporate Services .....	39
LEGISLATION & COMPLIANCE .....	41
PERFORMANCE INDICATORS .....	43
FINANCIAL STATEMENTS .....	49
APPENDICES .....	65
1 Trend in the Area of Native Forest Harvested	
2 Areas of Even-Aged Karri Regeneration	
3 Area of State-Owned Coniferous Plantations	
4 Area of State-Owned Broadleaved Plantations	
5 Trends in Log Production	
6 Trend in Chiplog Production	
7 Trends in the Production and Use of Sawm Timber	
8 Trend for W.A. Overseas Imports & Exports of Forest Produce	
9 Area of Prescribed Burns 1989-90 to 1992-93	
10 Number of Wildfires and Areas by Land Categories	
11 Purposes for Prescribed Burning by Forest Region	
12 Number of Prescribed Burns Conducted in Native Forests	
13 Area and Number of Wildfires within the Three Forest Regions	
14 Licences issued	
15 Summary of Damage Licences issued	
16 Offences Under the Wildlife Conservation Act and Regulations	
17 Publications Produced	

## Highlights

- Forest management plan approved and in place (pp. 2, 15)
- Hardwood plantations attract overseas investment (pp. 3, 18)
- Operation Foxglove extended through the northern jarrah forest (pp. 3, 8)
- Historic agreement to help develop potential anti-AIDS drug (p. 3)
- Twenty threatened-species recovery teams now operating (p. 6)
- Ibis Aerial Highway developed (p. 26)
- Forty-one community volunteer projects initiated (p. 30)

# Contents

**The opinions of the Auditor General appear after the Performance Indicators and the Financial Statements.**

## THE WAY AHEAD

Every public sector manager receives a daily deluge of advertisements for books or seminars on managing change. This is a reflection of the times we live in, where massive change is putting huge pressures on traditional approaches to public sector management. While I do not agree with much of what is proffered by the modern-day management gurus, I do agree that change is here to stay and that organisations that do not respond to that change will become moribund.

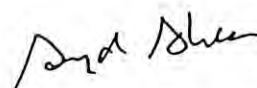
The 1993-94 fiscal year was a year of massive change. The year began with the first report of the Independent Commission to Review Public Sector Finances, and ended with the adoption of a totally new method of budgeting for CALM. The response of the Department to the McCarrey recommendations, and the Committee established by the Premier to oversee public sector reform, perhaps to the surprise of some, was to welcome the opportunity to develop new approaches to public sector management. The Department did not necessarily agree with some of the details of the McCarrey Report, but it strongly endorsed the philosophy that there was a desperate need to remove the shackles which prevented Public Service organisations being efficient and to replace them with incentives.

It was the Department's view that we can make major improvements in conservation, forest production, tourism and recreation, provided that we could operate flexibly and that we could fund the initiatives. For example, the State is poised to take advantage of a boom in nature-based tourism, and, because the Department manages many of our natural attractions, it has a critical role in ensuring not only that there is access to the natural wonders of our State, but that they are protected. The State is also ready to take advantage of the dramatic increase in demand for wood-based products, brought about by the decline in availability of wood fibre from traditional sources, such as the tropical hardwood forests, and the increased per capita demand for wood fibre from the Pacific rim countries to our north. We are now also in a position to pull many of our endangered species back from the brink of extinction by wide-scale feral animal control.

The decision by the Government to apply the principle of net appropriation to the Department (that is, retention of revenue earned), topped up by a community services allocation from the Consolidated Revenue Fund, has provided the opportunity for the Department to obtain significantly more resources for conservation and land management throughout the State. This decision also gives us the chance to overcome the crippling debt problem CALM was facing, which had resulted from our not being able to repay debt from the revenue we earned. The contracting out of non-core activities, the introduction of workplace reform and the application of user-pays principles, have provided the opportunity for the Department to substantially increase its capacity to manage public land and the State's wildlife at a lower cost to the taxpayer.

The most efficient way CALM can carry out its charter on behalf of the community of Western Australia is to create the opportunities for partnerships with community groups, the private sector and with nature itself. The technical word which describes what we are about is *synergisms*. There is not one Western Australian plant or animal that does not enjoy a beneficial plant partnership, because in the harsh environment of Western Australia loners don't survive. In the same way, CALM can only achieve its task of managing public land and the plants and animals in this State by working with all sections of the Western Australian community.

While change is inevitable, it also can be very uncomfortable to deal with. I know that all the people who work for CALM have been put under some additional stress as the organisation responds to the changing environment we work in. I am pleased to record, however, as I do each year in this report, that the organisation's best asset continues to be the people who work in it.



Syd Shea  
EXECUTIVE DIRECTOR  
30 August 1994



*CALM is an integrated agency. The Department manages lands and waters for their renewable resources, for the recreation and tourism they can support, and for conservation of the native plants and animals which they sustain. CALM's primary responsibility is to manage these lands and waters on an ecologically sustainable basis so that the needs of the present are met without compromising the choices of future generations.*

*The 1993-94 year saw many advances made in integrating the environmental, social and economic development of the conservation estate that will yield significant benefits for the State. The three Program sections of this annual report detail these achievements; the present section looks at some of the highlights that gained the community's attention.*

## NATIVE PLANTS: NATURE'S MEDICINE CABINET

An historic agreement was signed in December 1993 to help conserve WA's native flora and enable research into a new drug with potential as an AIDS treatment. The agreement was signed by Environment Minister Kevin Minson, CALM Executive Director Syd Shea and executives of the Australian company AMRAD, which has been offered a world-exclusive licence to develop the drug by the United States' National Cancer Institute (NCI). The NCI holds the patent on the compound, Conocurvone, which is derived from the WA *Conospermum* species, or smokebush.

Conocurvone has been shown to control the AIDS virus in preliminary test tube trials, but must pass many further tests before it can be judged as a safe and effective drug. Depending on Conocurvone's success, the CALM/AMRAD agreement means the State could earn more than \$5 million for research and conservation work; ensures WA scientists are involved in the research project; and brings private investment into nature conservation. The agreement also sets an internationally significant precedent, opening the way for other countries to benefit from their natural resources.

*That was  
the Year . . .*

CALM has formed a research consortium of more than 30 scientists - including botanists, biologists, ecologists, remote sensing specialists, chemists, virologists, horticulturalists and medical research workers - to help develop Conocurvone into a marketable product. The Consortium's intellectual property is patent protected and the group works through CALM's Centre for Bioproduct Development (CBD). This is in line with CALM's new function to promote the use of our native flora for therapeutic and scientific purposes, under amendments to the CALM Act passed during the year. The amendments also enable the Minister and CALM's Executive Director to enter commercial contracts, such as the agreement with AMRAD, for these purposes. These measures ensure the WA community will receive an appropriate return from the sustainable use of its wildlife.

It's estimated that WA has more than 12 000 flowering plant species in a hostile environment. The CALM Consortium has plans for analysing, or 'bioprospecting', selected WA biota to see if there are other compounds suitable for medicinal use.

## LAND PROBLEMS: SALINITY AND DIEBACK

The two greatest threats against land conservation in Western Australia are salinity and dieback. To help deal with the first, the Department has embarked on a program to develop and popularise a range of economically competitive, deep-rooted, perennial plants.

Land salinity occurs because conventional agricultural plants are shallow-rooted annuals and do not use up all the rainfall. The surplus water infiltrates the deep salt-bearing subsoils, then builds up extensive groundwater systems which slowly discharge salty water into the valleys. Without remedial treatment, the extent of salt-degraded farmland will probably increase from the present three per cent to a huge 15 per cent, causing increasing damage to rivers, lakes, etc., and to what native vegetation remains in agricultural areas.

The most attractive remedy is to plant woody shrubs and tree crops on farms. Bluegums are now available in higher-rainfall areas, where they can increase farm profits as well as control salinity. A major thrust to develop tree crops for the drier Wheatbelt is now under way, with oil-producing mallee eucalypts currently the best prospect. CALM has continued demonstration plantings, establishing another 150 hectares during the year.

One of the measures against dieback is the new Dieback Review Panel, established by the Hon. Minister during the year to provide advice on future research and management of the disease. Dieback is caused by the root-infecting fungus *Phytophthora cinnamomi*, the most serious threat to the biodiversity of the State's flora. Of

460 plant taxa so far surveyed, more than 38 per cent are known to be susceptible.

Research continued during the year to learn more about how the fungus behaves, and measures are being taken to contain its further spread. The measures include the spraying of threatened flora with the compound phosphonate.

During the year, CALM staff worked closely with the Dieback Review Panel, which is expected to report its findings early in 1995.

## FORESTS: PLANNING FOR THE 21<sup>ST</sup> CENTURY

The growth in the State's conservation estate will accelerate markedly over the next few years following the Government's adoption in March of a new Forest Management Plan for the next decade.

The plan, which was subject to more than two years of public and scientific scrutiny, provides for an unparalleled level of protection, but also heralds a new chapter in sustainable use of the south-west native hardwood forests. Under the plan, a further 120 000 hectares will be included in the conservation reserve system and excluded from timber harvesting. This means that 33 per cent of the jarrah forest and 46 per cent of the karri forest will be managed primarily for nature conservation. As well, CALM's Southern Forest region, which includes the karri forests, will be managed to recognised national estate values in line with the Memorandum of Understanding signed by CALM and the Australian Heritage Commission.

Equally, the new plan incorporates timber harvesting levels set in August after an assessment by a scientific and administrative panel.

A Supreme Court challenge by the South West Forests Defence Foundation to the implementation of the management plan was dismissed in November. In his decision, Justice White rejected what he termed the 'sinister' implications made by the Foundation about the management of CALM scientific papers. Justice White refused to find there was evidence of bad faith by CALM.

## PROTECTION: FIGHTING FIRE WITH FIRE

Fire continues to be perhaps the most controversial issue facing land managers in Western Australia. In the past year, it was at the forefront of public interest, especially in the wake of the tragedies in New South Wales and California.



CALM's prescribed burning practices were the subject of an independent review as part of the Ministerial Conditions set for the adoption of the new Forest Management Plan and the Government's election commitments. The review panel was chaired by Sandy Lewis (former Lower South West MLC) and included David Bell (associate professor of plant ecology at the University of WA) and Phil Cheney (the CSIRO bush fire research unit's principal scientist).

The panel said fuel reduction burns were imperative to minimise the potential hazard of wildfires, particularly in south-west forests and heathlands, and recommended that CALM substantially upgrade its fire protection resources and its program of prescribed burning. It found no evidence that current prescribed burning practices had resulted in major disruptions to the natural ecosystems.

During the year, CALM began upgrading its fire surveillance operations by ordering six WA-made Eagle aircraft to replace the ageing Piper Super Cub fleet that has served so well for around 20 years. Work also began on upgrading some of the lookout towers in the Sawn and Central Forest regions and upgrading fire access and watering points in the Southern Forest region.

Protection of the conservation estate, including native hardwood forests, from wildfires - particularly those caused by arson - continues to be a high priority in the Department's overall conservation strategy.

The Department also continued to support local volunteer bush fire brigades through the provision of fire fighting units in strategic areas such as in the Lower Great Southern, where pine and bluegum plantations are increasing. These units were funded through the income CALM earned through managing plantations on behalf of two big Asian consortiums.

## PLANTATIONS: PREPARING FOR THE FUTURE

CALM signed formal partnership agreements with two major companies for hardwood plantations based on bluegums. The first was with the Albany Plantation Forest Company of Australia Pty Ltd, which is investing \$60 million to establish 20 000 hectares of bluegums over 10 years. The company is a joint venture between Oji, Japan's biggest pulp and paper manufacturer, and Itochu, that country's biggest trading house.

The second was with Hansol Forest Products of Korea. This is the first plantation agreement signed by any Korean company outside its own country and involves an investment of \$30 million over the next 10 years to plant 10 000 hectares of bluegums.

A further milestone was reached with the announcement of CALM's elite plantation tree-breeding program, which has resulted in the development of the 'western bluegum', now a registered name of a strain of *Eucalyptus globulus* that grows 40 per cent faster than other strains.

Western Australia now has more than 1 000 different bluegum families planted in 35 trials across the south-west - a total of around 110 000 trees. Only 300 of these trees have been judged to be good enough to be grown in the seed orchards to produce 'western bluegums'.

Amendments to the Conservation and Land Management Act relating to establishing commercial tree plantations also were made during the year.

## FERAL ANIMALS: THE FIGHT CONTINUES

The European fox has been called the 'crown of thorns' of the land. The fox and feral cat together are the single biggest threats to our small native mammals, such as the numbat (the State's faunal emblem), woylie, tammar wallaby, quenda, phascogale and mardo.

CALM scientists have recently developed a bait to which feral cats are attracted, making large-scale operational control feasible for the first time. Feral cats occur throughout WA and are known to have caused the extinction of several populations of native mammals.

Operation Foxglove, an initiative by CALM with sponsorship from Alcoa of Australia, was extended during the year to take in almost 500 000 hectares of the jarrah forest between Mundaring and Collie, and outliers such as Julimar Forest north-west of Toodyay.

Operation Foxglove involves aerial baiting of the forest with dried meat baits treated with '1080', a poison that occurs naturally in poison peas (*Gastrolobium* spp). A broadscale research project - with assistance from the Australian Nature Conservation Agency and the Co-operative Research Centre for Biological Control of Vertebrate Pest Populations - is being run in conjunction with 'Foxglove' to gain the maximum benefit from the control measures.

CALM research in several areas, such as Julimar and the Dryandra Woodland in the western wheatbelt, has shown that fox control can result in the recovery of significant populations of native mammals. Applying this knowledge, together with technological advances such as Global Positioning Systems, and exploiting the natural synergies that exist between our native flora and fauna, CALM aims to create a 'wildlife wonderland' throughout the jarrah forest.

## THREATENED: A RARE MOMENT IN HISTORY

Western Australia's wildlife protection list was expanded during the year, but not necessarily because more species were threatened with extinction or were at special risk.

The schedule of extinct, rare and threatened species was expanded to include invertebrates - spiders, shrimps, snails and even a native bee. This is the first time invertebrates have been given the top level of protection under the State's Wildlife Conservation Act.

In an allied move, a new schedule for fauna thought to be extinct was included on the lists of specially protected fauna. This recognises that there are different conservation strategies needed for species thought to be extinct compared with those threatened with extinction. If species thought to be extinct are rediscovered, they immediately need a high level of protection because they are still very likely to be at risk.

As well as the 11 invertebrates listed, a further 133 species were included on the new schedules compared with 125 on the previous schedule released in 1990. A total of 100 animal species are now listed as threatened or presumed extinct. Additions to the threatened species schedule include the loggerhead turtle, malleefowl, orange horseshoe bat and the Pilbara olive python. Three bird species - the crested hawk, black bittern and barking owl - were removed because they were either naturally uncommon in WA or the species as a whole could not be considered threatened.

## PARTNERSHIPS: THE WAY AHEAD

In the past year, CALM entered into several new partnerships that will result in great investment by the private sector in the State's conservation effort and CALM's Tourism and Recreation Program.

New private sector investments totalling \$5 million are being made at Matilda Bay Reserve on the foreshore of the Swan River in Perth, and at four caravan parks: Coalmine Beach in Walpole, Hamelin Bay in the Leeuwin-Naturaliste National Park, Waroona Dam and Logue Brook Dam. At Yanchep, a lease was signed which should result in significant upgrading of facilities in the park.

So far, the lessees of the Matilda Bay Restaurant have spent \$2.5 million upgrading the complex and will spend a further \$1 million over the next three years. Lessees of the four caravan parks will spend more than \$2.5 million on upgrading the parks, including installation of more campsites and caravan bays, chalets, cabins and other facilities.

These partnerships are building on Western Australia's tremendous natural advantage and encourage further nature-based tourism opportunities in regional areas. In another partnership, CALM and the DarlIngunaya Aboriginal Corporation of Fitzroy Crossing launched a new boat tour that gives visitors an Aboriginal perspective of Geikie Gorge National Park. DarlIngunaya people, from the Banuba Aboriginal language group, represent the traditional owners of the gorge, and the venture provides a more intimate glimpse of the national park through their eyes.

## COMMUNICATIONS: BREAKING NEW GROUND

CALM's communications program was broadened during the year with the first edition of *CALMScience*, an expert journal dedicated to nature conservation and land management research. *CALMScience* maintains editorial standards based on internationally accepted principles and is an invaluable source of research information for scientific and special-interest organisations. The magazine will be published twice a year along with supplements concentrating on papers with specific themes.

The conservation, forests and wildlife magazine, *LANDSCOPE*, is CALM's flagship publication. It has always aimed to present the reading public with up-to-date information on the State's conservation and land management effort. In 1993-94, *LANDSCOPE* won three gold medals in Australia's most prestigious printing and design competition, the National Print Awards. The magazine also virtually scooped the pool in the State's major environmental writing award, the Alex Harris Memorial Medal. The medal-winning article documents how DNA fingerprinting has made it possible for CALM wildlife officers and Curtin University scientists to disprove claims by unscrupulous bird breeders that they can breed rare species of cockatoos. Other articles published throughout the year received high commendations for excellence in environmental writing.



## Objective

*To conserve indigenous plants, animals and ecological processes in natural habitats throughout the State.*

## Description

*This Program involves the production and implementation of land management plans, policies and management programs for wildlife (fauna and flora) conservation and protection. It also involves research into wildlife and communities and regulation of human activities with protected wildlife, including aviculture, commercial wildlife interactions (e.g. whale watching) and scientific research licensing, as well as encouragement for conservation initiatives on private property and roadsides, prevention of illegal taking of protected wildlife, emergency actions such as rescues of stranded whales or oiled seals, and public information and liaison programs.*

*Wildlife management programs are developed for species and communities which are threatened, are commercially exploited, or have a high public profile or public interaction interest, according to the principles of ecological conservation and sustainability.*

*Lands and waters are reserved and managed to conserve viable representative samples of the State's natural ecosystems and their inherent natural processes, as well as for the protection of their flora and fauna.*

*The Program focuses on three areas:*

- conservation of the State's wildlife;*
- planning and research, to provide the basis for management;*
- public awareness and liaison, to enhance appreciation of nature conservation needs and processes, and private contributions to nature conservation.*

*The Roadside Conservation Committee operates within the overall Nature Conservation and Wildlife Management Program to coordinate and promote the conservation and effective management of native vegetation on road and rail reserves for the benefit of the environment and the people of Western Australia. CALM meets the cost of servicing the Committee and obtains contributions towards the Committee's operations from Main Roads Western Australia and Westrail.*

## Highlights

- Three species of presumed extinct flora rediscovered (p. 6)
- First-ever protection for threatened invertebrate species (p. 6)
- Twenty-one recovery teams now operating (p. 6)
- Operation Foxglove extended through northern jarrah forest (p. 8)
- Historic agreement to help develop potential anti-AIDS drug (p. 9)

# Nature Conservation and Wildlife

*Management Program 1*

# CONSERVATION OF WILDLIFE

## Threatened and Rare Wildlife

The Minister for the Environment approved changes to the Schedule of Declared Rare Flora recommended by the Endangered Flora Consultative Committee. Thirteen species were added to the Schedule after survey work had shown that these species were rare, threatened with extinction, or in need of special protection. Twelve species were deleted from the Schedule after survey work showed that they were more common than previously thought.

Two of the added species, *Eremophila vermicosa* ms and *Lepidium aschersonii*, are presumed to be extinct; surveys have failed to relocate any plants in the wild. One of the deleted species, *Styloidium neglectum*, was previously thought to be extinct, but has been found in numbers sufficient for it no longer to be considered at threat of extinction. During the year two other presumed extinct flora species, *Centrolepis caespitosa* and *Plectrachne bromoides*, were also rediscovered.

The Priority Flora List was revised. Added were 216 taxa in need of further survey to determine their conservation status; 45 taxa were deleted, either due to taxonomic clarification of their true identity, or because surveys have determined that they are not as rare or threatened as previously thought. Currently there are 279 taxa listed as extant declared rare flora, 40 as presumed extinct declared rare flora, 1 387 as poorly known and requiring further survey, and 194 as rare (but not threatened) and being monitored.

A revised listing of threatened fauna species was approved by the Minister for the Environment during the year. Changes in interpretation of the *Wildlife Conservation Act* resulted in the identification of four categories of specially protected fauna: Presumed Extinct Fauna, Rare or Likely to Become Extinct (threatened) Fauna, Birds Protected under an International Agreement, and Other Specially Protected Fauna.

An exciting new initiative was the listing of invertebrate fauna species as specially protected for the first time. Ten invertebrate species were listed as rare or likely to become extinct (threatened), including seven spiders, two cave shrimps and a snail. The importance of invertebrates in conserving genetic diversity cannot be overstated. While there are only about 1 000 bird, mammal and reptile species in Western Australia, there are likely to be several hundred thousand invertebrate species. The vast majority of these remain undescribed and unstudied, but some of the groups that have been studied include invertebrates that are relicts, originating millions of years ago. These include several of the spiders now listed as threatened.

Other additions to the threatened fauna list were the loggerhead turtle, malleefowl, orange horseshoe bat and

Pilbara olive python. Western Australia now has 100 animal taxa listed as presumed extinct or threatened with extinction.

There are now 20 recovery teams coordinating the recovery of threatened species of plants and animals, and one recovery team coordinating work on a threatened ecological community. New teams established during 1993-94 were for Corrigin grevillea, matchstick banksia, Swan Region threatened flora, Merredin District threatened flora, Central Forest Region threatened flora, Southern Forest Region threatened flora, Geraldton District threatened flora, Lancelin Island skink, western bristlebird, and Thevenard Island mouse.

Considerable progress has been made with the implementation of Recovery Plans. Some highlights are:

**Western swamp tortoise** A fox-proof fence has been completed around Twin Swamps Nature Reserve, and the WA Water Authority has constructed a bore, pump and pipelines to enable supplementation of swamps in the reserve. This will allow reintroduction of western swamp tortoises bred at Perth Zoo during the coming year.

**Shark Bay mouse** Translocations took place to Doole Island in Exmouth Gulf and Heirison Prong at Shark Bay. Animals have been fitted with radio collars to monitor post-release survival. The animals have occupied the entire 350 ha island and some breeding has taken place.

**Woylie** Western Australian woylie populations have thrived under their recovery program. The Recovery Team are hoping to down-list the woylie's endangered status by the end of 1995.

**Numbat** The writing of the numbat Recovery Plan has been completed. Numbats were translocated to Karroun Hill Nature Reserve, Batalling State forest and Yookamurra Sanctuary in South Australia.

**Noisy scrub-bird** A large increase of singing male birds was found at Mount Manypeaks, and birds from that area have begun to spread up the Waychincup River. Monitoring of the parent population at Two Peoples Bay revealed no apparent effect from the removal of birds for translocation.

**Orange-bellied and white-bellied frogs** Approximately 90 per cent of landholders who have populations of the white-bellied frog on their land have given preliminary permission for the Recovery Team to construct conservation fences to protect the frogs and their habitats.

**Chuditch** Trials into the effects of fox baiting on chuditch in the jarrah forest have been completed, demonstrating that fox control enhances the conservation of the chuditch as well as other forest mammals. In fox-baited areas, population densities increased to approximately three times that of unbaited forest. The translocation of chuditch to Julimar Forest has been successful.



**Rose mallee** The conservation status of this species was significantly improved when five new populations with a total of more than 300 plants were reported by a local landowner as a result of the activities of the Recovery Team. Hundreds of plants have been propagated in a mining company's nursery for translocation to the wild.

**Lake Toolibin** The Recovery Team is revising the Recovery Plan prepared by consultants and is developing accurate costings for the actions necessary to prevent the lake becoming saline.

Additionally, burrowing bettongs (boodies) were successfully reintroduced to Boodie Island, and quenda and brushtail possums reintroduced to Julimar Forest.

The Swan Region and Merredin District wildlife management programs for declared rare flora and other flora in need of special protection are being implemented, the Merredin program with the assistance of Commonwealth funds. Similar programs are in draft form for Albany and Esperance Districts, and, for declared rare flora only, Katanning District. Draft programs are being prepared for Moora and Narrogin Districts, and survey work has commenced with Commonwealth funding for programs in Central Forest and Southern Forest Regions, and Geraldton District. When these programs are completed, the South West Botanical Province will be covered by flora management programs. This will be a major achievement for flora conservation in Western Australia.

Income from the BankWest *LANDSCOPE* Conservation Visa Card, which was launched in 1993, has been allocated to four recovery projects: the Lancelin Island skink, the Wyalcatchem foxglove, Trigwell's *rulingia* and Lake Toolibin.

Several populations of declared rare flora on private land were fenced, with the co-operation and assistance of the property owners, to enhance their protection. CALM continued its liaison with other government instrumentalities, and a number of populations of declared rare and priority flora on road and rail reserves were marked.

A new CALM Policy Statement, No. 50, "Setting Priorities for the Conservation of Western Australia's Threatened Species", was prepared to provide a basis for ranking threatened species and identify those in most need of management actions. Policy 29, now titled "Translocation of Threatened Flora and Fauna", was also revised following consultation with interested scientists and the public.

## Commercial Use of Wildlife

The WA Flora Industry Advisory Committee (WAFIAC) met on two occasions during the year to consider various issues associated with the management of the wildflower

industry. WAFIAC provides a forum for consultation between the industry and other interested parties, and provides advice on industry management to CALM and the Minister for the Environment. Issues discussed included the management of boronia harvesting, research projects, licensing requirements, roadside flora conservation and the Western Australian flora management program.

The draft boronia management program has been revised for the 1994 season. Research into sustainable harvest quotas and management requirements of boronia began during the 1993 season, funded partially by royalties. This research will continue during the 1994 season, with the method of quota assessment being progressively refined.

Research has also been undertaken on the distribution and land tenure of occurrence for *Conospermum* species being investigated for the compound Conocurvone. The aim of this survey was to identify the potential resource that may be utilised in a sustainable manner.

Under Commonwealth legislation, the Australian Nature Conservation Agency (ANCA) requires the Department to prepare a management program under which flora harvested in this State may be exported from Australia. This program has undergone a major revision during the year, and has been submitted to ANCA for comment. Industry and other interest groups have been consulted, particularly about the list of export species that will be covered by the program.

The triennial aerial survey of red kangaroos, western grey kangaroos and euros in Western Australia was concluded in August 1993. This survey covered 1 041 958km<sup>2</sup> or approximately 35% of the State and the majority of the areas where commercial kangaroo harvesting is permitted. The population estimates for the three species in the surveyed areas are shown below, along with the 1994 commercial harvest quota limits.

	Kangaroo Species		
	Red	Western Grey	Euro
1993 Population estimate in surveyed areas	1 363 000	432 000	>168 000
1993 quota	350 000	65 000	10 000
1993 commercial harvest	140 000	47 000	8 500
1994 quota	220 000	60 000	10 000

A comparison of aerial survey results for areas common to past surveys showed that the red kangaroo population fell by approximately 41% between 1990 and 1993, but was still 38% higher than in 1981.

Using the same comparison, the western grey kangaroo population remained at similar levels to those estimated previously, allowing for bias detected in the 1990 survey.

The first management program for saltwater crocodiles and freshwater crocodiles in Western Australia was completed and approved during the year. The management program covers all aspects of crocodile

management, including problem crocodiles, population surveys and regulation of crocodile harvests, farming, processing and export. The management program was approved by the Federal Minister for the Environment, Sport and Territories, thereby allowing for export of crocodile products sourced from Western Australia. The Federal Government, through ANCA, also approved a submission from Western Australia on the crocodile harvest limits to apply under the management program, with initial limits as shown below, for the period 1 July 1993 to 30 June 1994.

Species	Saltwater Crocodiles	Freshwater Crocodiles
eggs/hatchlings	400 (ex-King River)	5 000 eggs or 2 5000 hatchlings
juveniles/adults	84	500*

\*Lake Argyle only

Surveys were again undertaken of saltwater crocodile and freshwater crocodile populations in the Cambridge Gulf-Lake Argyle area. The survey techniques appear to underestimate the total crocodile population, but overall the survey indicated a slight decline in the saltwater crocodile population of Cambridge Gulf. Development of the aerial survey technique continued, with calibration of boat-spotlight counts against helicopter counts.

The emu farming industry continued to expand with 56 farms licensed at the end of the year, an increase of 15 over the previous year (see p. 10 and Appendix 14).

## Dieback, Mining and Weeds

Disease management procedures for timber harvesting have been reviewed and documented in the Departmental manual *Timber Harvesting in WA*. A Dieback Protection Plan has been drafted for Perth District, and the plan for the South Coast Region has been reviewed and updated for the period 1994-1998. Implementation of the plan for the South Coast Region includes the closure of 30% of the Stirling Range National Park to prevent further infection. Dieback interpretation is continuing, with five national parks and 13 nature reserves in the South Coast Region being completed in the year. Investigations have continued into the application of airborne and satellite remote sensing for monitoring and mapping vegetation condition in the northern jarrah forests.

The membership of the Northern Sandplains Dieback Working Party has been expanded to include representatives from the Department of Agriculture. The new membership structure recognises the need to take into account farming interests in the region, and to incorporate dieback management into land care activities.

Personnel from CALM, other Government departments, industry and the public have received training in dieback disease management. Three core training packages have been produced to address the training needs of CALM and industry personnel working on CALM-managed lands.

Phosphonate was applied to areas of CALM-managed land to minimise dieback impact. In addition, specific treatments have been applied to five species of declared rare flora on the south coast. Monitoring of results continues.

In collaboration with the NPNCA, Department of Minerals and Energy (DOME) and the Department of Environmental Protection, mining guidelines and conditions were reviewed, and a pamphlet titled *Guidelines for the Application of Environmental Conditions for Exploration and Mining* was issued by DOME. Liaison with the mining industry also included representation on the Petroleum and Environment Liaison Group, the Mining and Environment Group, the State Gravel Supply Strategy Group, and DOME's reviews of the reports on rehabilitation in the gold and mineral sands industries.

One hundred and ninety-eight mining tenements were processed and appropriate environmental conditions imposed. Fourteen proposals for exploration were approved after detailed environmental review. Three mining proposals on C-class nature reserves were approved by the NPNCA or EPA. Comment was made on three mining proposals formally assessed by the EPA, and on eight Annual Reports or mining plans. An exploration licence over the Fitzgerald River National Park was refused, and the EPA recommended against mining for gypsum in Chinocup Nature Reserve. There was also considerable interaction with the petroleum industry, including review of 12 proposals for seismic work, three proposals for drilling, three survey beacon stations, considerable new construction (Thevenard Island) and control of mice and seagulls (Varanus Island).

A total of \$2 243 000 was received in mining compensation payments.

The Department has continued to be involved in Zone Control Authorities and Regional Advisory Committees set up by the Agriculture Protection Board for liaison and coordination of weed and feral animal management.

Management of major weed infestations on CALM-managed lands continued, in particular with African boxthorn being targeted on the Beagle and Abrolhos Islands, and in Stokes National Park, and Woody Lake and the Recherche Archipelago nature reserves. Other weed species being targeted include bridal creeper, freesia and blackberry.

## Foxes and Other Feral Animals

Fox-baiting programs have continued in selected areas across the State, resulting in security for populations of threatened fauna. The programs are now being expanded to a large-scale operation over 450 000 ha of the northern jarrah forest under Operation Foxglove. This predator control will allow the reintroduction of the woylie to

several areas of the forest where they have become rare, in addition to removing predator pressures from many other species of forest fauna.

Feral animal control has continued in the Kimberley, with specific efforts directed at cattle and donkeys, reducing these animals to manageable levels in Purnululu National Park and the Mt Hart lease. Similarly, over 8 000 goats were removed from the Peron Peninsula, Kennedy Range and Kalbarri national parks, and Cooloomia and Zuytdorp nature reserves and adjoining areas in the Midwest Region, in conjunction with the Agriculture Protection Board and local Land Conservation Districts. Forty-five feral pigs were also removed from Kalbarri National Park.

## General Wildlife Management

Public submissions continued on a draft Wildlife Conservation Bill. The public consultation period had been extended in response to a high level of public and industry interest. The submissions are being analysed.

Similarly, public comments on the draft Nature Conservation Strategy have been analysed and summarised. The draft Strategy has been revised for submission to the Minister as a result of these comments.

The Conservation and Land Management Act was amended during the year to enable the Department to promote and encourage the use of flora for therapeutic, scientific or horticultural purposes for the good of the people in this State or elsewhere. The amendment also enables the Executive Director and the Minister to enter into agreements with other parties to confer on them exclusive or preferential rights to specified flora on Crown land. Following passage of these amendments, a major agreement was signed with an Australian pharmaceutical company, AMRAD, to develop an anti-HIV drug from a compound found in Western Australian species of smokebush (*Conospermum*). This agreement will earn the State up to \$5 million for research and conservation work, plus royalties, if the drug is successfully developed. The signing of the agreement also saw an initial payment to the State of \$1.15 million as a research grant.

The Department has liaised with other State and Commonwealth agencies about the management of marine areas. In particular, discussions have been held with the Australian Nature Conservation Agency (ANCA) over the management of Commonwealth waters, including training in the relevant Commonwealth legislation. Memoranda of Understanding with ANCA have been prepared for Commonwealth waters at Ningaloo Marine Park and Mermaid Reef Nature Reserve. A Memorandum of Understanding has also been completed with the Western Australian Museum for the management of shipwrecks in marine parks.

Departmental officers attended 37 reported whale and dolphin strandings throughout the year, involving both

live and dead animals. These strandings involved 43 individual animals, representing ten species. In four instances, eight of the stranded animals were successfully returned to the sea. Officers also attended 17 pinniped strandings throughout the year, including three sub-antarctic fur seals, 12 Australian sealions, one leopard seal and one New Zealand fur seal. In most cases, these animals were ill, injured, or suffering from entanglement in discarded debris. Two of these animals were successfully returned to the sea.

## Wildlife Interactions, Licences and Compliance with Legislation

Wildlife interaction-based industries continued to be managed by the Department. A total of 31 licensed whale-watch boat-tour operators conveyed over 9 000 passengers from various centres around the State, to look primarily at humpback whales, but also southern right whales. Management guidelines and licensing provisions for commercial whale shark operations were overseen in Ningaloo Marine Park, where 14 licensed operators conveyed 900 passengers who spent 1 500 dive days with whale sharks. Dolphin interactions continued at Monkey Mia, Cockburn Sound and Bunbury.

The Department ensures that wildlife-based activities are licensed, in accordance with the Wildlife Conservation Act 1950, and conducts monitoring and investigations to ensure compliance with the legislation and the licences issued.

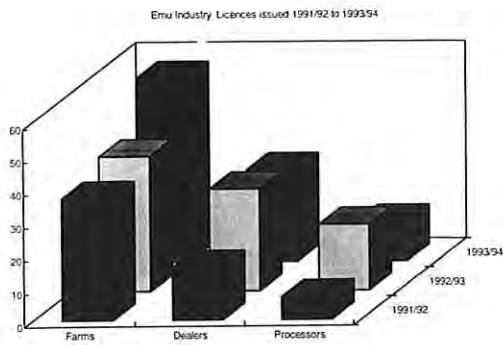
Flora licences issued by the Department decreased by 7.9% from those issued in 1992-93. This decrease was largely attributable to a drop by 18.1% to 588 for Commercial Purposes licences (to pick on Crown lands). Private property Commercial Producers licences continued to increase; rising by 4.8% to 346. See p. 10 and Appendix 14 for details of flora licences.

A total of 6855 fauna (other than damage) licences were issued during the year, an increase of 6.4% over the previous year (see p. 10 and Appendix 14). The principal increases were realised through the emu industry, with an increase in licensed farms from 41 to 56, and significant increases in exports of both live birds and skins interstate.

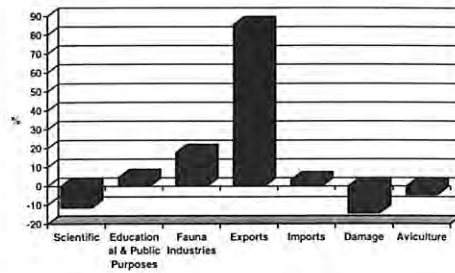
There was a slight fall in the number of licensed aviculturists from 3 805 in 1992-93 to 3 632 in 1993-94, but these licences still made up the majority of fauna licences issued. They made up 54% of the total, excluding damage licences.

The Minister for the Environment declared revised open seasons for the Australian shelduck, maned duck, little corella, galah, ringnecked parrot, western silvereye, Australian raven, Australian crow, little crow, red-capped parrot and western rosella during the year. The revised open seasons relate to specific areas of the State and provide for the fauna species identified to be taken in

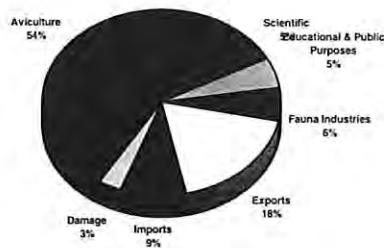




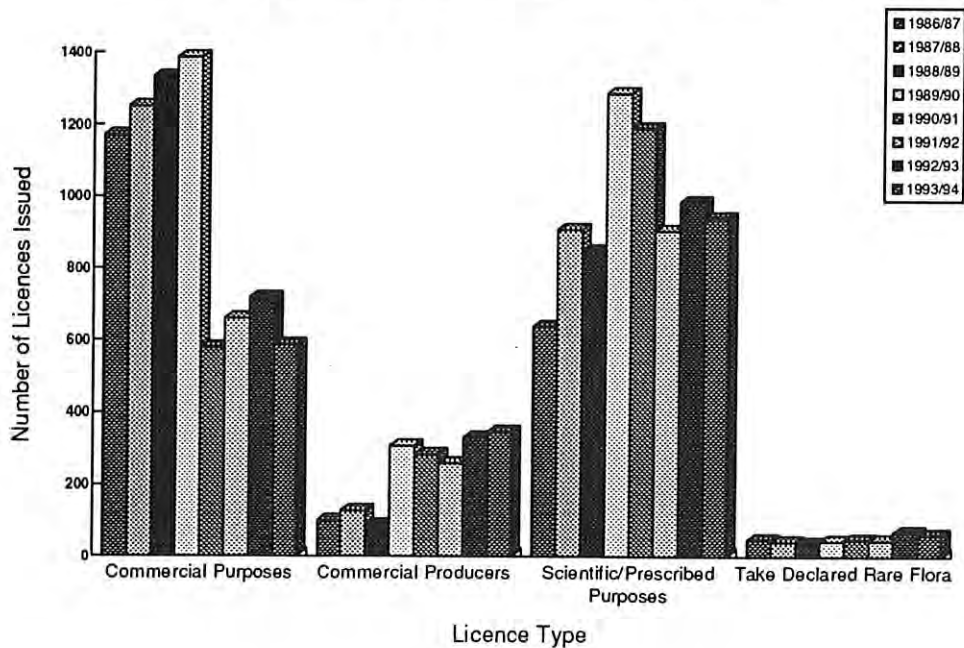
Emu Industry Licences issued 1991-92 to 1993-94



% Change to number of licences issued, by licence category, 1992-93 to 1993-94



Proportional representation of the 6 855 fauna licences issued during 1993-94 pursuant to the Wildlife Conservation Regulations



Flora Licences issued from 1986-87 to 1993-94

specified areas where they are causing damage, without the requirement for a damage licence. The extension of the open season coincided with a decrease in overall bird damage licences issued from 215 in 1992-93 to 161 in 1993-94. The number of damage licences issued for emus rose from 19 in 1992-93 to 43 in 1993-94, reflecting increased emu pressures in the vicinity of the State barrier fence during the latter part of the year.

During the year, Departmental officers contacted over 2 300 people about offence-related matters. Advice and guidance was provided to the majority of these people. Verbal warnings were issued as appropriate, and 209 offences were the subject of written reports (see Appendix 16). To date, action in 118 matters has been completed.

1992-93 Reported Offences		1993-94 Reported Offences	
Total Offences Reported	174	Total Offences Reported	209
Convictions	60	Convictions	42
Dismissals	1	Dismissals	1
Letters of Warning	78	Letters of Warning	64
No further Action	12	No further Action	11
Action Pending	23	Action Pending	91
<b>Total Fines</b>	<b>\$25 650</b>	<b>Total Fines</b>	<b>\$14 650</b>
<b>Total Costs</b>	<b>\$8 183</b>	<b>Total Costs</b>	<b>\$2 026</b>

Note 1: Figures for 1992-93 reported offences are updated. Since 30 June 1993, 79 of 102 charges then pending have been finished.

Note 2: An error occurred last year in the number of offences recorded for 1992-93. This is corrected in this table.

Note 3: See Appendix 16 for details of 1993-94 offences.

The trend in aviculture appears now to be more towards the keeping of exotic birds, in particular parrots. Access to new technology, such as DNA profiling, has discouraged the illegal possession of sought-after native birds, but interstate and overseas smuggling remains a concern to the Department. Illegal importation of exotic animals presents risks in terms of potential disease, predation and competition affecting native species.

Forty-eight reports of problem crocodiles were received by officers in the Kimberley and five were reported in the Pilbara. Seven saltwater crocodiles were captured and relocated to crocodile farms because of the threat they posed to public safety.

## Area Management

Three significant conservation parks (Devonian Reef, Geikie Gorge Extension and Brooking Gorge) were added to the conservation estate. Draft management plans were prepared for Monkey Mia Reserve, the Dryandra Woodland and Yalgorup National Park. Interim Management Guidelines were prepared for the Kennedy Range National Park, and Beekeeper and Badgingarra Nature Reserves. Each of these areas has significant nature conservation values that will be managed under the plans and guidelines that have been prepared.

CALM participated in the Department of Planning and Urban Development Central Coast regional planning study, and, with the Department of Environmental Protection, reviewed conservation values of unvested reserves and vacant Crown land in the study area.

A joint CALM-University of Western Australia project was begun to develop a Marine and Coastal Geographic Information System for use by managers of waters in the Shark Bay World Heritage Area.

## WILDLIFE RESEARCH

Research into the population ecology of five *Daviesia*, three *Lambertia*, four *Grevillea*, six *Eremophila* and two *Chamelaucium* species of threatened flora are continuing. These studies will provide necessary information for the management of these species, and other species with similar ecological characteristics. A research program is also being undertaken in conjunction with Curtin University of Technology into the population ecology and reproductive biology of *Banksia brownii* and *Banksia verticillata*. This research information will be used to formulate recovery plans for these species.

A similar study into the ecology, population genetics and management requirements of five orchid species has been completed. This research will now be reviewed to determine the requirement for the preparation of recovery plans for the species, and identification of management actions.

An externally funded project on the distribution and abundance of a rare mammal, the mulgara, has been completed. This survey was successful in discovering the most significant populations of this animal in Western Australia, in the Collier Range National Park and the proposed Carnarvon Range National Park.

The status of marine turtles and dugong in Western Australian waters has been assessed. Important turtle rookery sites have been identified, and management guidelines for their protection prepared.

Research into the decline of ground-dwelling medium-sized mammals in the arid and semi-arid parts of Western Australia, as part of the Desert Dreaming project, has demonstrated that cats, as well as foxes, are major contributing factors. Research into the ecology of the fox, and the potential for biological control, also continued through the year. Operational guidelines for the control of the fox have been prepared, and significant advances have been made in the development of an effective bait-control method for feral cats. The research component of Operation Foxglove began, with the intention of determining the most effective broadscale fox-baiting technique for the jarrah forest.

## The Herbarium

CALM's WA Herbarium mounted 9 191 new specimens, adding them to its database. A further 54 362 specimen records were added to the WAHERB specimen database, bringing the total number of databased entries to 316 500. This represents an estimated 90% of the State collection's data now available in electronic form. A prototype system for spatial validation of WAHERB records was also established, based on *Acacia* and funded by the Environmental Resources Information Network.

A total of 6 440 plant specimens were identified for researchers. Specimen loans were transacted with 17 national and international institutions, with 3 497 herbarium specimens being loaned, and 3 922 herbarium specimens received on loan from other herbaria. Also 2 174 herbarium specimens were distributed on exchange to other institutions, and 2 261 herbarium specimens of WA flora were received from other institutions to add to the collection.

The public access Reference Herbarium now comprises 8 136 specimens vouchered and linked to a databased specimen in the main herbarium collection. It was consulted by 768 recorded visitors, including CALM staff, tertiary students and amateur and professional botanists.

WACENSUS, the database of plant names for the State, now comprises a total of 12 819 records. The number of names in current use totals 10 809, of which 10 170 are formally published names and 639 are manuscript or phrase names for taxa yet to be formalised. Protocols have been established for maintenance of the Census entries which are now directly linked to information in the herbarium collection.

The regional herbarium at Manjimup was officially opened during the year, and is linked through the computer network to the main collection. The regional herbaria at Karratha and Albany also continue to provide decentralised access to herbarium facilities, with the Albany herbarium currently housing 12 170 specimens. Equipment was purchased to establish a regional herbarium at Geraldton. Volunteer support for the herbaria has remained strong through the year.

## PUBLIC AWARENESS AND LIAISON

Wildlife information signs or interpretive displays were constructed for six Abrolhos Islands, Geikie and Windjana Gorges, Purnululu, Porongorup Range, Hamelin Pool and Shell Beach and Lake Dumbleyung. A brochure on the Fitzgerald River National Park Biosphere was also produced. Environmental education activities included an Earth Caretakers program at Canning River Regional Park for teachers and students, presentations at the State-wide Museum Education expo for educators held at Perth Zoo,

and four Dryandra Woodland Ecology courses run for the public.

Interaction with Aboriginal groups has assisted CALM in gaining an understanding of nature conservation issues from the Aboriginal perspective. A collaborative project was completed with the Paupiyala Tjarutja Aboriginal Corporation on the biota of the Great Victorian Desert, and consultation has commenced with the Ngaanyatjarra Council over the future management of the proposed Lake Throssell Conservation Park in the Goldfields Region. Cooperative interactions have also continued with the Wheatbelt Aboriginal Corporation.

The Department again assessed the applications to the Remnant Vegetation Protection Scheme for providing funding assistance for the fencing of remnant vegetation for nature conservation. A total of 138 applications were received, 48 fewer than last year. Ninety-seven applications were funded to fence off a total of 3789 hectares of remnant vegetation. \$245 113 were provided for fencing subsidies, at a cost effectiveness of \$64.68 per hectare protected.

The Department also coordinated the State assessment of the Commonwealth-funded Save the Bush component of the national Landcare program. Forty-nine applications were assessed, which, although being a reduction of 25 from last year, did represent an improvement in standards of application, and also an increased level of innovation in addressing awareness and management for nature conservation by the community. The funding provided to Western Australia under Save the Bush increased from \$187 569 in 1992-93 to a recommended \$221 009 for 1993-94. Both funding schemes provide an important nature conservation contact for the Department with the community, and in particular the Land Conservation Districts. This contact is further strengthened by the continued appointment of a rural nature conservation officer, funded by the Save the Bush program.

## ROADSIDE CONSERVATION COMMITTEE

The Roadside Conservation Committee, with assistance from Main Roads Western Australia, has continued to produce maps depicting the conservation value of roads within Shires. This year, maps have been produced for the Shires of Bridgetown/Greenbushes, West Arthur, Gingin and Chittering. These maps, when used in conjunction with remnant vegetation data from the Department of Agriculture and the conservation estate from CALM, provide local authorities and landcare groups with a valuable planning and management tool.

During the year the RCC ran a workshop on *Watsonia* species: their identification, distribution, control, biology



and methods of control. The workshop was well attended and the proceedings were published.

A wildflower tour brochure entitled *Wildflower Tours of Wickiepin* was produced in June. This brochure is the fourteenth in a series of roadside flora tour brochures being produced by the RCC for Local Government Authorities around the State.

Through the past year several Shires have proclaimed Flora Roads within their areas. This positive action helps to conserve a valuable resource by making road managers aware of the values that need to be protected, and through the stewardship role that develops in the local communities.

During the past year the RCC has funded research projects (conducted by CALM's Science and Information Division) into bridal creeper biology and distribution, and the management of exotic plant species at rare flora sites on rail and roadsides. Final drafts of these reports are expected in the forthcoming year.

The RCC awards a Certificate of Merit to encourage the sympathetic management of rail and roadside vegetation. For 1993-94 this was presented by the Minister for the Environment to Mr D MacKenzie of Munghlinup and to Main Roads (Kalgoorlie Division) for their respective revegetation projects.

Codes of practice for conservation and maintenance of roadside vegetation have been produced by some Shires. These documents provide a foundation for all operations and will help to ensure sound roadside vegetation management.

In February a workshop was held to consider the current operations of the RCC and make recommendations for future directions of this group. Participants at the workshop included representatives of 'stakeholder' groups. As a result of this workshop, the RCC has been able to define and prioritise its areas of interest, e.g. Local Government training on roadside conservation matters.

A paper entitled Roadside Corridors and Community Networks was presented at a CSIRO Networks Conference. This paper, co-authored by the Chairman and Executive Officer of RCC, documents the RCC experience in establishing community networks to conduct roadside surveys.



## Objective

*To provide, regulate and sustain the supply of forest resources for the satisfaction of long-term social and economic needs in a manner that integrates the use of all resources, maximises their return to the State and minimises the impact on all forest values.*

## Description

*This program includes, where it is a designated land use, producing and implementing timber production prescriptions for hardwood State forests, including regeneration and silvicultural treatment, establishing and growing softwood plantations, developing and managing hardwood and softwood sharefarming schemes, controlling the sandalwood industry on Crown land, protecting forest resources from adverse effects of fire and disease, supplying log products from CALM-managed lands to the timber industry and integrating the supply of logs from sharefarmed land, providing the community with seeds, seedlings, firewood and other minor forest produce, and providing public advice on tree planting for timber production on a commercial basis; and developing public awareness, understanding and support for the forest resources management program, services and policies.*

## Highlights

- Major new forest management plan approved and in place (p. 15)
- Overseas investment in hardwood plantations (p. 18)
- Oil-producing mallee eucalypts show commercial potential (pp. 18-19)
- Expanded sawmill for softwood plantations (p. 20)

## FOREST MANAGEMENT

During the year the Minister for the Environment approved the Forest Management Plan 1994-2003. The draft was assessed under the provisions of the Environmental Protection Act 1986. It was prepared with extensive public consultation by way of seminars and workshops, and by the circulation of a draft for public comment. The plan complies with the principles set out in the 1992 Australian National Forest Policy Statement, and is in accordance with the nationally adopted principles of ecologically sustainable development for forests, and with the National Conservation Strategy.

The plan details the Government's vision of ecologically sustainable management for the State's publicly owned native forests. It is designed to ensure that a publicly owned native forest estate is maintained in perpetuity, with potential for an efficient, sustainable and competitive range of forest-based industries to be further developed. The plan will make sure that native forests are managed for all values recognised by Western Australians, while noting that the importance of any particular value will vary over the forest estate.

Under the plan, biodiversity will be conserved within gazetted reserves and in forest which will be used for productive purposes. Expansion and better management

# Forest Resources

## Management Program 2



## Silviculture

### The Jarrah Forest

Harvesting in the jarrah forest is undertaken using a variety of silvicultural objectives (silviculture is the art and science of establishing and tending forests). Where there is a predominance of vigorously growing trees, the stand is thinned; where this is not the case the stands are harvested with the object of regenerating them. This is achieved either by harvesting in a way that will release existing lignotubers to grow unimpeded into saplings; or, where there are inadequate lignotubers, harvesting to create a shelterwood under which seedlings are established. The proportion of each area that is harvested to each of these objectives, and the degree of intermixing, vary according to the existing stand structure and condition.

In many areas the desirable silvicultural objective is achieved completely or nearly completely by the harvesting operation itself. A proportion of the remainder is completed by silvicultural tending operations one or two years after harvesting. In more marginal forest types harvesting is done by selective cutting. In some areas harvesting precedes clearing for mining or the construction of public utilities such as reservoirs or power lines. Cleared areas are not regenerated immediately but where possible are rehabilitated later.

of private forest will be emphasised, in accordance with the provisions of the National Forest Policy. In particular, private investments in plantations will be encouraged.

The Department has subsequently negotiated contracts with 49 sawmilling companies, which will guarantee their resource base for the next 10 years. The guarantee has provisions to ensure that products of the highest value are produced from our valuable native hardwood timbers.

More timber was harvested from softwood plantations during the year. This was a result of increased production by Wespine Industries Pty Ltd in accordance with the Dardanup Pine Saw Log Agreement Act. Significant areas of pine plantations have been replanted following clearfelling.

### NATIVE FOREST MANAGEMENT

Several tools for integrated forest planning have been designed and implemented during the year. The first of these is a computer program that will enable managers to compare the effects of different strategies on annual yields for the next hundred years.

### The Karri Forest

Karri forest harvesting is also dependent on the structure and age of the existing forest, though it is less complex than jarrah harvesting. Patches of even-aged and vigorously growing forest which are greater than two hectares in size are identified for thinning. When the stand is old enough to yield saleable products, it is thinned to an appropriate density by commercial harvesting. No further tending is necessary.

Mature forests and forests of mixed structure created by past logging activities are harvested under a clearfelling system. Regeneration following harvesting is achieved within the following year or two by means of temporarily retained seed trees, by planting with nursery raised seedlings, or by broadcast seeding. Seed trees are the preferred method, but planting is used in the years when there are inadequate seed crops available in the karri forest. Broadcast seeding is only used to a limited extent.

A further series of computer programs simulate 15-30 year harvest plans that will take account of factors such as the dispersal of harvest areas, maintenance of strategic fire protection zones and changes in the visual landscape. This 'whole of forest' approach can be extended to managing wildlife habitat and recreation values.

A third area of developments caters for the detailed recording of harvest activities and the programming of follow-up silviculture tending. This record of the present condition of the forest is essential for future planning. The harvest and tending operations shown below are the first to be generated from the new system.

In 1993, 14 290 ha of jarrah forest were harvested for the following reasons:

	Hectares
Thinning	3 500
Release of regeneration	4 600
Establishment of regeneration	2 120
Single tree selection	1 690
Selective	2 360
Other	20
<b>TOTAL</b>	<b>14 290</b>

During the year 1993-94 tending operations were carried out on 5 050 ha of jarrah forest harvested in either this or previous years.

A study of the effects of thinning and fertilising on the growth and physiology of jarrah pole stands was completed during the year. The study demonstrated that the response to thinning was due to greater availability of water and the response to fertiliser was due to increased leaf area and leaf nutrient status.

Alcoa continued to fund the Forest Improvement and Rehabilitation Scheme (FIRS) through which areas of jarrah forest next to bauxite mining areas are rehabilitated, increasing the capacity of the land to support long-term land uses and minimising the effects of dieback disease. During 1993, 182 ha of jarrah forest were treated under this scheme.

In 1993, 1 710 ha of karri forest were harvested as follows:

	Hectares
Regrowth forests	
- thinned	80
Mature forests	
- clearfelled	1 110
- cut to seed trees	520
<b>TOTAL</b>	<b>1 710</b>

Regeneration was completed on 1 930 ha harvested in either this or previous years by the following methods:

	Hectares
Hand planted	1 620
Natural seed fall	310
<b>TOTAL</b>	<b>1 930</b>

## Disease and Pests in Native Forest

The presence of dieback disease (*Phytophthora cinnamomi*) and its predicted impact on the jarrah forest is mapped prior to logging, mining and operations associated with the provision of public utilities such as reservoirs and power lines. Mapping is done either from interpretation of large-scale colour photographs or from intensive ground survey. In both cases interpretation is supported by laboratory analysis of plant and soil samples. The aerial photographs are taken under full cloud cover so that indicator species in the understorey are not camouflaged in contrasting light conditions. Acquisition of photography is programmed for the end of summer when the trees and shrubs may be under stress of drought and the disease symptoms are most evident. Completion of the program is often difficult due to the absence of suitable cloud conditions. In 1993-94, 23 800 ha (89%) of the shadowless photography program over logging areas was achieved and photographs covering 10 200 ha were acquired on behalf of Alcoa of Australia.

CALM staff mapped the presence and predicted impact of dieback on 39 000 ha of jarrah forest and rechecked 4 500 ha previously mapped. Alcoa-sponsored interpreters under CALM supervision mapped 7 340 ha and rechecked 3 660 ha. The proposed route for the Beenup powerline was mapped under contract.

Following screening of *P. cinnamomi*-resistant jarrah from the CALM provenance collection, seedlings were selected and transferred for propagation by tissue culture.

During the year a seven-year study of jarrah leafminer (*Perthida glyphopa*) outbreaks was completed, demonstrating that timber harvesting and prescribed burning have not promoted outbreaks.

Large tracts of the northern jarrah forest have now been baited to control fox numbers under Operation Foxglove. This predator control will encourage the reintroduction of the woylie (*Bettongia penicillata*) to several areas of forest where they have become rare.

## Fire in Native Forests

Fire in the form of prescribed burning was used as a management tool over 166 600 ha of indigenous State forest. This was done to reduce fuels for protection of CALM-managed lands and community assets, to regenerate harvested areas, to provide wildlife habitat, and to enhance nature conservation values. The 1993-94 fire season was characterised by an extended rainless period from mid-October 1993 to late May 1994. This reduced the number of days available for burning, particularly in autumn 1994. However, the Department's achievements were not significantly less than last year due to the optimised scheduling of the burning program with the weather conditions. Trends in areas of prescribed burning achievements are shown in Appendix 9.

The year saw a 34 per cent increase in the incidence of wildfires throughout the State relative to the 1992-93 season. This was due mainly to increases in arson-caused fires, escapes from prescribed burns, and from lightning strikes. In indigenous State forest some 4 470 ha were burnt. Details of the causes, numbers and area of wildfires over the last three years are shown in Appendix 10.

CALM's Wildfire Threat Analysis project continues to be used for fire management planning in the forest regions as a decision support tool. It combines values at risk with the probability of fires occurring, the suppression response and potential fire behaviour. Applications this year include reviewing Master Burn Plans, particularly the appropriateness of strategic protection buffers in the forest regions.

A number of equipment development projects were begun, including a satellite-based global positioning navigational system (GPS) for aerial prescribed burning and a more effective aerial ignition incendiary machine for both fixed-wing and helicopter aircraft. An operational trial evaluating the technique of helicopter ignition for prescribed burning of thinning slash in karri regrowth stands has shown potential and will be continued.

A fire behaviour and impact model for jarrah forests was completed during the year. The model enables better

predictions of fire behaviour, its acute impact on plants and animals and its potential to damage tree crops.

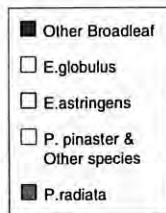
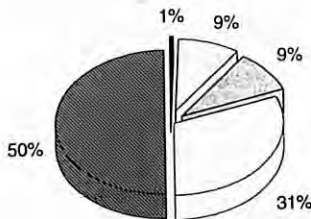
The regeneration responses of 187 jarrah forest plant species to fire has been documented and incorporated in a fire response database. The time to first flowering after fire, and the month of peak flowering, for 255 jarrah forest species were also databased.

## AFFORESTATION

### Plantation Establishment

A total of 2 258 ha of State-owned coniferous plantation forest was established during 1993. This included replanting of 1 496 ha following harvesting in existing plantations on public land and 696 ha established on private property under sharefarm agreements. A total of 139 ha of eucalypts were established, including 114 ha in the Darkan/Boyup Brook area under sharefarm agreements.

The total area of State-owned plantation at 31 December 1993 was 72 090 ha of coniferous and 17 160 ha of broadleaved species (see Appendices 3 and 4 for details).

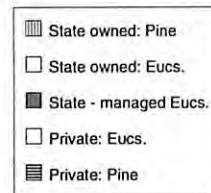
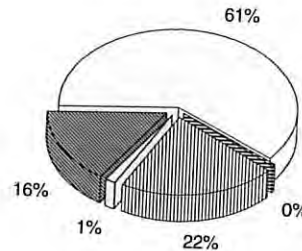


**Area of State-Owned Plantation as at 31-12-93**  
(Total Area of 89 250 ha)

During the winter of 1993, 1 000 ha of *E. globulus* (bluegum) were planted in the Albany area and 508 ha in the Collie area by CALM acting as agent for the Albany Plantation Company of Australia Ltd and Hansol Australia Ltd respectively. These agreements have brought investors into partnership with farmers to grow commercial trees in patterns which are complementary to agriculture, and also environmentally beneficial. Other plantings include 122 ha of *E. globulus* in the Upper Denmark catchment with CALM managing the resource for the Water Authority, and 52 ha for a Water Authority effluent project.

The trend for investment in fast-growing eucalypt plantations continued, with private afforestation companies reporting the establishment of 6 390 ha of bluegum in 1993. Indications are that this figure is conservative with up to 500 ha of plantings on the south and west coasts not having been reported. During the same period private growers only established 48 ha of pine.

The total area of private plantations reported to the Department at 31 December 1993 was 19 335 ha eucalyptus (mainly *E. globulus*) and 16 543 ha of pine (mainly *P. radiata*).



**Plantations Established During 1993**  
(Total Area of 10 465 ha)

### Research and Development

Successful trials of pines, bluegums and oil-producing mallee eucalypts over a variety of sites have created great interest in growing trees and an optimism about future afforestation throughout rural areas. Results of the trials and major research developments are described below.

Three pilot farms have been established at Dandaragan, Busselton and Boyup Brook to demonstrate the integration of pine trees with farming. 'Whole farm' planning incorporating information on soils, geophysics, farm resources, landscape values and economics has been carried out to determine the optimum placement of pine. The project has been funded from the Federal Government's Farm Forestry Program.

Flowering studies were carried out at the *Pinus pinaster* seed orchard in Manjimup to evaluate the fecundity of each parent. This information is used to calculate the overall breeding value of the orchard seed and the amount of seed likely to be produced. About 80 kg of seed is expected to be harvested in 1994. This will be the highest genetic quality *P. pinaster* seed available in the world.



More than 1 900 grafts were made of the highest-ranked *Pinus radiata* breeding value trees in terms of growth rate, tree form and *Phytophthora* (dieback) resistance.

Development of commercial *E. globulus* planting in the Esperance area continued with the establishment of a demonstration planting in a low rainfall area. This completes a program of demonstration plantings across the range of rainfall and soil types in the Esperance region.

The program to develop oil-producing mallee eucalypts as a commercial farm tree crop continued with the extension of demonstration plantings into the Lake Toolibin and Esperance areas. Total plantings of 150 ha were established at some 15 sites. These plantings incorporated a wide range of research, development and demonstration objectives.

## Plant Propagation

Almost 12 million hardwood and more than three million softwood seedlings were despatched from the Plant Propagation Centre at Manjimup during the 1993-94 season. The table below demonstrates the trend towards private investment in *E. globulus* plantations, and also CALM's commitment to replant State-owned softwood plantations after harvesting. *Eucalyptus diversicolor* (karri) seedlings supplement regeneration from seed trees in the native hardwood forest.

### Seedling Dispatch from the Plant Propagation Centre, Winter 1994

Species	CALM use	Private use
<i>E. globulus</i>	2 087 900	4 751 300
<i>E. diversicolor</i>	3 694 500	9 900
Oil Mallees	-	400 000
<i>P. radiata</i>	2 049 700	268 800
<i>P. pinaster</i>	920 500	75 000
Other species	506 600	390 100
<b>Total</b>	<b>9 259 200</b>	<b>5 895 100</b>

The Narrogin and Broome nurseries, being primarily commercial nurseries, have continued to grow plants suitable for rural revegetation, mine site rehabilitation, community projects and amenity purposes. Narrogin despatched over one million seedlings, which included 600 000 oil mallees and Broome 20 000 seedlings, during the 1993-94 season.

## Seed Handling

Seeds of the principal species needed for Departmental forest plantings, rehabilitation and conservation projects, as well as for public sales, were acquired, processed and stored at the Manjimup Plant Propagation Seed Centre.

Other than seed orders from within Australia, seed was exported to Japan, New Zealand, South Africa, the United States of America and the United Kingdom.

A total of 1 118 kg was acquired:

<i>Euc. diversicolor</i>	161 kg
<i>Euc. globulus</i>	108 kg
<i>Euc. calophylla</i>	89 kg
<i>Euc. marginata</i>	62 kg
Other euc. species	145 kg
Pinus species	196 kg
Legumes	317 kg
Other species	40 kg

Seed disbursement (mostly to commercial nurseries) totalled 986 kg. Receipts from public sales totalled \$83 649.

## TIMBER SUPPLY

CALM supplies forest produce, including sandalwood, on a commercial basis from public and CALM-managed land while recovering associated in-forest, administration, roading, and harvesting costs. Harvesting operations are managed to facilitate regeneration and maintain or enhance conservation, landscape, and other forest values such as water quality.

## Native Forest

Sawmilling contracts for harvesting of native hardwood forests were renegotiated on 1 January 1994 for periods of up to 10 years. The contracts provide resource security for the industry and confidence to invest in, and develop, appropriate technology to value-add to timber products.

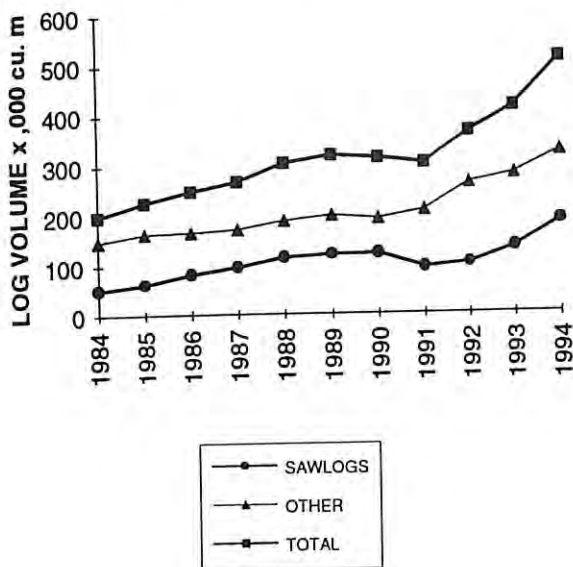
The Department continued to manufacture VALWOOD®, an edge-and-face-glued panel designed for value-adding to regrowth eucalypts, in its pilot plant at Harvey. The intention is for commercial interests in other states to take up licences to manufacture and market VALWOOD®. The research program continued with emphasis on stability assessments.

There are now twenty units of the CALM solar-assisted kilns, mainly in Western Australia, used for drying appearance-grade timber. The concept was developed to provide low-cost drying facilities to small sawmillers wanting to value-add. Some commercial timber drying was carried out on a fee-for-service basis for potential customers of the CALM kilns. An ongoing research program is establishing improved drying schedules for different thicknesses of appearance-grade timber milled from regrowth eucalypts.

A major survey of equilibrium moisture contents (EMC) of timber in different regions in the State, and of seasonal effects on EMC, resulted in the preparation of an EMC map which will be of benefit to timber producers.

## Plantation Forest

In May 1994 the expanded Wespine sawmill at Dardanup was officially opened. This modern sawmilling complex, the result of a joint venture between Westralian Forest Industries and Bunnings Forest Products, will process most of the sawlogs produced from CALM's softwood plantations over the next 18 years. The graph below shows the increase in softwood log production from Crown land in recent years. Production will continue to rise as plantations on Crown land reach maturity and those being established on private land under sharefarm agreements begin to produce small logs from thinning operations. It is anticipated that softwood log production will exceed 750 000 m<sup>3</sup> by the year 2000.



Trends in Softwood Log Production from Crown Land

## Sandalwood Management

For the first time all harvesting, carting, processing, marketing and exporting operations associated with the removal of sandalwood (*Santalum spicatum*) from Crown land were established as contract arrangements between the Executive Director and the contractor, bringing a clear structure to the industry. The production of sandalwood for 1993-94 is shown below compared with that for 1992-93.

	1992-93	1993-94
<i>From Crown land</i>		
green sandalwood	1 017	859
dead sandalwood	806	927
<i>From Private Property</i>		
green sandalwood	217	85
dead sandalwood		125

Exports for 1993-94 totalled 2 032 tonnes compared with 1 899 tonnes the previous year.

Research into the establishment and growth of Indian sandalwood (*Santalum album*) continues on the Ord River irrigation area. It appears likely that the species can be grown successfully there and it could be a commercial substitute for the native sandalwood (*Santalum spicatum*) in the south of the State.

## Production Statistics

The actual amount of timber harvested from Crown land was 1 383 300m<sup>3</sup> hardwood and 509 400m<sup>3</sup> softwood. These figures include sawlogs, chiplogs, particleboard logs and firewood as shown in the following tables, plus an additional 11 000 m<sup>3</sup> of minor forest products such as fencing material and bridge timbers.

### Hardwood Sawlog & Veneer Log Production from Crown Land 1993-94 (Cubic Metres)

Species	Mature Forest					Regrowth Forest	Total
	Premium & high grade feature logs	1st Grade Sawlogs	Other Sawlogs	Veneer Logs	Short Logs	All Sawlogs	
Jarrah	2 376	315 189	105 588	-	233	-	423 386
Karri	200	146 438	71 189	666	-	22 616	241 109
Marri	43	31	20 332	-	-	-	20 406
Other Species	108	3 153	542	-	-	10	3 813
<b>Total</b>	<b>2 727</b>	<b>464 811</b>	<b>197 651</b>	<b>666</b>	<b>233</b>	<b>22 626</b>	<b>688 714</b>

### Hardwood Chipwood Production from Crown Land & Private Property 1993-94 (Cubic Metres)

	Crown Land	Private Property	Total
Marri logs from:			
- regrowth forests	61 269	4 767	66 036
- mature forests	343 842	43 839	387 681
Karri logs from:			
- regrowth forests	55 852	4 526	60 378
- mature forests	109 097	5 501	114 598
Other logs from:			
- regrowth forests		15 762	15 762
<b>Total</b>	<b>570 060</b>	<b>74 395</b>	<b>644 455</b>

### Softwood Sawlog & Veneer Log Production From Crown Land 1993-94 (cubic metres)

Species	1st, 2nd & 3rd Grade Sawlogs	Small Sawlogs	Veneer	Total
Radiata	142 816	18 956	4 003	165 775
Pinaster	3 175	16 591	-	19 766
<b>Total</b>	<b>145 991</b>	<b>35 547</b>	<b>4 003</b>	<b>185 541</b>



### Firewood Production 1993-94 (tonnes)

Log Source	1990-91	1991-92	1992-93	1993-94
<b>Forest Residue</b>				
From Crown land				
- domestic firewood	33 751	30 123	42 141	54 090
- industrial firewood	61 989	62 118	68 505	57 052
From Private property				339
- domestic firewood			4 199	4 198
- industrial firewood				
<b>Total</b>	<b>95 740</b>	<b>92 241</b>	<b>114 845</b>	<b>115 679</b>
<b>Sawmill Residue</b>				
From Crown land	97 258	80 651	116 567	57 079*
From Private property	1 053	96	472	248
<b>Total</b>	<b>98 311</b>	<b>80 747</b>	<b>117 039</b>	<b>57 327</b>

\* July-Dec 1993 figures only, Jan-June data not yet available.

Sawmill figures for 6 months July-December 1992 published in the 1992-93 Annual Report have been updated to include January to June 1993 amounts.

Above data includes Solid Wood, Sawdust Shavings, Chips & Edgings sold as fuel & for own use.

### Log Production From Crown Land & Private Property 1993-94 (Cubic Metres)

Type	Crown Land	Private Property	Total
<b>SAWLOG TIMBER *</b>			
Jarrah	423 386	5 047	428 433
Karri	241 109	6 144	247 253
Marri	20 406	1 966	22 372
Blackbutt	1 130	139	1 269
Wandoo	594	288	882
Sheoak	1 582	63	1 645
Other	507	68	575
<b>Total Hardwood</b>	<b>688 714</b>	<b>13 715</b>	<b>702 429</b>
Pine	185 541	38 534	224 075
<b>TOTAL SAWLOGS</b>	<b>874 255</b>	<b>52 249</b>	<b>926 504</b>
<b>OTHER LOG MATERIAL **</b>			
Hardwood ***	572 418	75 224	647 642
Softwood	323 846	76 685	400 531
<b>TOTAL LOG TIMBER</b>	<b>1 770 519</b>	<b>210 216</b>	<b>1 974 677</b>

\* Sawlog timber from all sources, including veneer, but not including chiplogs, firewood, piles and minor forest products.

\*\* Includes chiplogs, pine particleboard material, pine rounds and pine industrial material.

\*\*\* Hardwood residue includes 2 291 m<sup>3</sup> of marri particleboard/ industrial wood and 67 m<sup>3</sup> of jarrah industrial wood from private property.

Note: The trends in the production of logs are shown in Appendices 5 and 6.

### Sawn Production From Crown Land & Private Property 1992-93 (Cubic Metres)

	Hardwood	Softwood	Total
<b>Sawn Timber Production</b>			
- Crown land	203 610	58 335	261 945
- Private property	5 736	7 229	12 965
<b>Sawn Sleeper Production</b>			
- Crown land	21 007		21 007
- Private property	592		592
<b>Total</b>	<b>230 945</b>	<b>65 564</b>	<b>296 509</b>

Final figures for 1993-94 not yet available. These will be published in the next annual report.

Note: The trend in the production of sawn timber is shown in Appendix 7.

## Objective

*The objective of the Tourism and Recreation management program is to identify, provide and maintain opportunities and services to the community which allow them to enjoy the wildlife, lands, waters and resources entrusted to the Department without compromising conservation and other management objectives.*

## Description

*This program deals with tourism and recreation in the natural environment on lands and waters managed by CALM. It includes preparing and implementing management plans and the provision, management and maintenance of appropriate access, recreation opportunities and facilities, protecting visitors and facilities from fire, training of staff and CALM volunteers, designing and initiating educational information and activities concerning tourism and recreation in the natural environment, and developing public awareness, understanding and support for the tourism and recreation management program, services and policies.*

## Highlights

- Five draft management plans released for public comment (p. 23)
- Development of the Ibis Aerial Highway in the Kimberley (p. 26)
- Approximately 43 000 people participated in visitor activities (p. 27)
- Forty-one new community volunteer projects (p. 30)

## RECREATION PLANNING AND DESIGN

### Area and Regional Plans

The final management plan for John Forrest National Park was approved by the Minister for the Environment in May 1994 and will be gazetted early in the next financial year. Draft management plans covering five conservation reserves were released for public comment in accordance with CALM Act requirements. Work continued on the preparation of a further 21 plans. All of these plans provide recreation strategies and recommendations. Particular effort has again focused on the Midwest Region, with plans in preparation for the various terrestrial and marine reserves of the Shark Bay World Heritage Area. Draft management plans are also being prepared for six conservation reserves of the Midwest. CALM staff have assisted with the Shark Bay Fisheries Management Plan and regional and shire coastal plans.

The following tables list the area of each tenure category managed by CALM for which management plans are now completed. It also lists the status of plans which are in preparation or already approved as at 30 June 1994.

# Tourism and Recreation

## Management Program 3

## Areas Covered By Management Plans

Tenure Classification	Area covered by Plans (ha)	Total tenure Area (ha)	% covered
National Park	587 282	4 836 571	12.1%
Nature Reserve	17 614	10 769 699	0.2%
Marine Reserve	235 064	1 145 940	20.5%
Other Recreation /Conservation Reserve	58 166	163 781	35.5%
<b>Total CALM Conservation Estate</b>	<b>898 126</b>	<b>16 915 991</b>	<b>5.3%</b>

## Regional Management Plans

CALM Region	Area (millions of ha)	% of WA (Total Area)
Swan	2.1	0.8%
Central Forest	1.4	0.6%
Southern Forest	1.8	0.7%
South Coast	16.3	6.4%
<b>Total</b>	<b>21.6</b>	<b>8.5%</b>

*Note: Regions are as delineated in Forest Management Plan 1994-2003 for Forest Regions*

NOTE: Management plans concentrate on areas where recreation and environmental management issues are most pressing. The proportion of the CALM-managed estate covered by plans significantly underplays the degree to which the most important management issues have been addressed. For example, management plans have not yet been completed for Rudall River National Park (1.3 million ha - 26% of the total area of WA's national parks), or Karijini National Park (627 445 ha - 13% of the total area of WA's national parks). However, plans have now been completed for many of the most frequently visited reserves.

## Landscape Management

Landscape management and design plans providing for tourism and recreation were prepared for Serpentine, Porongurup and Nambung National Parks. Landscape management is an integral part of all area management plans. Landscape design plans were also prepared for a total of 81 kilometres of roads, providing improved access to CALM-managed lands. A State-wide study was completed this year of 'landscape character types'. This study examined broadscale areas of land having common or diverse visual characteristics based on landform, vegetation and waterform. Research was also conducted into public perceptions of landscape preference, with two research projects based on native forests and one on pine plantations.

## Recreation Site and Facility Plans

Recreation master plans were prepared this year for Matilda Bay Reserve; Yanchep National Park (McNess precinct); Wellington Dam (Potters Gorge); Mt Hampton Dam (for the Water Authority of WA); Coalmine Beach Caravan Park lease; Hamelin Bay Caravan Park; Canning River Regional Park (in consultation with the Department of Planning and Urban Development and the City of Canning); Chapman River Regional Park (for the City of Geraldton); and the Hedges Goldmine.

Recreation development plans were completed and are being progressively implemented for Parry's Lagoon Nature Reserve, Spectacles Wetlands, Silent Grove, Hills

Forest Activity Centre, Shannon Townsite Camping Area, Wellington Forest and the Lower Collie Valley, Wellington Discovery Forest, Hamelin Bay, and various other areas. Conceptual plans for redevelopment at Black Point in D'Entrecasteaux National Park were completed. Southern Forest Region recreation framework plan was further developed and is now almost completed.

An Advanced Recreation Planning and Management course was conducted for CALM staff at Point Walter.

Assistance was provided for the preparation of several draft area management plans and specifications were prepared for a wide range of building and furniture items. Specifications and designs were also prepared for the Discovery Centre at the Discovery Forest Eco-museum and the visitor information centre at the Tuart Eco-museum.

## TOURISM AND RECREATION OPPORTUNITIES

Despite the tight budgetary situation this year, there was significant improvement of facilities to enhance recreation opportunities and services for visitors. Major projects included the following.

**South Coast:** Campsites have been upgraded in Waychinicup; Cape Arid and Stokes National Parks. A public carpark has been marked out for construction, and



**CALM Management Plans: Status at 30/06/94**

<b>Approved management plans</b>	<b>Date of gazettal</b>	<b>Final plans in preparation</b>	<b>Draft plans in preparation</b>
<b>NATIONAL PARKS</b>			
Cape Range	23/03/90	Purnululu	Karijini
Fitzgerald River	19/06/91	West Cape Howe	Nambung
Leeuwin-Naturaliste	21/04/89	Yalgorup *	Serpentine
Shannon & D'Entrecasteaux	08/01/88	Lesueur *	Stirling Range and Porongorup
Walpole-Nornalup	03/07/92		
Yanchep	29/09/89		
John Forrest*	(not yet gazetted)		
<b>NATURE RESERVES</b>			
Benger Swamp	12/02/89	Two Peoples Bay	
Dampier Archipelago	31/08/90	Coomallo*	
Forrestdale Lake	10/07/87		
Mooradung	21/02/86		
Nature Reserves of the Shire of Wyalkatchem	21/02/86		
Nature Reserves of Shires of York/Northam	10/07/87		
<b>MARINE PARKS AND MARINE NATURE RESERVES</b>			
Ningaloo Marine Park	24/11/89		Shark Bay Marine Park
Marmion Marine Park	15/05/92		Shark Bay Terrestrial Reserves Shoalwater Marine Park Swan River Estuary Marine Pk
<b>OTHER RESERVES</b>			
Lane Poole Reserve	14/12/90		Canning River Regional Park
Matilda Bay Reserve	21/05/93		Leschenault Peninsula
Shoalwater Islands	20/10/92	Monkey Mia*	Shark Bay World Heritage Area
<b>STATE FOREST</b>			
Logue Brook Reservoir and Catchment Area	16/03/90	Dryandra State Forest*	
Waroona Reservoir and Catchment Area	16/03/90		
<b>REGION PLANS</b>			
Central Forest Region	12/02/88	Goldfields Region	
Northern Forest Region	12/02/88		
South Coast Region	13/03/92		
Southern Forest Region	12/02/88		

+ Approved in 1993-94

\* Released as draft plans in 1993-94

restoration work has been done at Woody Lake Nature Reserve. Six kilometres of road were upgraded in Cape Le Grand National Park and regular maintenance was done on a total of 640 km of access roads throughout the region. Conveyor belting donated by Alcoa Ltd has been used to complete stabilisation of tracks in West Cape Howe National Park, 12 km of eroded tracks were rehabilitated in Cape Arid National Park, and footpaths have been upgraded in all parks in the South Coast Region. Twenty-five kilometres of firebreak maintenance and 152 ha of manual prescribed burning were carried out successfully in South Coast national parks.

**Southern Forest:** Great progress has been made toward completion of the Mandalay Beach steps and boardwalk in D'Entrecasteaux National Park. At Walpole-Nornalup National Park, continuing recreation works include

Coalmine Beach Caravan Park lease works construction, John Rate Lookout and Valley of the Giants visitor facilities. Facilities are being improved at the Perup Research Centre; Shannon National Park camping area has been redeveloped and a new system of camping fee self-registration introduced; ablution facilities were completed at Gloucester National Park; and high-quality signs have been increased throughout Pemberton District. State forest recreation sites are being redeveloped at Fernhook Falls, King Jarrah, One Tree Bridge, and Broad Axe Bridge. Safety railing and a new walk trail and dam bridge were completed at Big Brook Dam.

**Central Forest:** At Leeuwin-Naturaliste National Park, roads and carparks were completed in the Cape Freycinet area, new walktrails were constructed linking Yallingup

and Cape Naturaliste, and Injidup campsite was closed and the area rehabilitated and upgraded for visitor day-use. Carpark and picnic facilities have been completed at 10 Mile Brook to complement the construction of a new water supply dam to service Margaret River township. The first stage redevelopment of Wrights Bridge camping and picnic area was completed, and restoration of the Golden Valley Homestead is progressing well. A new access road, carpark and toilets have been installed at Lake Haywood picnic site in Yalgorup National Park, and improvements at Leschenault Peninsula Conservation Park include the Tuart Grove picnic site and a camping area at Belvedere.

**Swan Region:** Historic Marinup POW Camp has been refurbished with new toilets, walk trails, roads, and information displays. The Hills Forest project is progressing well, with facilities at the Activity Centre now almost complete and 15 sites ready to use at Patens Brook campsite. Redevelopments are continuing at Yanchep National Park with a new entry station and 170-bay carpark at McNess House; the visitor centre also opened this year and offers a range of interpretive and tourism programs. New toilet and changeroom facilities and an upgraded reticulation system have been installed at Matilda Bay Reserve in accordance with the recreation and landscape master plan.

**Wheatbelt:** A new lease has been negotiated and signed between CALM and Lions Dryandra Forest Village (Inc) for lease and management of the settlement at Dryandra State Forest. The draft management plan for Dryandra was released for public comment this year.

**Goldfields:** The Kalgoorlie Arboretum has had a facelift, with the installation of water harvesting banks and infill tree planting to provide an extensive self-reticulated recreation area; Goldfields timbers have been purchased to construct a bridge at the arboretum. Visitor facilities have been upgraded at Rowles Lagoon Conservation Park, with rationalisation of boundaries and roads, fencing of the dune system, feral animal control, relocation of the ablution facilities and improved picnic and camping sites. The Mt Elvire Homestead (located in proposed State forest) has been upgraded for use by *LANDSCOPE* tours and the remote Cave Hill recreation site has improved management and new signs.

**Midwest:** At Hamelin Pool Marine Nature Reserve a 232 m boardwalk has been constructed over the stromatolites and additional visitor information provided. Site developments at Peron Homestead in the François Peron National Park include a pastoral lifestyle walk trail, toilets, shower and artesian 'hot-tub', a picnic area, visitor information and carpark. Major redevelopment of visitor facilities, including roads, carparks, toilets, footpaths, visitor information and beach rehabilitation, were completed at Shell Beach Conservation Park. Perimeter management access tracks at Lesueur National Park were upgraded, and access to the Pinnacles within Nambung National Park was further improved with another 2.6 km

of road sealed; more than half of the Pinnacles Drive road program is now completed. Interpretation of the stromatolites has been developed for Hamelin Pool, and information video and panels upgraded at Monkey Mia. Radio communication links have been upgraded at Moora and Geraldton to assist in the protection of areas and provision of services.

**Pilbara:** Successful negotiations between the Aboriginal Economic Development Office (AEDO), Karijini Aboriginal Corporation (KAC) and CALM have seen the establishment of a temporary visitor centre in the Karijini National Park, staffed by members of the KAC. Commonwealth funding for Aboriginal contractors made possible the upgrading of the Homestead walktrail at Millstream-Chichester National Park and Hamersley Gorge day-use recreation site at Karijini National Park.

**Kimberley:** Implementation of the Ibis Aerial Highway has begun. CALM has played a lead role in the promotion of the concept and construction of facilities, including at Mt Hart pastoral lease a new campground and upgrading and commissioning of an airstrip for visitor access at Silent Grove. Another camping area has also been started at Bell Creek. A new airstrip has been constructed next to Windjana Gorge National Park and negotiations are in hand for the land to be transferred to CALM's control. A new interpretive structure and display were installed at Purnululu National Park and slide shows provided for visitors. A West Kimberley Environment and Education Centre is being established at the district headquarters in Broome. The centre features a low-water-use garden and a snake display. Plans are under way for an avicultural display and amphitheatre.

## Commercial Tourism Interests

CALM co-operates wherever possible with the private sector in the delivery of services and opportunities for visitors. Commercial leases for visitor services have been finalised for Yanchep Inn, Matilda Bay Restaurant, Coalmine Beach Caravan Park and Waroona Dam Caravan Park. Negotiations are continuing with proponents for redevelopment and management of Hamelin Bay Caravan Park and Logue Brook Caravan Park.

All private tour operators conducting commercial tourist activities on conservation areas are required to obtain a licence in accordance with the *CALM Act Amendment Regulations 1993*. CALM has received, in response to public advertisements this year, expressions of interest to conduct commercial tourist activities in the Shark Bay and Ningaloo Marine Parks, including specific submissions relating to whaleshark interaction tours. Whaleshark tours were previously licensed under the *Wildlife Conservation Act 1950*. The licensing provisions of the new regulations, however, allow for more effective management of tourist activities and the implementation of "user-contributes" fees and charges, where appropriate, to provide funds for management. Other submissions

covered both existing operations and new proposals. Negotiations with proponents are continuing.

New licences do not match the previous number of permit holders (82) prior to the new Regulations. This can be attributed to a rationalisation of permit holders and the administration time in issuing licences. At 30 June 1994, a total of 64 commercial tour operators were licensed with CALM and as many as 50 further applications are being assessed.

CALM has continued to develop nature-based tourism opportunities, including facilities and services for launching the Ibis Aerial Highway. *LANDSCOPE* Expeditions, a joint initiative with the University of Western Australia Extension Service, has continued to be an attractive and well supported program. This year, four expeditions were undertaken, with participants joining CALM research and operations staff in field-based study and research projects in monitoring endangered mammals in the Gibson Desert, documenting wildflowers of the North Kimberley, and researching water birds at Lake Gregory and Broome.

New CALM commercial concessions included the production and marketing of Nambung National Park T-shirts and an equity concessional arrangement allowing the formalisation of Mt Hart Homestead as the premier remote tourist accommodation in the Kimberley, providing a unique experience for visitors in homestead life and also an integral part of the Ibis Aerial Highway.

## INTERPRETATION AND VISITOR SERVICES

Outdoor education activity programs were conducted in a range of CALM locations to enrich visitor experiences and develop public awareness, understanding and support for sensitive conservation management and compatible tourism and recreation services and policies. About 43 000 people took part in CALM's visitor activity programs, an increase of 20 per cent over last year. Some of the more popular activities included the Yanchep National Park programs, Hills Forest Go-Bush activities, Southern Forest Region's school activity program and the Purnululu National Park interpretive slide show.

Visitor information services provided this year included:

**South Coast:** Interpretive activities training workshops were conducted for CALM staff at Porongorup National Park and at Esperance. A tourist information bay was installed at Norseman in conjunction with the Dundas Shire, and a visitor information shelter was designed for the Esperance Ten Mile Lagoon Wind Farm.

An interpretive display was prepared for Porongorup National Park and brochures prepared for Fitzgerald River National Park and Albany's three parks.

**Central Forest:** Interpretive panels, signs and displays were completed for four sites at Leschenault Peninsula, a new recreation guide for the 'Wellington Forest' was released, an interpretive activities program commenced in Yalgorup National Park received good community support, and the annual 'On the Ridge' program at Leeuwin-Naturaliste National Park was very successful again last January.

**Swan Region:** Dieback-resistant jarrah trees were planted in John Forrest National Park as part of the Arbor Day program. Shopping centre displays were developed to raise appreciation and awareness for the natural environment and encourage people to visit conservation areas; the display has been booked for all school holidays for 1993-95. A marine education kit for primary school children is in preparation. One thousand one hundred school children attended activities and talks this year at the Hills Forest Activity Centre, 3 000 visitors participated in the 'Go-Bush: Discovering the Hills Forest' program, and 700 people attended special group and tourist activities. Eighteen teachers and 416 students attended an Earth Caretakers environmental educational program at Canning River Regional Park, and a cultural activities training workshop was conducted at Yanchep for Aboriginal participants.

**Southern Forest:** The annual CALM staff 'Big Brook Relay' once again brought big crowds to Pemberton to enjoy themselves in the forest. The Shannon Easter Activities program proved very popular and school interpretive activities are offered once a fortnight in the region.

**Wheatbelt:** Four Dryandra ecology courses were attended by 76 fee-paying clients. Interpretive signs were developed and installed at Lake Dumbleyung and a seminar/workshop was held for Nyungar people at the Dryandra Study Centre.

**Midwest:** A World Heritage Information Centre was erected as a joint project between CALM, Shark Bay Tourist Committee and the Shire of Shark Bay. Information displays have been produced and installed at Hamelin Pool and Shell Beach, a new shelter was installed at Mt Augustus National Park, and interpretive signs were developed and placed in the Abroholos Islands. Other new visitor information included 12 World Heritage note sheets, a World Heritage Area tabloid information sheet, and new brochures for Mt Augustus and Kennedy Range National Parks and Shark Bay Marine Park.

**Pilbara:** Information and goods for sale were available from the new temporary visitor centre at Karijini National Park.



**Kimberley:** A new 'Kimberley Parks' tabloid information sheet has been revised and distributed to all tourist outlets in the region and adjacent areas. A regular newsletter is now being sent to all Kimberley tour operators to enhance information and cooperation between CALM and the industry. Contact with visitors has been increased through introduction of slide shows at Purnululu. A new interpretive shelter has been built at Purnululu National Park, information displays installed at both Purnululu and Geikie Gorge National Parks, and trailside signs at Windjana Gorge National Park.

## VISITOR RESEARCH

Traffic counter surveys, staff observation counts, and informal surveys were used to monitor 33 parks, 19 reserves and nine State forest areas in 1993-94, with a total of 124 sites providing the basic data. These data do not represent the total number of visits to the whole CALM-managed estate, but provide indications which can be compared year to year and examined for variations and trends.

There were 4.5 million recorded visits for the 61 parks, reserves and State forest areas monitored during the year. This represents a small increase from the previous year's recorded visits. The estimated total number of visits for 1993-94 is 4.9 million, reflecting a continuous interest by the public in visiting natural areas.

### Recorded Visits to CALM-Managed Land and Waters

Year	No. of data collection sites	Recorded visits	Estimated no. of visits to CALM-managed estate <sup>1</sup>
1989-90	85	3.6 million	4.5 million
1990-91	107	4.5 million	4.8 million
1991-92	115	4.4 million	4.7 million
1992-93	116	4.4 million <sup>2</sup>	4.8 million <sup>2</sup>
1993-94	124	4.5 million <sup>3</sup>	4.9 million <sup>3</sup>

<sup>1</sup> As visitor data are collected only at certain times and at selected sites, it is necessary to extrapolate to estimate the total number of visits to CALM-managed areas. The accuracy of the estimate has improved with the addition of 39 collection points since 1989 and better recording procedures.

<sup>2</sup> Amended from last financial year as additional data became available.

<sup>3</sup> Provisional estimate, based on limited data and subject to future amendment.

Visitor comment-card surveys began in 1993-94. They are designed to obtain feedback on visitors' recreational experiences at principal national parks, State forests and reserves. These preliminary surveys at three national parks and one reserve were on too small a scale to obtain statistically valid results, but they were a useful pilot study and provided some interesting feedback, as can be seen from the results below. In future, larger sample sizes are needed to gain a better understanding of visitors' needs.

These results show that respondents generally enjoyed their visit very much and appreciated the naturalness of the areas. The main requests for more/better facilities and services were in relation to poor access roads, and other requests were for provision or addition of ablution blocks and site facilities.

Other surveys and observation studies were also carried out during the year, including a social survey of visitor attitudes, preferences and activities in nine parks and reserves of the Swan Region. Non-visitors were interviewed by telephone. Management planning surveys were also conducted, such as at Shark Bay World Heritage Area, Nambung National Park, and Wanagarren, Nilgen and the proposed Beekeepers' nature reserves.

### Visitor Comment Card Survey Results

Conservation area	Response rate; sample size (N)	Enjoyed visit very much	Natural beauty - main attraction	Request for more/better facilities and services	Origin of visitors
Purnululu National Park	75%; N = 54	100%	94%	59%	87% interstate
Nambung National Park	70%; N =100	91%	89%	45%	61% interstate and overseas
Kalbarri National Park	40%; N =100	85%	73%	58%	84% from Perth metro area
Lane Poole Reserve	33%; N =100	73%	64%	84%	97% from Perth metro area

## COMMUNITY INVOLVEMENT

CALM encourages public cooperation in the prevention and solution of recreation management problems. Community groups and individuals are encouraged to take part in the development of appropriate tourism and recreation projects on conservation lands and waters.

### Aboriginal Programs

CALM's wildlife and land management responsibilities continue to bring the Department into regular contact with Aboriginal groups throughout the State. Opportunities to involve Aboriginal people in CALM's activities continue to be pursued, with an increasing focus on nature-based tourism and the interpretation of Aboriginal culture on CALM-managed lands.

While opportunities for Aboriginal people to secure permanent, full-time employment with CALM have been very limited, employment partnerships and contract employment assumed a higher profile.

The introduction of State and Commonwealth legislation addressing native title issues limited the scope of CALM's formal negotiations with some Aboriginal groups, but communication between regional offices and most Aboriginal organisations within the regions remained positive.

Achievements this year included:

- Aboriginal post-secondary students studying environmental management were assisted in finding work experience placements of varying length at CALM offices in Manjimup, Narrogin, Dwellingup, Kalbarri and Albany, and a vacant national park ranger's position was filled at Millstream-Chichester National Park by an Aboriginal graduate.
- An inventory of training needs and career development options has been completed for the 24 Aboriginal staff currently employed by CALM. Extensive contact is maintained with relevant State and Commonwealth agencies and tertiary institutions.
- With assistance from the Australian Nature Conservation Agency (ANCA), CALM contracted 40 Aboriginal people to undertake 13 projects relating to natural and cultural resource management. The total value of these contracts was over \$280 000. Projects included:
  - recreation site management at Karijini National Park
  - upgrading of the Aboriginal heritage trail at Walyunga National Park
  - biological and cultural resource survey - Western Desert Region

- employment of an Aboriginal Tourism Development Officer - Kimberley
- Martu ecological knowledge - Rudall River National Park
- rehabilitation and management of south coast national parks
- Nyungar oral history - Albany
- Consolidation of Darngku Heritage Tour's operations at Geikie Gorge National Park, now in their second year of operation. The tour represents a partnership between CALM and the Aboriginal custodians of the gorge. Public responses to the tour have been very positive, highlighting the great potential for cultural ecotourism.
- CALM and Karijini Aboriginal Corporation (KAC) negotiated an agreement for KAC to establish a temporary visitor information centre at Karijini National Park. The centre will operate on a trial basis for 12 months to determine its viability, and will provide visitors with information about the park and its Aboriginal heritage.
- A training seminar was held at Yanchep National Park to provide Aboriginal people with some of the skills necessary to participate in ecotourism and cultural interpretation. Twelve Aboriginal people attended the course; three went on to participate in commercial tours.
- Approximately 40 Nyungar people attended a seminar at CALM's Dryandra Study Centre to discuss CALM's endangered fauna management programs and the role of mammals in Nyungar culture. The Dryandra Draft Management Plan was also discussed.
- Communications with the Nyungar community in CALM's Wheatbelt Region have continued to improve since a Nyungar Aboriginal Liaison Officer was appointed in 1992. To date, five formal sessions have been held within the region to discuss cross-cultural issues and CALM's relationship with the Nyungar community.

### Advisory Committees

CALM's successful involvement with members of the public is evidenced through the ongoing work of advisory committees. These committees are established as a means of participation by local communities in the management proposals for local conservation areas or issues. The committees meet regularly to discuss items of concern and issues of interest to CALM and the community, to assist in information exchange and to advise the Department about management proposals. Membership of committees usually comprises local community representatives and State and local government officers.

The Leeuwin-Naturaliste National Park Task Force met a number of times throughout the year, considering a range of issues, primarily concerned with the introduction of fees and other matters of interest to the local community about the management of the park. The Task Force presented a comprehensive report to the Executive Director, recommending upgrading of certain sites and implementation of fee collection at locations where substantial improvements and visitor facilities have been provided. Other recommendations included suggestions for improving representation and effectiveness of the Park Advisory Committee.

There were two new advisory committees established in 1993-94, taking to 19 the total number of CALM advisory committees relating to management of CALM lands and waters.

## Volunteers

The Department's community volunteer program has progressed with steady growth over the last 12 months.

A 'volunteer summit' was held during the year, with both staff and volunteers attending, to review the program and develop initiatives, goals and strategies to meet the challenges of future growth.

Forty-one new projects were initiated. More than 800 volunteers contributed a total of 40 000 hours to the Department. This does not take into account thousands of unrecorded hours given by 170 wildlife carers. The number of volunteers registered with the Department has increased to 1 773. (There is a time lag between registration as a volunteer and the beginning of project work - hence the difference between the contributing number and the registration number.)

The Honorary CALM Officer project has received nominations from districts, regions and branches, and the training course is in the final stages of preparation.

Volunteer activities include assisting at information centres with the provision of information and interpretation, forest and wildlife research, care and rehabilitation of sick and injured wildlife, campground hosting, turtle tagging, park rehabilitation, flora surveys and general curation at the Herbarium.

### Calm Volunteers

Year	No. registered	Hours contributed
1990-91	980	31 000
1991-92	900	40 000
1992-93	1 260	40 000
1993-94	1 773	40 000

## External Funding

In 1993-94 the R & I Bank (now BankWest) introduced the *LANDSCOPE* Visa Card, an innovative new affinity group credit card offering a reduced interest rate to cardholders while raising funds for CALM endangered species projects. Four projects benefited from funds raised by the card in 1993-94.

In conjunction with the Australian Wildlife Fund 1993-94, CALM introduced an overprint for the collectible Duck Stamp program and the use of the stamp to validate national park passes in WA, raising further funds for research.

CALM also received funding from several Commonwealth agencies for a range of programs. The following table outlines the total grant funds received from the Commonwealth since 1989-90, including those from programs such as the Endangered Species Program, the National Estate Grants Program and the National Reserves System Cooperative Program.

### Commonwealth Grants Received by CALM

Year	Amount \$
1989-90	2.70 m
1990-91	1.70 m
1991-92	2.25 m
1992-93	3.06 m
1993-94	3.98 m

Also, CALM received a further \$0.96 million in special purpose grants from State agencies such as Main Roads Western Australia and the South West Development Commission.

## FIRE MANAGEMENT

Precautionary burns were carried out in precise locations in national parks to protect the parks and visiting public from wildfires. Some of these were D'Entrecasteaux, Mt Frankland, Shannon, Leeuwin-Naturaliste, Fitzgerald River, and Millstream-Chichester national parks. Other protective burns were carried out in State forest recreation areas.



*This section contains general information about CALM. For details of Program achievements and other statistics, see the Program sections and the appendices.*

*The Department is headed by an Executive Director, who is also a member of the Lands and Forest Commission, a member of the National Parks and Nature Conservation Authority, and Chairman of the Forest Production Council. In keeping with the varied interests of CALM there is also a Corporate Executive, which consists of seven directors working with and reporting to the Executive Director. Regional, branch and other specialist officers often attend meetings of the Corporate Executive.*

*The Department gives responsibility to its staff whenever possible, depending on skills and potential. Provided there is opportunity, there is no impediment to the progress of a capable individual in the organisation.*

*The detailed structure of divisions, regions and branches is shown in Figure 1. The names and qualifications of the officers occupying senior positions are shown in the nearby list.*

## REGIONAL ACTIVITIES

CALM is committed to regionalisation. There are nine regions which, according to the intensity of activity, are subdivided into districts. Accordingly, the Department is spread over many locations. Figure 2 shows CALM regional boundaries and the location of regional offices, as well as the types of lands and waters the Department manages.

Management structures are in place at nine regional, 22 district, one sub-district office and two district outstations. Within the regions there are national park rangers at 32 other locations, and a district wildlife officer at one other.

Because of community concern for protection of the natural environment and an increasing desire to experience its values, the roles of regional managers and their staff are most important. Satisfactory experiences for the 4.9 million visitors (1993-94 figures) to CALM-managed lands and waters, drawn from interstate and overseas as well as from all over Western Australia, are largely in their hands. Regional staff are also responsible for the conservation of native flora and fauna within regional boundaries. The three forest regions in the south-west of the State have a large commitment to manage wood resources, and to regenerate and protect the

# *Facts and Figures*

forests for a wide range of other values. The Goldfields region has a similar commitment to sandalwood resources, as have the South Coast and Wheatbelt regions to economic tree crops that can be integrated into farming practice.

Regional managers have a degree of autonomy. Each is responsible under corporate direction for developing the region's annual works program, and for managing the region's budget allocation. Liaison with local groups, especially Aboriginal communities, other Government agencies and the community in general, is extensive. There are often advisory committees established with a focus on parts of CALM-managed lands and waters. The committees make input into the preparation of management plans and, after their approval, advise on management. It is mostly the regional managers and their staff who are responsible for this important interface with the local community.

## SPECIALIST AND SERVICE ACTIVITIES

Operations throughout the State are directed by the Corporate Executive and supported by specialist and service staff. Their responsibilities are as follows.

**Science and Information Division** provides up-to-date, scientifically sound information to uphold effective conservation and land management in Western Australia. Four science groups address CALM's scientific needs: to discriminate and document the biota, ecological processes and biological resources of the State; to conserve threatened species and ecological communities by minimising inimical processes; and to ensure that lands, waters and biological resources are used sustainably.

**Corporate Relations Division** plans, coordinates and implements CALM's public information and public relations activities, produces publications, displays, media releases and audiovisuals, coordinates community education programs, and conducts public affairs and market research.

**Afforestation Branch** develops silvicultural guidelines and practices for coniferous and broadleaved plantations and advises on their implementation. It manages CALM nurseries and seed supplies.

**Economics Branch** advises the Executive Director on economics, socio-economics, financial planning and long-term strategic management planning across all functions and activities of the Department. The work directly influences the magnitude of the Department's revenues and expenditures, and the management of forests and other resources.

**Engineering Services Branch** manages the Department's vehicle fleet, houses, buildings and stores, and provides professional engineering advice to support the Department's functions.

**Environmental Protection Branch** prepares guidelines and procedures for protection from dieback, weeds and feral animals, evaluates mining proposals, and advises on implementation and rehabilitation of CALM-managed lands and waters.

**Finance Branch** maintains, operates and develops financial systems and procedures and provides users with financial training, expertise, reports and budgeting information.

**Fire Protection Branch** sets fire management standards, coordinates the preparation of fuel reduction and suppression plans, provides detection communications, aircraft and other fire support services, and conducts fire training.

**Forest Management Branch** develops silvicultural guidelines and practices for native forests and advises on their implementation. It services the forestry operations of the Department with resource information and plans for forest production and disease protection, and develops associated computer systems.

**Human Resources Branch** provides policies, advice and coordination in the areas of personnel management, labour relations, training and health, safety, and welfare.

**Information Systems Branch** facilitates, coordinates and advises on information technology resources for the Department and the management of corporate information in support of the CALM management Programs.

**Land Administration Branch** provides administrative support in relation to all land tenure matters, including conservation reserve acquisitions and other variations to CALM-managed lands and waters. It administers the granting and renewal of various leases, licences and permits within those lands and waters.

**Land Information Branch** plans, coordinates and implements the development of CALM's integrated Geographic Information System (GIS), and provides a land-related information service, digital and analogue, within the Department and externally as required.

**Planning Branch** prepares management plans in draft and final form, according to the requirements of the Act, and provides planning advice.

**Policy and Extension Branch** develops policies and strategies for recreation, tourism and visitor services, including business development, external funding and community involvement. It coordinates policies and programs concerning Aboriginal and other special interests and visitor research and surveys.

**Records Management Branch** controls the Department's records, associated hard copy file information, research reference and Parliamentary Question databases, and ensures the flow of information.

**Recreation and Landscape Branch** provides recreation and landscape management training, planning and design assistance, and plans and coordinates interpretation and visitor services.

**Timber Supply Branch** controls and manages the harvesting of timber and the collection of royalties and other charges. It advises on timber quality, wood technology and related matters.

**Wildlife Branch** develops policies and provides information and advice on wildlife protection and management throughout the State, administers wildlife licences and permits, enforces the Wildlife Conservation Act and Regulations, maintains and manages databases on wildlife resources and conservation status, and ensures compliance with legislation and licence conditions.

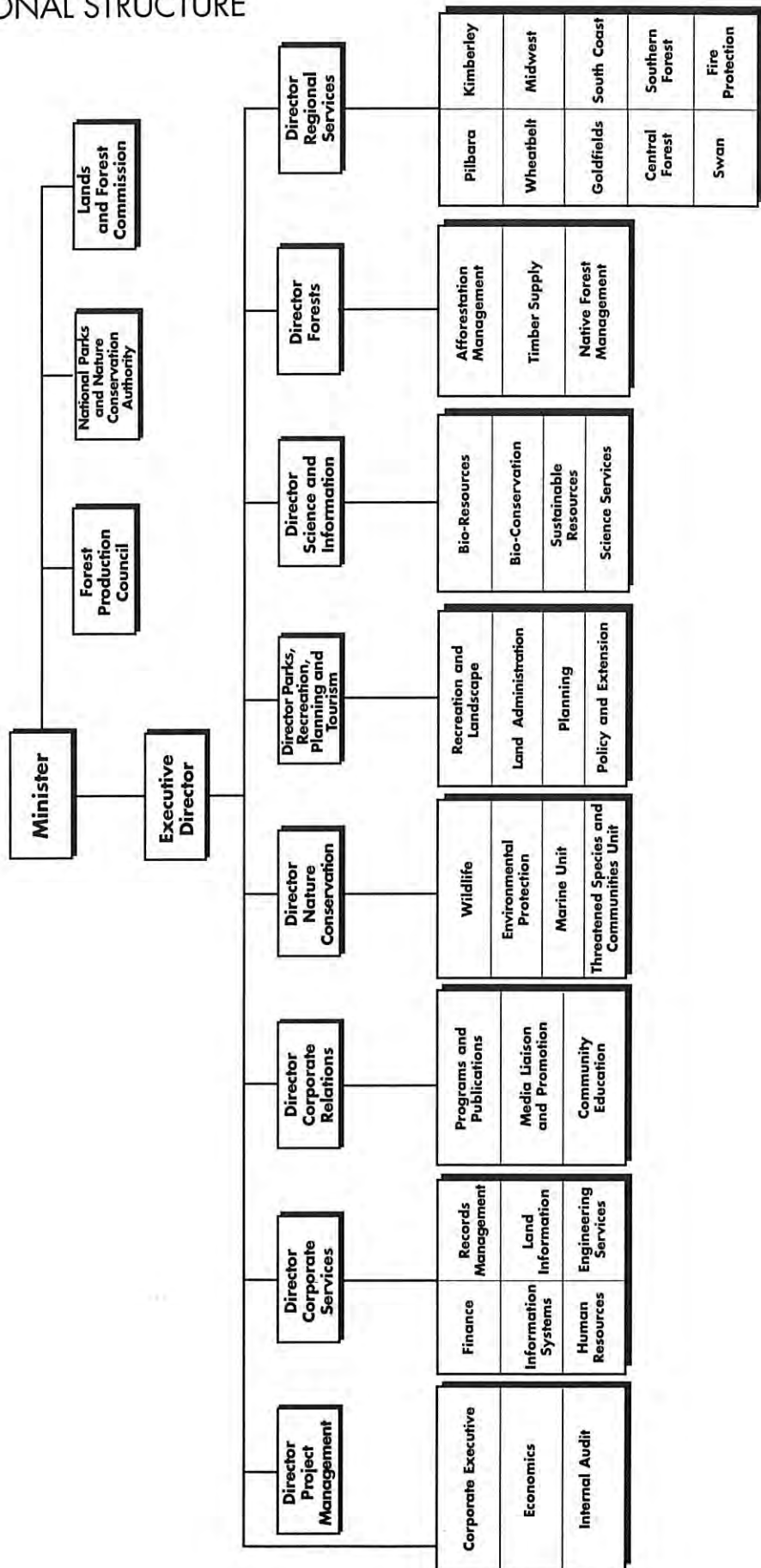
The **Threatened Species and Communities Unit** coordinates and assists with Departmental programs for threatened species and communities, including preparation and implementation of recovery plans.

The **Marine Unit** provides policy and strategic advice for marine conservation and management, and advises marine reserves planning teams.

**Internal Audit** reports to the Executive Director, providing regular management-oriented appraisals of financial operations and activities within the Department.



FIGURE 1  
ORGANISATIONAL STRUCTURE



## CORPORATE EXECUTIVE

EXECUTIVE DIRECTOR  
S R Shea BSc, MSc, PhD

DIRECTOR, REGIONAL OPERATIONS  
C Haynes\* BSc

DIRECTOR, NATURE CONSERVATION  
K J McNamara B Nat Res (Hons)

DIRECTOR, PARKS, RECREATION, PLANNING &  
TOURISM  
J R Sharp\* Dip Phys Ed, M Ed

DIRECTOR, FORESTS  
D J Keene Dip For, BSc

DIRECTOR, SCIENCE & INFORMATION  
J A Armstrong BSc Agr, PhD

DIRECTOR, PROJECT MANAGEMENT  
F H McKinnell Dip For, BSc, PhD

DIRECTOR, CORPORATE SERVICES  
J C Byrne MBA, PhD, FCPA

DIRECTOR, CORPORATE RELATIONS  
R A Kawalilak BA

## OTHER SENIOR STAFF

DIRECTOR, ECONOMICS  
G Malajczuk BSc, MSc, MPhil, M For, PhD

REGIONAL MANAGER, CENTRAL FOREST  
D Spriggins BSc

REGIONAL MANAGER, GOLDFIELDS  
I G Kealley BSc

REGIONAL MANAGER, KIMBERLEY  
C C Done BSc

REGIONAL MANAGER, MIDWEST  
E G Leaman B App Sc

REGIONAL MANAGER, PILBARA  
C Muller Dip For, BSc For

REGIONAL MANAGER, SOUTH COAST  
J R Watson BSc, PhD, ARIC

REGIONAL MANAGER, SOUTHERN FOREST  
K R Vear BSc For

REGIONAL MANAGER, SWAN  
A W Walker BSc For

REGIONAL MANAGER, WHEATBELT  
K J Wallace Dip Ed, BSc (Hons)

MANAGER, AFFORESTATION MANAGEMENT  
G B Inions BSc For (Hons), PhD

MANAGER, ENVIRONMENTAL PROTECTION  
F E Batini Dip For, BSc, MSc

MANAGER, FINANCE  
I Frame Dip Acctng

MANAGER, FIRE PROTECTION  
R Sneeuwjagt BSc, MSc

MANAGER, HUMAN RESOURCES  
A A Scott\* BA

MANAGER, INFORMATION SYSTEMS  
B J Kerr Dip Comp Prog, B Bus (Admin), MACS, AFAM

MANAGER, LAND ADMINISTRATION  
D Hampton BEcon

MANAGER, LAND INFORMATION  
P J Bowen Dip Cart, Grad Dip S&M, MAIC

MANAGER, NATIVE FOREST MANAGEMENT  
F J Bradshaw Dip For, BSc

MANAGER, PLANNING  
A J Williamson Dip For, BSc, M For, MSc

MANAGER, POLICY & EXTENSION  
C B Ingram\* B App Sc

MANAGER, PROGRAMS & PUBLICATIONS  
R F Bailey BA (Hons), PhD

MANAGER, RECREATION & LANDSCAPE  
W G Schmidt BSc, M For

MANAGER, TIMBER SUPPLY  
J H Murch BSc (Hons)

MANAGER, WILDLIFE  
G J Wyre B Nat Res (Hons)

HEAD, BIO-CONSERVATION GROUP  
A N Start\* BSc, PhD

HEAD, BIO-RESOURCES GROUP  
N G Marchant\* BSc (Hons), PhD

HEAD, SUSTAINABLE RESOURCES GROUP  
P E Christensen BSc (Hons), PhD

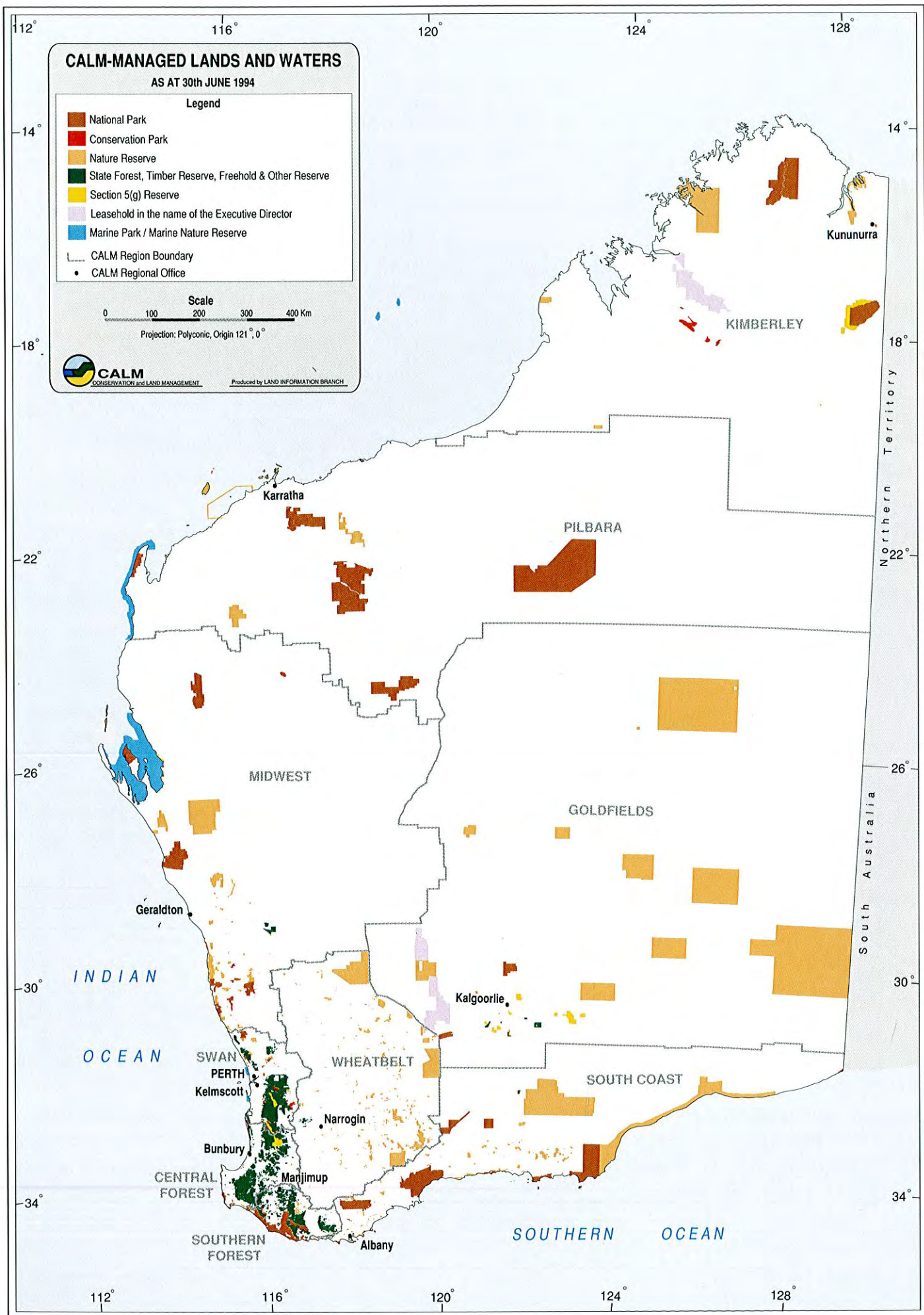
HEAD, SCIENCE SERVICES GROUP  
I J Abbott\* BSc (Hons), PhD, DSc

DIRECTOR, WA THREATENED SPECIES &  
COMMUNITIES UNIT  
A A Burbidge BSc, PhD

MANAGER, MARINE UNIT  
H Chevis BSc For, MSc

SENIOR INTERNAL AUDITOR  
P J Ryan

\* *Acting*





## CALM-MANAGED LANDS AND WATERS

The following figures represent gazetted or legal areas. A number of amendments have been made to previously published areas, thanks to constant checks undertaken jointly with the Department of Land Administration.

### Total Estate

As at 30 June 1994 the total area under CALM's care was 19 936 785 hectares. This was a decrease of 1 73 789 hectares during 1993-94.

The terrestrial area (i.e. not including marine reserves) is approximately 7.5 per cent of the land area of Western Australia.

## CALM-Managed Lands and Waters as at 30 June 1994

Tenure Classification	(ha)
National Park	4 836 571
Conservation Park	87 119
Nature Reserve	10 769 699
Marine Park	1 013 940
Marine Nature Reserve	132 000
State Forest	1 748 883
Timber Reserve	141 487
5g reserve	257 449
Miscellaneous Reserve	12 918
Freehold (Exec Dir)	33 688
Leasehold (Exec Dir)	903 031
<b>Totals</b>	<b>19 936 785</b>

Source: Land Information Branch (TENIS)

## National Parks

National parks are for wildlife and landscape conservation, scientific study, preservation of features of archaeological, historic or scientific interest, and enjoyment by the public. They have national or international significance for scenic, cultural or biological values.

The area of the 63 national parks as at 30 June 1994 was 4 836 571 hectares.

### National Parks Vested in the National Parks and Nature Conservation Authority

Name	Area (ha)	Name	Area (ha)
Alexander Morrison	8 500	Millstream-Chichester	199 736
Avon Valley	4 366	Moore River	17 540
Badgingarra	13 121	Mount Augustus	9 168
Beedelup	1 786	Mount Frankland	30 830
Boorabbin	26 000	Nambung	18 318
Brockman	49	Neerabup	1 069
Cape Arid	279 382	Peak Charles	39 959
Cape Le Grand	31 578	Porongurup	2 511
Cape Range	50 581	Purnululu	208 723
Collier Range	235 162	Rudall River	1 283 706
D'Entrecasteaux	114 566	Scott	3 273
Drovers Cave	2 681	Serpentine	4 363
Drysdale River	448 264	Shannon	52 598
Eucla	3 342	Sir James Mitchell	497
Fitzgerald River	329 039	Stirling Range	115 920
Francois Peron	52 529	Stokes	9 726
Frank Hann	61 404	Tathra	4 322
Geikie Gorge	3 136	Torndirrup	3 936
Gloucester	875	Tuart Forrest	2 049
Goongarrie	60 397	Tunnel Creek	91
Gooseberry Hill	33	Walpole-Nornalup	15 861
Greenmount	58	Walyunga	1 812
Hassell	1 265	Warren	2 982
Hidden Valley	2 068	Watheroo	44 474
John Forrest	2 676	Waychinicup	3 982
Kalamunda	375	West Cape Howe	3 517
Kalbarri	186 050	William Bay	1 734
Karijini	627 445	Windjana Gorge	2 134
Kennedy Range	141 660	Wolf Creek Crater	1 460
Leeuwin-Naturaliste	19 119	Yalgorup	12 888
Lesmurdie Falls	56	Yanchep	2 842
Lesueur	26 987	<b>TOTAL</b>	<b>4 836 571</b>

Changes to the national park estate consisted of an increase to Karijini National Park (20 848 hectares) by including an area of adjacent vacant Crown land and adding two cancelled conservation parks; a nett increase of 300 hectares to Rudall River National Park, including an addition of 15 400 and excision of 15 100 for proposed resource development (however, DOLA's recalculations show that the gazetted area has decreased by 285 753 hectares); and an increase of 264 hectares to Tuart Forest National Park with the inclusion of revoked State Forest No 1.

## Conservation Parks

Conservation parks have the same purposes as national parks, but they do not have the same national or international significance. They have significant local or regional value for conservation and recreation.

The area of conservation parks as at 30 June 1994 was 87 119 hectares, representing an increase of 39 501 hectares in 1993-94. Notable additions to this category were Devonian Reef (41 371 hectares), Brooking Gorge (7 967 hectares), Geikie Gorge area (5 332 hectares) and Coalseam (754 hectares).

## Nature Reserves

Nature reserves are for wildlife and landscape conservation, scientific study, and preservation of features of archaeological, historic or scientific interest. Wildlife values may not be commercially exploited, and recreation which does not harm natural ecosystems is allowed.

The area of nature reserves as at 30 June 1994 was 10 769 699 hectares. There was an increase of 12 706 hectares during the year. The only sizable addition was 11 571 hectares to a new unnamed reserve in CALM's Esperance District.

## State Forest

State forests are managed for multiple purposes, including water catchment protection, recreation, timber production on a sustained yield basis, and conservation. Provision is also made for public utilities and mineral production, where these activities are imposed.

Within State forests, designated areas are managed for specific purposes, such as conservation or optimum yield of exotic plantings.

The area of State forest as at 30 June 1994 was 1 748 883 hectares, a increase of 558 hectares during the year. The major addition was 735 hectares to State Forest No. 36 in CALM's Pemberton District, while the major decrease was the revocation of State Forest No. 1 (264 hectares) for inclusion into the Tuart Forest National Park.

## Timber Reserves

Timber reserves declared under the CALM Act are managed on the same basis as State forests. The category is transitional; as reserves are evaluated they may be changed to a more appropriate tenure, e.g. State forest or nature reserve.

The area of timber reserves as at 30 June 1994 was 141 487 hectares, a decrease of 407 hectares during the year. The decrease was due to the cancellation of a timber reserve near Bridgetown, which has since been set aside as a nature reserve.

## Marine Reserves

Marine parks are managed for marine conservation and recreation, with areas zoned for commercial fishing on a sustained yield basis. Marine nature reserves are managed for the conservation of marine and terrestrial flora and fauna and their habitats. Fishing and collecting are not permitted.

The area of marine parks as at 30 June 1994 was 1 013 940 hectares (approximately). The area of marine nature reserves as at 30 June 1994 was 132 000 hectares (approximately). There were no changes during the year.

## 5(G) Reserves

Within the meaning of the CALM Act, land categorised as *5(g) Reserve* is land reserved under the Land Act (1933) which is vested in the NPNCA or the LFC, is not a National Park, Conservation Park, Nature Reserve, Marine Park or Marine Nature Reserve, and, immediately before the commencement of the CALM Act, was vested in, or under the control and management of, the National Parks Authority but not as a National Park.

The area of 5(g) reserves as at 30 June 1994 was 257 449 hectares, an apparent increase of 14 674 hectares during the year. The major reason for this increase is an improvement in area calculations. Stockyard Gully, which was previously listed as a nature reserve, has now been included in this category.

## Miscellaneous Reserves

The CALM Act has provision for a miscellaneous category of land which covers those areas that do not readily fall within any of the above discrete categories. The purposes of reserves within this category are varied, but normally involve recreation and/or conservation.

The area of miscellaneous reserves as at 30 June 1994 was 12 918 hectares, an increase of 59 hectares during the year.

## Other Land

The area of freehold land held by the Executive Director as at 30 June 1994 was 33 688 hectares, an increase of 123 hectares during the year. The major portion of this land is committed to commercial softwood forestry.

The area of pastoral leases held by the Executive Director as at 30 June 1994 was 903 031 hectares, an increase of 23 311 hectares during the year. This resulted from a land exchange with an adjoining lease to Mt Hart.

## Conservation Land Acquisitions

The Department acquired several areas of land through purchase or land exchange for future addition to the conservation estate. A land exchange with the pastoral lease adjacent to Mt Hart Station was the most significant addition for the year.

The following areas of freehold land were purchased in the name of the Crown and thus are not reflected in the above area statements for the CALM-managed estate:

- 473 hectares south of Kulin for a nature reserve
- 65 hectares east of Esperance for addition to Cape Arid National Park
- 39 hectares east of Gracetown for addition to Leeuwin-Naturaliste National Park
- 20 hectares south of Mandurah, acquired through a land exchange, for inclusion within Yalgorup National Park

## EMERGENCY ASSISTANCE

CALM mitigates bushfire threats by contributing to community bushfire planning, reducing fuels on CALM-managed lands, and fighting bushfires on and adjacent to private property. CALM also assists during oil spills, sea and land searches for lost people, and flood and cyclone emergencies. CALM was a major participant in the Ministerial working group investigating the Darling Escarpment hazard and assisted in the suppression of 1 118 fires emanating from private property. Of these, 21 occurred in the metropolitan area, threatening the community or its assets.

## CORPORATE SERVICES

CALM supports its three main Programs by providing corporate services; for example, the management of human resources, financial management, and management of corporate information.

## Human Resources

The average staffing level for the Department fell from 1344.47 in 1992-93 to 1301.52 in 1993-94.

During the year, a voluntary redundancy program was offered to all staff, with the intention that it would assist in downsizing staff numbers at a faster rate than could be achieved through natural attrition. Seventeen salaried and 25 wages personnel accepted the offer, and ceased employment between April and June 1994. Restructuring is continuing, following this program and other changes brought about by budgetary constraints and reallocation of staffing priorities.

An integrated personnel and payroll computerised system was purchased to replace the former system, which had become inadequate. As at 30 June 1994, the new system was still under development and being customised to meet the Department's needs for calculating wages at the various District Offices and amalgamating those records with the centrally calculated salaries system to produce a single payroll. The system will also store and, where necessary, calculate all personnel details for individual employees.

Sixty-three salaried staff achieved career advancement by way of reclassifications and promotion to advertised vacancies.

The Department has been successful in funding salaries and on-costs from a range of external (non-Consolidated Revenue Fund) sources. As at 30 June 1994, 33 people funded in this manner were employed in different capacities, for fixed periods, undertaking specific projects.

## Industrial Relations

Management, workplace representatives and unions covering CALM employees continue to seek an Enterprise Agreement to progress workplace reform. A task force is examining productivity initiatives, including annualised hours and salaries, business units, and demarcation and career pathing. There is considerable support throughout CALM for the initiatives.

Further to a decision on 24 September 1992, the Australian Industrial Relations Commission ratified the Australian Workers' Union (Western Australian Public Sector) Award 1992 on 2 March 1994. This occurred as a consolidation of the Construction Maintenance and Services (WA Government) Award 1987.

A Workplace Agreement for four interpreters was registered by the Acting Commissioner of Workplace Agreements, with effect from 1 March 1994.

CALM has appeared in the State and Federal Industrial Relations Commission on four occasions for hearings and on six occasions for conferences.



## Training and Development

Training within the Department continues to be a priority, given the technological and organisational changes that are occurring. New training courses continue to be developed to meet the demands of staff seeking new skills, updating their present skills or seeking development opportunities.

The impact of the national training reform agenda will require all in-service courses to be prepared in the competency-based format and accredited with the State Department of Training. Accreditation of courses will ensure that the training outcomes conform to national competency standards developed by industry, and that the course is recognised nationally. As training course participants complete training programs, they will receive a certificate, which will be recognised throughout the industry within Australia. Existing courses are progressively being rewritten in the new required format and will be accredited when complete.

## Risk Management

CALM uses this process in identifying risks, evaluating their impact and determining the most appropriate and necessary form of protection.

	1993-94	1992-93
Lost Time Injury Frequency Rate:	18	16
All Injury Frequency Rate:	73	65
Number of Lost Time Incidents:	38	34
Number of Days Lost:	1198	1395
Annual Workers' Compensation Premium:	\$ 712 491	\$ 786 448
Rehabilitation Success Rate:	80%	85%

Eighty-eight work groups achieved predetermined safety targets and were presented with awards under the IFAP/GIO Safeway Award Scheme. CALM attained top place over competing organisations throughout Western Australia.

## Land Information

Land-related information plays a vital part in CALM's land management. Throughout 1993-94, the Land Information Branch has provided a range of services and products for strategic and operational purposes.

Development of a tenure information system (TENIS) has been completed, with a comprehensive database incorporating all lands and waters managed by CALM. Area statements for CALM tenure in this annual report have been extracted from TENIS.

Extensive analysis of corporate land-related data, using GIS technology, was undertaken to finalise the forest management plan.

A database depicting the area and types of the AHC national estate register has been finalised and used extensively for strategic analysis.

A major inventory has been completed to determine the abundance of commercial conocurvone-producing smokebush species.

In conjunction with CALM's sharefarming operations, resource area statements and maps have been provided for 90 plantations. At a strategic level, completion of the Coniferous and Broadleaf Plantation database of CALM and private plantings has allowed the production of a regional map portraying this resource, together with its location in terms of ports and other major places.

## ACTS ADMINISTERED

- *Conservation and Land Management Act 1984*
- *Sandalwood Act 1929*
- *Wildlife Conservation Act 1950*

On behalf of the people of Western Australia, the Department of Conservation and Land Management (CALM) directly manages national parks, conservation parks and marine parks, State forests and timber reserves, nature reserves and marine nature reserves, and any associated fauna, flora and forest produce. It is also responsible for conserving flora and fauna throughout the State.

The Department and three statutory controlling bodies were established under the *Conservation and Land Management Act 1984*. The controlling bodies are the Lands and Forest Commission, the National Parks and Nature Conservation Authority, and the Forest Production Council. All are responsible to the Minister for the Environment. The functions of these three bodies are described in separate annual reports.

## MINING AND GOVERNMENT AGREEMENTS ACTS

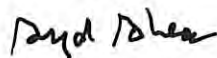
People often ask why the Conservation and Land Management Act 1984 does not protect land managed by the Department from mining or development projects. The reason is the way the State's legislation is structured. Section 4 of the CALM Act states that nothing in the Act shall take away from the operation of any Act relating to minerals or petroleum or any Agreement Act for a development project. The Agreements Acts (e.g. the Alumina Refinery Agreement Act 1961) are administered by the Minister for Resources Development. The CALM Act cannot impose restrictions on mining or on development projects subject to an Agreement Act. The requirements for mining and development projects with respect to land managed by the Department are stated in the Mining Act 1978 and the individual Agreements Acts. The Environment Protection Act 1986 also needs to be satisfied with such projects on land managed by the Department.

- The following mining and petroleum Acts prevail over the Conservation and Land Management Act: *Mining Act 1978; Petroleum Act 1967; Petroleum Pipelines Act 1969; Petroleum (Submerged Lands) Act 1982.*

Agreements Acts which involve clearing land managed by CALM, or which require access to forest resources, also include specific responsibilities for the Department. The bauxite and coal operations predominantly require

### *Statement of Compliance with Written Law*

*We have complied with the requirements of relevant written law, as originally enacted and as variously amended. The relevant Acts and amendments are noted in this section of the annual report. At the date of signing we are not aware of any errors or omissions.*



*Syd Shea*  
*Executive Director*  
*15 August 1994*

# *Legislation and Compliance*

- The Agreements Acts with specific Departmental responsibilities include: *Albany Hardwood Plantation Agreement Act 1993; Alumina Refinery Agreement Act 1961; Alumina Refinery (Pinjarra) Agreement Act 1969; Alumina Refinery (Wagerup) Agreement and Acts Amendment Act 1978; Alumina Refinery (Worsley) Agreement Act 1973; Collie Coal (Griffin) Agreement Act 1979; Collie Coal (Western Collieries) Agreement Act 1979; Dardanup Pine Log Sawmill Agreement Act 1992; Silicon (Picton) Agreement Act 1987; Wesply (Dardanup) Agreement Authorisation Act 1975; Wood Chipping Industry Agreement Act 1969. The Mineral Sands (Western Titanium) Agreement Act 1975 affects the Department's management of the land involved in the project.*
- International agreements relevant to the Department's activities: *Agreement between the Government of the People's Republic of China and the Government of Australia for the Protection of Migratory Birds and their Environment; Agreement between the Government of Japan and the Government of Australia for the Protection of Migratory Birds and Birds in Danger of Extinction and their Environment; Convention on Wetlands of International Importance Especially as Waterfowl Habitat (Ramsar Agreement); Convention on International Trade in Endangered Species of Wild Fauna and Flora; Convention for the Protection of the World Cultural and Natural Heritage; Convention on the Conservation of Migrating Species of Wild Animals; Convention on Biological Diversity.*

## OTHER RELEVANT ACTS

The Act which probably influences the management of land by CALM most frequently is the *Bush Fires Act 1954*, which has requirements for the Department with respect to fires on land managed by the Department.

- Other State Acts which have relevance to CALM: *Aboriginal Heritage Act 1972; Acts Amendment and Repeal Act (Industrial Relations) Act (No. 2) 1984; Aerial Spraying Control Act 1966; Agriculture and Related Resources Protection Act 1976; Agriculture Protection Board Act 1950; Constitution Act 1893; Country Areas Water Supply Act 1947; Dividing Fences Act 1961; East Perth Cemeteries Act 1932; Environmental Protection Act 1986; Equal Opportunity Act 1984; Explosive and Dangerous Goods Act 1961; Financial Administration and Audit Act 1985; Fisheries Act 1905; Freedom of Information Act 1992; Government Employees Housing Authority Act 1964; Health Act 1911-79; Heritage of Western Australia Act 1990; Industrial Relations Act 1979; Industrial Relations Amendment Act 1993; Land Act 1933; Land (Titles and Traditional Usage) Act 1993; Metropolitan Water Supply, Sewerage, and Drainage Act 1909; Minimum Conditions of Employment Act 1993; Occupational Health, Safety and Welfare Act 1984; Occupiers' Liability Act 1985; Rights in Water and Irrigation Act 1914; Public Service Act 1978; Soil and Land Conservation Act 1945; State Employment and Skills Development Authority Act 1990; State Energy Commission Act 1979; State Supply Commission Act 1991; Swan River Trust Act 1988; Timber Industry Regulations Act 1926-69; Town Planning and Development Act 1928; Workers' Compensation and Rehabilitation Act 1981; Workplace Agreements Act 1993.*
- Commonwealth Acts relevant to the Department's activities: *Arts, Territories and Environment Legislation Amendment Act 1982; Australian Heritage Commission Act 1975; Conservation Legislation Amendment Act 1988; Endangered Species Protection Act 1992; National Parks and Wildlife Conservation Act 1975; Training Guarantee Administration Act 1990; Whale Protection Act 1980; Wildlife Protection (Regulation of Exports and Imports) Act 1982; World Heritage Properties Conservation Act 1983.*

## CHANGES IN LEGISLATION

### Financial Administration

When the Financial Administration Legislation Amendment Act 1993 came into operation on 27 August 1993, all references to the Consolidated Revenue fund and the General Loan and Capital Works Fund in the Conservation and Land Management Act 1984 were deleted and the Consolidated Fund substituted. This Amendment Act also enabled net appropriation agreements to be made between the Treasurer and the Department's accountable officer so that certain revenue could be retained for a specified purpose.

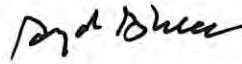
### Timber Sharefarming Agreements

Amendments were included in the Conservation and Land Management Amendment Act 1993. They correct legal uncertainties related to the *profit à prendre* status of timber sharefarming agreements, confirm that these agreements can be registered and assigned, enable the Executive Director to act as an agent for another party, free the State of agreement obligations where the agreement has been assigned, and enable products other than timber to be the subject of a timber sharefarming agreement.

### Utilisation of Flora Products

Promotion and encouragement of the use of flora for therapeutic, scientific or horticultural purposes and undertaking projects or operations related to using flora for these purposes have been established as a function of the Department under the Conservation and Land Management Amendment Act 1993. The Amendment Act came into operation on 20 December 1993. It also provided the Executive Director with an ability to enter into business undertakings connected with this function, and enables the Minister and the Executive Director to enter into agreements that have the effect of conferring exclusive rights to flora to a third party.

*I certify that these performance indicators are based on proper records and fairly represent the performance of the Department of Conservation and Land Management for the year ended 30 June 1994.*



*Syd Shea  
Executive Director  
30 August 1994*

## NATURE CONSERVATION AND WILDLIFE Management Program 1

### **Objective**

To conserve indigenous plants, animals and ecological processes in natural habitats throughout the State.

### **Key Effectiveness Indicator**

**The number of the State's wildlife taxa listed as either threatened or requiring special conservation attention compared to previous years.**

### **Measure**

- A total of 2 113 taxa (1 900 flora and 213 fauna) were declared to be specially protected, or included on the Department's priority flora/reserve fauna lists, at the end of 1993-94. This represents an increase of 17.1% in the number of taxa listed as requiring special conservation status compared to 1992-93.

### **Notes**

A **taxon** (plural **taxa**) is a term for any classificatory group of organisms, including species, subspecies and varieties. The indicator refers to the proportion of the State's wildlife taxa declared to be specially protected (rare, likely to become extinct, or otherwise in need of special protection) under the Wildlife Conservation Act

# *Performance Indicators*



1950, or included in the Department's priority flora or reserve fauna lists, in comparison with previous years.

Under the Wildlife Conservation Act, 1950, the Minister for the Environment can list, by Gazette Notice, those taxa of native fauna and flora which warrant special protection. Taxa may be listed as rare, likely to become extinct, or otherwise in need of special protection. CALM also prepares lists of those taxa that require special monitoring or management, through the priority flora and reserve fauna lists. In 1993-94, assessments were made of the status of the State's taxa, with the help of expert committees (Threatened Fauna Scientific Advisory Committee; Endangered Flora Consultative Committee). The Gazetted list of rare flora was amended in November 1993, and that for specially protected fauna was amended in April 1994. The Priority Flora and Reserve Fauna lists were also amended.

## Key Efficiency Indicator

The change in number of the State's wildlife taxa on conservation lists, relative to the resources used, compared to previous years.

### Measure

- Recurrent expenditure in the program totalled \$23 545 million, an increase of 1.7% over 1992-93. This increase was accompanied by an overall increase of 17.1% in the taxa requiring special conservation attention.

## FOREST RESOURCES

### Management Program 2

#### Objective

To provide, regulate and sustain the supply of forest resources for the satisfaction of long-term social and economic needs in a manner that integrates the use of all resources, maximises their return to the State and minimises the impact on all forest values.

## Key Effectiveness Indicator #1

The quantities of sawlogs harvested each year from native forest on Crown land will be regulated by contracts of sale.

### Measure

- The actual quantities of sawlogs harvested compared to the quantities specified in contracts of sale.

	Jarrah	Karri	Marri
Contract quantity (m <sup>3</sup> )	507 426	256 865	56 500
Actual quantity harvested 1993-94 (m <sup>3</sup> )	422 289	241 047	20 375
Quantity harvested as a % of contract quantity	83%	94%	36%

### Note

Sawmilling contracts were renegotiated on 1.1.94 for periods of up to 10 years, providing resource security for the industry. Contract quantities are expressed in terms of annual averages, so the actual quantities may be above or below the agreed annual average in any particular year.

The contracts regulate harvesting from the forest to levels that can be sustained indefinitely. In 1993-94 some sawmillers did not require their full entitlement of jarrah (in particular) or karri. With respect to marri, there was insufficient sawlog quality marri available in the coupes cut over.

## Key Effectiveness Indicator #2

The harvest from the native hardwood forest will be maintained at a sustainable level.

### Measure

- The quantity of log timber harvested compared to the quantity predetermined by Government, based on the estimated sustainable yield.

Year ending 30 June	Log timber harvested from Crown land (m <sup>3</sup> )	Quantity predetermined by Government (m <sup>3</sup> )
1988	1 427 620	1 501 500
1989	1 432 530	1 459 500
1990	1 319 250	1 451 000
1991	1 170 230	1 463 500
1992	1 247 730	1 476 000
1993	1 258 250	1 446 500
1994	1 236 620	1 466 000

### Notes

The quantities predetermined by Government shown above are as specified in the Timber Production Strategy adopted by the Lands and Forest Commission in December 1987 (up to 1992-93) and the Hon. Minister's determination for the period 1.1.94 to 31.12.2003.

In all of the above years, the log timber harvested was below the quantity predetermined by the Government, based on the estimated sustainable yield. Fluctuations in the actual cut have been largely because of economic factors.

## Key Effectiveness Indicator #3

The Forest Resources management program will be managed profitably.

### Measure

- Comparison between Program revenue and operating expenditure.

Year ending 30 June	Revenue	Operating Expenditure	Operating Profit
1992	\$83 976 547	\$83 584 196	\$ 392 351
1993	\$93 310 376	\$88,230,740	\$ 5 079 636
1994	\$97 793 385	\$95 748 007	\$ 2 045 378

**Note**

The above expenditure and revenue figures are for the Consolidated Fund only, and exclude recoupable projects and grants. Expenditure and revenue data for the whole program are not available for 1993-94 and previous years but should be available for future years. The profit for 1991-92 was reduced and that for 1992-93 increased by the Government decision to grant timber companies extra time to pay their accounts during the period from December 1990 until December 1992.

**Key Efficiency Indicator #1**

Area managed for the whole Forest Resources management program per employee.

**Measure**

- The area of existing and proposed State forest managed by CALM, designated for timber production on a sustained yield basis, divided by the number of CALM employees working for the Forest Resources management program.

Year ending 30 June	Area managed by the Forest Resources Mgt Program (ha)	Number of employees (full time equivalents)	Hectares per employee
1991	1 849 800	N/A	N/A
1992	1 730 100	739	2 341
1993	1 733 000	693	2 501
1994	1 730 800	654	2 646

**Note**

The above figures relate to the whole program and include native forest and plantation areas and employees working on forest management and timber supply. The figures show an improving figure trend in efficiency from 1991-92 to 1993-94. Employee figures at program level are not available for earlier years.

**Measure for Key Efficiency Indicator #4**

Year ending 30 June	Timber supply expenditure in nominal \$	Timber supply expenditure in 1993-94 \$	Volume of timber supplied m <sup>3</sup>	Cost per m <sup>3</sup> nominal \$	Cost per m <sup>3</sup> 1993-94 \$
1991	\$43 988 143	\$45 411 166	1 487 437	\$29.57	\$30.53
1992	\$49 153 081	\$50 359 861	1 667 646	\$29.47	\$30.20
1993	\$48 461 226	\$49 510 763	1 701 321	\$28.48	\$29.10
1994	\$53 427 106	\$53 427 106	1 932 483	\$27.65	\$27.65

**Key Efficiency Indicator #2**

Area managed for native forest management per employee.

**Measure**

- The area of native forest (mainly jarrah, marri, wandoo and karri) divided by the number of CALM employees working on native forest management.

Year ending 30 June	Area of multi-use native forest (ha)	Employees (full time equivalents)	Hectares managed per employee
1991	1 769 300	N/A	N/A
1992	1 647 000	N/A	N/A
1993	1 646 000	400	4 115
1994	1 639 800	366	4 480

**Note**

The figures show an improving trend in efficiency from 1992-93 to 1993-94. Employee figures at subprogram level are not available for earlier years.

**Key Efficiency Indicator #3**

Area managed for afforestation (plantation) management per employee.

**Measure**

- The area of plantation (mainly pine, bluegum and mallet) divided by the number of CALM employees working on afforestation management.

Year ending 30 June	Plantation area (ha)	Employees (full time equivalents)	Hectares per employee
1991	80 537	N/A	N/A
1992	83 106	N/A	N/A
1993	86 953	215	404
1994	90 980	196	464

**Note**

The figures show an improving trend in efficiency from 1992-93 to 1993-94. Employee figures at subprogram level are not available for earlier years.

**Key Efficiency Indicator #4**

The cost of supplying log timber from Crown land.

**Measure**

- The expenditure on timber supply (converted to today's \$ values) divided by the volume of timber supplied from Crown land and CALM-produced logs from private property.

### Note

**Nominal \$** means the dollar values of the year in question. When comparing figures for a number of years, it is appropriate to adjust the figures to today's dollar values (1993-94 \$) by use of the Consumer Price Index to remove the effects of inflation.

The figures for cost per cubic metre (**Cost per m<sup>3</sup>**) indicate a substantial and continuous improvement in efficiency from 1990-91 to 1993-94. The expenditure figure for 1994 has been reduced by \$2 561 750, the expenditure for supply of sandalwood, which in earlier years was costed to native forest management.

## TOURISM AND RECREATION Management Program 3

### Objective

To identify, provide and maintain opportunities and services to the community which allow them to enjoy the wildlife, lands, waters and resources entrusted to the Department without compromising conservation and other management objectives.

### Key Effectiveness Indicator #1

**The provision of appropriate recreation opportunities and services for the enjoyment of the public.**

#### Measures

- Twenty-nine new recreation sites were developed, and facilities and public access were significantly upgraded at an additional 27 sites. Despite the tight economic constraints, this total of 56 new or improved recreation areas compares very well with the previous year's total of 42.
- The number of commercial tour operators licenced under the *CALM Act Amendment Regulations 1993* this year totalled just 64. In addition, there were 50 applications pending assessment at 30 June 1994. This number of approved licences is less than the 82 operators registered last year before the implementation of the new regulations, but the number of licence-holders is expected to increase as further applications are processed. Operators provide approved tours and activities for visitors in conservation areas according to the terms and conditions of their licences.
- Seventeen different visitor activity programs were provided by CALM across the State in 1993-94. Four of these were new programs. These activity programs are provided as a service to the public to enhance the enjoyment of their visit and increase appreciation for natural and cultural values.

### Notes

A **recreation area** is a place, usually with improved access and facilities, in which the public participate in leisure-time activities or experiences, e.g. camping and picnic areas. A **recreation facility** is a physical means or equipment associated with a recreational area or experience, e.g. roads, tables, bird hides, toilets.

CALM intended to establish a State-wide recreation facility database (RECDATA) in 1993-94. This system was to provide an inventory of new and existing recreation facilities and services. One regional and two district databases were begun on a trial basis in 1993-94. As a result of this experience and further research, the concept has now been expanded to a more comprehensive tourism and recreation information system. This is still in the early stages of development, but it will include information such as an inventory of facilities, recreation sites and features (formerly called RECDATA); budgets for asset management and maintenance; and visitor statistics and research data (VISTAT). A computer program is being researched to see whether it is possible to link the existing CALM financial management system and the new database.

**Visitor activity programs** are provided where appropriate as a service to visitors to enhance their enjoyment and appreciation of natural and cultural values. They include interpretive experiences, outdoor education activities, cultural tourism activities, outback safety and bushcraft courses, ecology courses, LANDSCOPE Expeditions, guided walks, lectures and slide shows

### Key Effectiveness Indicator #2

**The extent to which the public has shown interest/support for CALM's tourism and recreation program.**

#### Measures

- Total number of new community volunteer projects initiated in 1993-94 was 41. The number of volunteer hours spent on tourism and recreation programs this year was 40 000. This is the same number of hours contributed by volunteers for each of the last two financial years.
- The number of participants in CALM visitor activity programs was 43 000 (including about 28 000 people who took the Geikie Gorge boat tour, led by a national park ranger). This represents a 20% increase in participation in CALM visitor activity programs from last year.
- As foreshadowed in last year's annual report, the Department conducted visitor surveys at several CALM-managed areas. In the four surveys so far analysed, 87% of visitors who completed the comment cards enjoyed their visit very much; the 1.5% who said they did not enjoy their visit gave the behaviour of other people as the main concern. A total of 80% of



respondents especially enjoyed the naturalness of the areas, but 61% would like to see improved facilities and services; in particular, better access roads and more ablution and other recreation site facilities were requested. See the Program report for additional details of these surveys.

### Key Effectiveness Indicator #3

**The number of visits to CALM-managed areas.**

#### Measures

- Visitor statistics indicate that the number of recorded visits to CALM lands and waters for 1993-94 was 4 486 000. This is a small increase of one per cent from last financial year's recorded visits of 4 442 000.

#### Note

Data are only collected at certain times and selected sites, so the number of recorded visits does not represent the complete number of visits to the whole CALM-managed estate; but an estimated total can be calculated by extrapolation from recorded figures. The total estimated number of visits in 1993-94 is 4.9 million as compared to an estimated total of 4.8 million in 1992-93. See the Program report for additional data.

### Key Efficiency Indicator #1

**Cost per visit.**

#### Measure

- The cost of providing CALM's tourism and recreation services/recorded visits in 1993-94 was \$4.38 per recorded visit. This represents a decrease of 4.2% on the previous year's cost of \$4.57 per recorded visit.

#### Note

The index of efficiency is based on the total expenditure for the Program in relation to the total number of recorded visits to CALM-managed lands.

## FIRE MANAGEMENT

Fire management is not a Departmental Program, but it plays such a considerable role in protecting CALM-managed lands and the community that its performance is judged to be of corporate importance.

### Key Effectiveness Indicator #1: Prescribed Burning

**The reduction of fuels in Priority 1 zones to a satisfactory condition in 90% of designated areas, and in Priority 2 zones to a satisfactory condition in 75% of designated areas.**

Region	Priority 1 (%)	Priority 2 (%)
Swan Region	78	66
Central Forest Region	70	65
Southern Forest Region	64	67
CALM AVERAGE	71	66

The base data have been derived manually from region and district plans. They will eventually be digitally verified and validated using standard data management systems.

#### Notes

CALM's prescribed burning program had fewer people and less money in 1993-94 than were needed to perform at the levels recommended by wildfire threat analysis. The deficiency in resources was identified by the March 1994 report of the Fire Review Panel to the Minister for the Environment. The Panel recommended, inter alia, an additional \$3 million per annum over three years for additional prescribed burning, as well as for expanded fire management recruitment and training programs.

**Priority 1** refers to 'essential burns'. Areas are identified by the need to protect human life and property, rare, threatened or fire-vulnerable wildlife species, and major softwood plantations from wildfire. **Priority 2** refers to 'important burns', which protect areas mainly for nature conservation reasons.

**Satisfactory condition** means that forest fuels available for burning will not exceed 7.6 to 8.5 tonnes per hectare in jarrah and 15.0 to 19.0 tonnes per hectare in karri. Under these forest regimes, headfire attack will be successful except on days when the fire danger is very high or extreme.

**The 90% and 75% fuel reduction limits** provide optimum protection of the community and conservation values described above.

**Designated areas** are forests where prescribed burning is an allowed landuse and where areas are available for burning. In particular the need to protect jarrah and karri regeneration renders these areas unavailable for prescribed burning for up to 20 years.

### Key Effectiveness Indicator #2: Fire Suppression

**The number of times an effective suppression force begins fire attack, within 95 percentile weather conditions, before fires exceed one hectare in Priority 1 areas and two hectares in Priority 2 areas.**

Region	Priority 1 (%)	Priority 2 (%)
Swan Region	95	99
Central Forest Region	96	97
Southern Forest Region	100	100
CALM AVERAGE 1993-94	97	99
CALM AVERAGE 1992-93	98	No data
CALM AVERAGE 1991-92	96	No data
CALM AVERAGE 1990-91	97	No data
CALM AVERAGE 1989-90	95	No data

**Notes**

*Suppression force is defined by CALM's Red Book Dispatch Tables for forest crews and equipment and by Wildfire Threat suppression classes.*

*The 95 percentile weather conditions refer to the days when the fire danger is below 'very high' and 'extreme'. Firefighters can work effectively and safely in these conditions if forest fuels have been kept down to satisfactory levels. The conditions also provide a long-term basis for comparison between fire seasons, because they exclude from the measure the 5% of days when weather conditions are most severe and suppression performance most difficult and dangerous.*

**Key Efficiency Indicator #1:  
Prescribed Burning**

**The 10-year averaged rolling cost of achieving the burning to meet Key Effectiveness Indicator #1 should not exceed \$6.00 per hectare.**

Year	Cost (in 1993-94 \$)	Area (hectares)	Unit Cost (\$/hectare)
1985-86	2 181 587	268 951	8.11
1986-87	Not available	250 360	Not available
1987-88	1 640 540	277 283	5.92
1988-89	1 930 277	242 379	7.96
1989-90	1 506 622	278 364	5.41
1990-91	1 195 694	365 164	3.27
1991-92	1 058 751	309 350	3.42
1992-93	1 057 833	270 682	3.91
1993-94	1 620 899	250 830	6.46
<b>Averaged Rolling Cost (over eight years)</b>			<b>5.56</b>

**Notes**

*Ten-year averaged rolling costs allow comparisons between fire seasons by smoothing out environmental variations (e.g. number of available burning days), and operational and budgetary variations (e.g. the annual size of the prescribed burning program). The rolling cost in the table is averaged over eight years. Because of inadequacies in the data collected in 1986-87, the tenth year of operation will be 1995-96.*

*The total prescribed burning program must be compared because of large variations in individual burn cost. The total program comprises aerial and manual burning to meet protection, silvicultural and nature conservation landuse objectives.*

**Key Efficiency Indicator #2:  
Fire Suppression**

**The cost of meeting Key Effectiveness Indicator #2 shall not exceed the 10-year averaged rolling cost for fire suppression preparedness.**

**PREPAREDNESS**

Year	Region	Preparedness Cost (\$)
1993-94	Swan Region	827 732
	Central Forest Region	1 543 750
	Southern Forest Region	957 776
<b>Total</b>		<b>3 329 258</b>

**SUPPRESSION**

Year	Region	Actual Fire Suppression Cost (\$)
1993-94	Swan Region	633 469
	Central Forest Region	681 596
	Southern Forest Region	787 900
<b>Total</b>		<b>2 102 965</b>

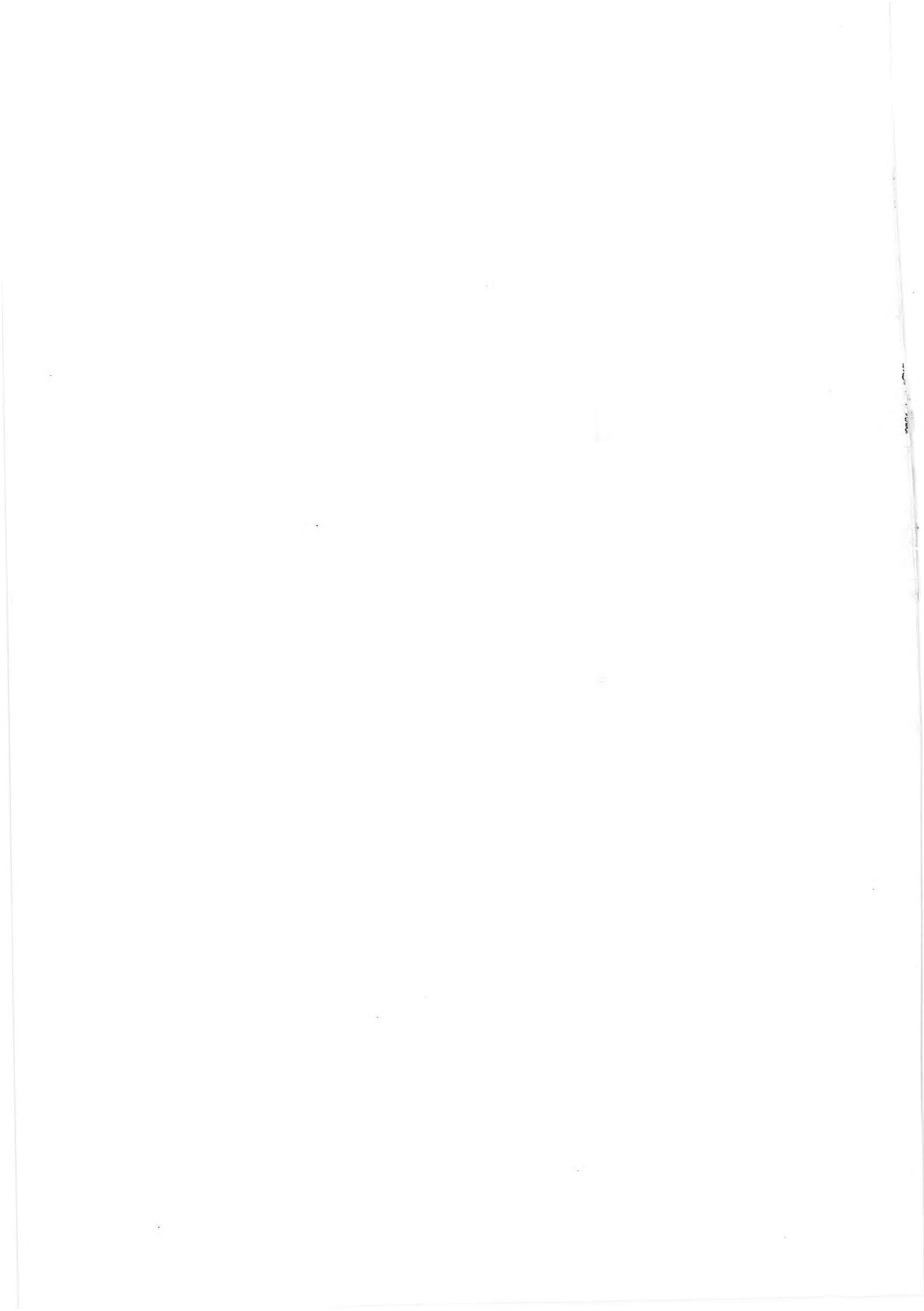
**Notes**

*Fire suppression readiness must be at a sufficient level (and therefore cost) if it is to successfully limit the cost of suppressing wildfires.*

*Data before 1993-94 are not sufficiently reliable to be included in a 10-year averaged preparedness rolling cost, because fire training and fire planning were not isolated as separate costs. The averaged data will be accumulated from 1993-94.*

*Preparedness costs comprise the installation of water points and firebreaks, prescribed burning, fire detection, fire standby, weather forecasting, the construction and maintenance of fire equipment, fire training and fire planning.*

*Prescribed burning has been included in preparedness costs because the activity contributes significantly to the success of wildfire suppression.*



CONSERVATION AND LAND MANAGEMENT FUND  
STATEMENT OF RECEIPTS AND PAYMENTS  
FOR THE FINANCIAL YEAR ENDED 30 JUNE 1994

1992-93		ACCOUNT	1993-94	
\$	\$		\$	\$
<u>4 484 376</u>		Balance as at 1 July		<u>4 685 525</u>
		<b>This is represented by:</b>		
	54 248	Recurrent Account (1)	852	
	217 997	Tree Planting Trust Fund Account	661 348	
	2 161 973	Capital Works Account	587 465	
	162 829	Nature Cons and Nat Parks Trust Account	154 667	
	1 811 986	Specific Purpose Trust Account	3 067 748	
	47 087	World Wildlife Grants Trust Account	42 222	
	403	Wood Utilisation Research Trust Account	155 956	
	27 853	Kal-Boulder Urban Land Care Trust A/C (2)	15 267	
	-	Sandalwood Cons and Regen Trust Account	-	
		<b>Receipts</b>		
	130 708 947	Recurrent Account	142 366 007	
	1 374 662	Tree Planting Trust Fund Account	1 386 880	
	13 156 924	Capital Works Account	12 849 462	
	118 904	Nature Cons and Nat Parks Trust Account	139 951	
	4 161 635	Specific Purpose Trust Account	5 890 339	
	63 435	World Wildlife Grants Trust Account	-	
	363 690	Wood Utilisation Research Trust Account	487 820	
	96 414	Kal-Boulder Urban Land Care Trust Account	77 043	
	-	Sandalwood Cons and Regen Trust Account	329 452	
<u>150 044 611</u>				<u>163 526 954</u>
154 528 987				168 212 479
		<b>Payments</b>		
	130 762 343	Recurrent Account	142 366 437	
	931 311	Tree Planting Trust Fund Account	1 615 751	
	14 731 432	Capital Works Account	12 676 468	
	127 066	Nature Cons and Nat Parks Trust Account	119 607	
	2 905 873	Specific Purpose Trust Account	4 232 092	
	68 300	World Wildlife Grants Trust Account	42 222	
	208 137	Wood Utilisation Research Trust Account	400 013	
	109 000	Kal-Boulder Urban Land Care Trust Account	66 245	
	-	Sandalwood Cons and Regen Trust Account	-	
<u>149 843 462</u>				<u>161 518 835</u>
4 685 525				6 693 644
		Balance as at 30 June		
		<b>This is represented by:</b>		
	852	Recurrent Account	422	
	661 348	Tree Planting Trust Fund Account	432 477	
	587 465	Capital Works Account	760 459	
	154 667	Nature Cons and Nat Parks Trust Account	175 011	
	3 067 748	Specific Purpose Trust Account	4 725 995	
	42 222	World Wildlife Grants Trust Account	-	
	155 956	Wood Utilisation Research Trust Account	243 763	
	15 267	Kal-Boulder Urban Land Care Trust Account	26 065	
	-	Sandalwood Cons and Regen Trust Account	329 452	

The purpose of the Conservation and Land Management Fund is to hold moneys derived under Sections 64, 68 and 69 of the Conservation and Land Management Act 1984.

Details of the various accounts are contained in the statements which follow.

The balance of the Conservation and Land Management Fund is held at and invested by Treasury with the interest being credited to the fund.

Some variation between this and supporting statements may occur due to rounding.

- (1) Previously known as Operating Account.
- (2) Previously known as the Goldfields Dust Abatement Account.



RECURRENT ACCOUNT  
STATEMENT OF RECEIPTS AND PAYMENTS  
FOR THE FINANCIAL YEAR ENDED 30 JUNE 1994

1992-93		1993-94		
Actual		Estimate	Actual	Variation
\$		\$	\$	\$
54 248	Balance as at 1 July	1000	852	(148)
<b>RECEIPTS (2)</b>				
119 377 000	Consolidated Fund	119 989 000	126 065 993	6 076 993
7 818 999	Contributions from Industry and Other Sources	9 519 000	12 589 845	3 070 845
1 983 770	Commonwealth Recoups	1 500 000	2 118 241	618 241
<u>1 529 178</u>	Income from National Parks	<u>1 800 000</u>	<u>1 591 928</u>	<u>(208 072)</u>
130 763 195		132 809 000	142 366 859	9 557 859
<b>PAYMENTS (3)</b>				
-	Ministers Office (incl. Env Appeals Committee)	400 000	621 808	221 808
1 445 806	Corporate Services	-	-	-
22 430 733	Nature Conservation and Wildlife Management	22 230 000	23 482 000	1 252 000
88 724 700	Forest Resources Management	91 724 000	99 380 178	7 656 178
18 051 626	Management for Tourism and Recreation	18 455 000	18 882 451	427 451
<u>109 478</u>	Emergency Assistance	-	-	-
130 762 343		132 809 000	142 366 437	9 557 437
852	Balance as at 30 June	-	422	422

TREE PLANTING TRUST FUND ACCOUNT  
STATEMENT OF RECEIPTS AND PAYMENTS  
FOR THE FINANCIAL YEAR ENDED 30 JUNE 1994

1992-93		1993-94		
Actual		Estimate	Actual	Variation
\$		\$	\$	\$
217 997	Balance as at 1 July	661 000	661 348	348
<b>RECEIPTS (2)</b>				
1 239 000	Consolidated Fund	1 239 000	1 239 000	-
<u>135 662</u>	Other Income	-	<u>147 880</u>	<u>147 880</u>
1 592 659		1 900 000	2 048 228	148 228
<b>PAYMENTS (3)</b>				
<u>931 311</u>	Forest Resources Management	<u>1 900 000</u>	<u>1 615 751</u>	<u>(284 249)</u>
661 348	Balance as at 30 June	-	432 477	432 477

CAPITAL WORKS ACCOUNT  
STATEMENT OF RECEIPTS AND PAYMENTS  
FOR THE FINANCIAL YEAR ENDED 30 JUNE 1994

1992-93		1993-94		
Actual		Estimate	Actual	Variation
\$		\$	\$	\$
2 161 973	Balance as at 1 July	587 000	587 465	465
<b>RECEIPTS</b>				
10 500 000	Borrowings (5.1)	10 000 000	10 000 000	-
<u>2 656 924</u>	Internal Funds (5.2)	<u>1 713 000</u>	<u>2 849 462</u>	<u>1 136 462</u>
15 318 897		12 300 000	13 436 927	1 136 927
<b>PAYMENTS (5.3)</b>				
Forest Resources Management Program				
Hardwood Forests				
318 122	Access Roads	700 000	527 680	(172 320)
2 605 021	Regeneration	2 600 000	2 756 576	156 576
1 620 693	Sharefarming Scheme	879 000	1 225 383	346 383
Softwood Forests				
14 402	Access Roads	40 000	27 362	(12 638)
4 664 907	Establishment and Tending	4 260 000	5 287 279	1 027 279
2 280 578	Sharefarming Scheme	1 971 000	1 374 519	(596 481)
Management for Tourism and Recreation Program				
1 605 672	Improvement to Tourism Facilities	650 000	770 293	120 293
Nature Conservation and Wildlife Management Program				
729 374	Conservation Land Acquisition	300 000	89 459	(210 541)
<u>892 663</u>	Plant and Equipment	<u>900 000</u>	<u>617 917</u>	<u>(282 083)</u>
14 731 432		12 300 000	12 676 468	376 468
587 465	Balance as at 30 June	-	760 459	760 459

NATURE CONSERVATION AND NATIONAL PARKS TRUST ACCOUNT  
STATEMENT OF RECEIPTS AND PAYMENTS  
FOR THE FINANCIAL YEAR ENDED 30 JUNE 1994

1992-93		1993-94
\$		\$
162 829	Balance as at 1 July	154 667
<b>RECEIPTS</b>		
86 759	Flora Licenses and Royalties	81 715
25 556	Gifts, Devises, Bequests and Donations	53 005
<u>6 589</u>	Interest	<u>5 231</u>
281 733		294 618
<b>PAYMENTS</b>		
<u>127 066</u>	Scientific Research Relating to Flora and Fauna	<u>119 607</u>
154 667	Balance as at 30 June	175 011

Section 68(1) of the Conservation and Land Management Act 1984 established the Nature Conservation and National Parks Trust Account within the Conservation and Land Management Fund. The account is credited with

moneys derived under the Wildlife Conservation Act 1950, gifts, devises, bequests and donations, and income from investment. The moneys may be applied for the purpose of scientific research relating to flora and fauna.

For presentation purposes the details of each research project has been omitted.

SPECIFIC PURPOSE TRUST ACCOUNT  
STATEMENT OF RECEIPTS AND PAYMENTS  
FOR THE FINANCIAL YEAR ENDED 30 JUNE 1994

PROJECT	OPENING BALANCE	RECEIPTS	PAYMENTS	CLOSING BALANCE
	\$	\$	\$	\$
Commonwealth Projects - ANCA	1 123 592	2 196 035	1 897 401	1 422 227
Flora and Fauna Conservation	834 174	577 874	971 814	440 234
Management Plans	36 970	26 049	21 226	41 793
Donations	35 187	58 567	15 011	78 743
Other	1 037 825	3 031 814	1 326 640	2 742 999
<b>GRAND TOTAL</b>	<b>3 067 748</b>	<b>5 890 339</b>	<b>4 232 092</b>	<b>4 725 995</b>

The purpose of this account is to hold funds received by CALM for specific purposes.

Donation boxes have been placed in some National Parks and recreation areas. Moneys received are spent in the National Park or recreation area in which the donation box is located.

The Australian Nature Conservation Authority (ANCA) provides funds for research into endangered flora and fauna. This research has the objective of preventing the extinction of the species and its eventual recovery to sustainable numbers.

Other funds are provided from various sources to recoup CALM for work done on behalf of these interests. The organisation provides funds in advance which are invested until used.

The Flora and Fauna Conservation item accounts for funds received for projects similar to those assisted by the Australian Nature Conservation Authority.

The balance of this account is invested by Treasury with the interest being credited to the trust account.

Moneys for Management Plans include contributions from companies in the area affected by the Management Plan.

WORLD WILDLIFE GRANTS TRUST ACCOUNT  
STATEMENT OF RECEIPTS AND PAYMENTS  
FOR THE FINANCIAL YEAR ENDED 30 JUNE 1994

1992-93		1993-94
\$		\$
47 087	Balance as at 1 July	42 222
	<b>RECEIPTS</b>	
63 435	Recoups received from the World Wide Fund for Nature	-
<u>110 522</u>		<u>42 222</u>
	<b>PAYMENTS</b>	
68 300	Wildlife Research Projects	-
<u>-</u>	Transfer to Specific Purpose Trust Account	<u>42 222</u>
68 300		42 222
42 222	Balance as at 30 June	-

The purpose of this account is to hold funds granted to CALM for the wildlife research purposes by the World Wide Fund for Nature.

The balance of this account was transferred to the Specific Purpose Trust Account during the financial year, and this account has been closed.

WOOD UTILISATION RESEARCH TRUST ACCOUNT  
STATEMENT OF RECEIPTS AND PAYMENTS  
FOR THE FINANCIAL YEAR ENDED 30 JUNE 1994

1992-93		1993-94
\$		\$
403	Balance as at 1 July	155 956
	<b>RECEIPTS</b>	
10 738	Innovative Marketing Board	-
345 959	Proceeds from Sales	481 912
<u>6 993</u>	Interest	<u>5 908</u>
364 093		643 776
	<b>PAYMENTS</b>	
<u>208 137</u>	Wood Utilisation Research	<u>400 013</u>
208 137		400 013
155 956	Balance as at 30 June	243 763

The purpose of this account is to hold funds for the Wood Utilisation Research Centre. The centre at Harvey researches the commercial utilisation of forest regrowth which would otherwise be unusable.

The balance of this account is invested by Treasury with the interest being credited to the trust account.



KALGOORLIE-BOULDER URBAN LAND CARE TRUST ACCOUNT  
STATEMENT OF RECEIPTS AND PAYMENTS  
FOR THE FINANCIAL YEAR ENDED 30 JUNE 1994

1992-93		1993-94
\$		\$
27 853	Balance as at 1 July	15 267
	<b>RECEIPTS</b>	
22 575	City of Kalgoorlie-Boulder Grant	25 000
23 000	Chamber of Mines Grant	-
-	Kaltails Grant	5 000
46 000	CALM Grant	46 000
4 148	Interest	535
<u>691</u>	Other	<u>508</u>
124 267		92 310
	<b>PAYMENTS</b>	
<u>109 000</u>	Land Care Projects	<u>66 245</u>
15 267	Balance as at 30 June	26 065

The Kalgoorlie-Boulder Urban Land Care Group formerly known as the Goldfields Dust Abatement Committee is a committee established in Kalgoorlie-Boulder to plan, coordinate and implement land care projects with community consultation, co operation and participation.

For presentation purposes the disclosure of components of expenditure on land care projects has been omitted.

The balance of the account is invested by Treasury with the interest being credited to the trust account.

SANDALWOOD CONSERVATION AND REGENERATION TRUST ACCOUNT  
STATEMENT OF RECEIPTS AND PAYMENTS FOR THE FINANCIAL YEAR  
ENDED 30 JUNE 1994

	1993-94
	\$
Opening Balance	-
<b>RECEIPTS</b>	
Contribution from Industry	515 656
Interest	<u>4 169</u>
	519 825
<b>PAYMENTS</b>	
Sandalwood Projects	<u>190 373</u>
Balance as at 30 June	329 452

This trust account was established to hold funds for conservation, regeneration and management of sandalwood including research, land and lease acquisition and management and establishment of plantations.

sandalwood and are applied to meeting costs associated with projects authorised by the Sandalwood Export Committee.

Moneys are received from a levy on proceeds from sale of

The balance of the account is invested by Treasury with the interest being credited to the trust account.

CONSOLIDATED FUND - REVENUE COLLECTIONS  
FOR THE FINANCIAL YEAR ENDED 30 JUNE 1994

1992-93 Actual \$		Estimate \$	1993-94 Actual \$	Variation \$
<b>TERRITORIAL (6)</b>				
16 176 345	Log Royalties	15 460 000	17 065 793	1 605 793
8 789 974	Chip Log Royalties	7 620 000	7 485 472	(134 528)
6 235 743	Sandalwood	6 500 000	7 156 018	656 018
<u>749 404</u>	Other	<u>720 000</u>	<u>787 559</u>	<u>67 559</u>
31 951 466		30 300 000	32 494 842	2 194 842
<b>DEPARTMENTAL (6)</b>				
18 221 476	Pine Conversion Sales	18 332 000	22 365 665	4 033 665
43 095 873	Hardwood Conversion Sales	41 190 000	42 852 998	1 662 998
<u>742 948</u>	Other	<u>600 000</u>	<u>481 095</u>	<u>(118 905)</u>
62 060 297		60 122 000	65 699 758	5 577 758
94 011 763	<b>GRAND TOTAL</b>	90 422 000	98 194 600	7 772 600

PRIVATE TRUST FUND ACCOUNT  
KEYNES FORESTRY PRIZE  
STATEMENT OF RECEIPTS AND PAYMENTS  
FOR THE FINANCIAL YEAR ENDED 30 JUNE 1994

1992-93 \$		1993-94 \$
540	Balance as at 1 July	571
<b>RECEIPTS</b>		
<u>31</u>	Interest	<u>27</u>
571		598
<b>PAYMENTS</b>		
-	Transfer to Specific Purpose Trust Account	598
<u>571</u>	Balance as at 30 June	-

The purpose of this trust fund is to provide an award for the most outstanding achievement by a student at the Department's Cadet School (since closed).

The balance of this account was transferred to the Specific Purpose Trust Account during the financial year and this account has been closed.

PRIVATE TRUST FUND ACCOUNT  
 C.E. LANE POOLE MEMORIAL TRUST  
 STATEMENT OF RECEIPTS AND PAYMENTS  
 FOR THE FINANCIAL YEAR ENDED 30 JUNE 1994

1992-93		1993-94
\$		\$
10 620	Balance as at 1 July	7 347
	<b>RECEIPTS</b>	
4 350	Donations	10 650
<u>511</u>	Interest	<u>434</u>
15 481		18 431
	<b>PAYMENTS</b>	
-	Printing and Associated Costs	578
<u>8 134</u>	Travel Costs Associated with Award	<u>3 183</u>
8 134		3 761
7 347	Balance as at 30 June	14 670

The purpose of this trust fund is to assist with extending the knowledge and experience of awardees by study and travel in Australia or overseas, on topics of value to the Department of Conservation and Land Management.

The balance of this trust fund is held at and invested by Treasury with the interest being credited to the trust fund.

PRIVATE TRUST FUND ACCOUNT  
 RESEARCH CO-ORDINATING COMMITTEE  
 STATEMENT OF RECEIPTS AND PAYMENTS  
 FOR THE FINANCIAL YEAR ENDED 30 JUNE 1994

1992-93		1993-94
\$		\$
15 401	Balance as at 1 July	16 306
	<b>RECEIPTS</b>	
<u>905</u>	Interest	<u>672</u>
16 306		16 978
	<b>PAYMENTS</b>	
<u>-</u>	Transfer to Specific Purpose Trust Account	<u>16 978</u>
16 306	Balance as at 30 June	-

The purpose of this trust fund is to hold moneys for research projects as approved by the Research Co-ordinating Committee.

The balance of this account was transferred to the Specific Purpose Trust Account during the financial year and this account has been closed.

PRIVATE TRUST FUND ACCOUNT  
 DIEBACK RESEARCH TRUST FUND  
 STATEMENT OF RECEIPTS AND PAYMENTS  
 FOR THE FINANCIAL YEAR ENDED 30 JUNE 1994

1992-93		1993-94
\$		\$
21 838	Balance as at 1 July	23 121
	<b>RECEIPTS</b>	
<u>1 283</u>	Interest	<u>1 082</u>
23 121		24 203
	<b>PAYMENTS</b>	
<u>-</u>		<u>-</u>
23 121	Balance as at 30 June	24 203

The purpose of this trust fund is to hold moneys for research projects as approved by the Dieback Research Fund Committee.

The balance of this trust fund is held at and invested by Treasury with the interest being credited to the trust fund.

PRIVATE TRUST FUND ACCOUNT  
 CONTRACTORS' DEPOSITS  
 STATEMENT OF RECEIPTS AND PAYMENTS  
 FOR THE FINANCIAL YEAR ENDED 30 JUNE 1994

1992-93		1993-94
\$		\$
660 596	Balance as at 1 July	1 069 521
	<b>RECEIPTS</b>	
498 093	Deposits Lodged During Year	610 332
<u>48 038</u>	Interest	<u>44 892</u>
1 206 727		1 724 745
	<b>PAYMENTS</b>	
<u>137 206</u>	Deposits Refunded During Year	<u>468 156</u>
1 069 521	Balance as at 30 June	1 256 589

The purpose of this trust fund is to hold deposits lodged by contractors to the Department of Conservation and Land Management.

The balance of this trust fund is held at and invested by Treasury with the interest being credited to the trust fund.



PRIVATE TRUST FUND ACCOUNT  
 CALM - PAYROLL DEDUCTIONS  
 STATEMENT OF RECEIPTS AND PAYMENTS  
 FOR THE FINANCIAL YEAR ENDED 30 JUNE 1994

1992-93		1993-94
\$		\$
31 292	Balance as at 1 July	228 695
	<b>RECEIPTS</b>	
<u>12 563 660</u>	Payroll deductions	<u>12 873 188</u>
12 594 952		13 101 883
	<b>PAYMENTS</b>	
<u>12 366 257</u>	Payments to relevant organisations	<u>13 066 654</u>
228 695	Balance as at 30 June	35 229

The purpose of this trust fund is to hold all income tax deductions and other payroll deductions from salaries and wages paid to CALM staff at various centres throughout the State. When all deductions for a pay period have been collected they are paid to the Australian Taxation Office,

insurance companies, medical benefit funds and other relevant organisations.

The balance of this trust fund is held at and invested by Treasury with the interest being credited to the Government of Western Australia.

PRIVATE TRUST FUND ACCOUNT  
 WITHHOLDING TAX - CONTRACTORS PRESCRIBED PAYMENTS  
 STATEMENT OF RECEIPTS AND PAYMENTS  
 FOR THE FINANCIAL YEAR ENDED 30 JUNE 1994

1992-93		1993-94
\$		\$
1 022	Balance as at 1 July	777
	<b>RECEIPTS</b>	
<u>2 908</u>	Withholding tax	<u>19 880</u>
3 930		20 657
	<b>PAYMENTS</b>	
<u>3 153</u>	Payments to Australian Taxation Office	<u>16 016</u>
777	Balance as at 30 June	4 641

The purpose of this trust fund is to hold moneys deducted from contractors prescribed payments in accordance with the Income Tax Assessment Act 1936.

The balance of this trust fund is held at and invested by Treasury with the interest being credited to the Government of Western Australia.

The deductions are paid to the Australian Taxation Office at the beginning of the month following the month in which deductions were made.

COMMONWEALTH GRANTS AND ADVANCES  
WILDLIFE RESEARCH AND DEVELOPMENT  
STATEMENT OF RECEIPTS AND PAYMENTS  
FOR THE FINANCIAL YEAR ENDED 30 JUNE 1994

1992-93		1993-94
\$		\$
-	Balance as at 1 July	-
<b>RECEIPTS</b>		
1 622 078	Grants received from various Australian Government organisations	2 705 663
<b>PAYMENTS</b>		
1 622 078	Transferred to Specific Purpose Grants Trust Account	2 705 663
-	Balance as at 30 June	-

The purpose of this account is to hold funds received from the Commonwealth pending transfer to CALM.

## NOTES TO THE FINANCIAL STATEMENTS

### 1. ACCOUNTING POLICIES

These financial statements have been prepared on a cash basis. Only collections received and payments made are included.

The statutory requirements of the Financial Administration and Audit Act 1985 and the Conservation and Land Management Act 1984 underlie the presentation of these Financial Statements.

Receipts are credited to the Consolidated Fund in respect of Territorial Revenue obtained from royalties and Departmental Revenue received as a result of the Department's commercial activities.

Payments are charged against Consolidated Fund Division 76 Items 156 and 157.

### 2. RECEIPTS

The Consolidated Fund Appropriation for recurrent expenditure for 1993-94 was overdrawn by \$6 076 993 due primarily to increased expenditure on Commercial Timber Logging (\$4 000 000) and unbudgeted wildfire suppression (\$1 800 000). Unbudgeted expenditure on legal fees and settlement of public liability claims made up the balance.

All expenditure in Timber Logging generates revenue which exceeds expenditure. For 1993-94 revenue from

logging operations was \$5 696 663 over budget. Wildfire suppression activity is not predictable and depends on fire conditions in the fire season. The appropriation does not include full provision for wildfire suppression, which has been funded by an excess each year.

The Contributions from Industry and Other Sources in 1993-94 comprise:

	\$
Recoupable Work	9 393 754
MRWA Road Grants	1 262 716
Contract Salaries	103 819
Saleable Publications	501 638
Nursery Sales	1 230 336
Interest	97 582

With the exception of saleable publications and interest, these moneys are for works of a recoupable nature. Requests are not always known at the time the budget is framed and as a consequence variation can occur between the estimate and the actual amount received.

Commonwealth Recoups are grants provided by the Commonwealth Government for wildlife and other research projects. Grants are for specific purposes and do not bear any comparison in dollar terms to grants in the previous year.

## NOTES TO THE FINANCIAL STATEMENTS (Cont.)

### 3. PAYMENTS

#### 3.1 Payments Charged to Programs and Sub-Programs

The Forest Resources Program has three sub-programs. The following table shows details of these sub-programs.

	Estimate		Actual	
	\$	\$	\$	\$
Forest Resources Management		93 624 000		100 995 928
Native Forest Management	23 870 000		22 434 642	
Afforestation Management	20 748 000		22 572 430	
Timber Supply	49 006 000		55 988 856	

#### 3.2 Payments

CALM receives three appropriations being \$119 865 000 for recurrent expenditure, \$1 239 000 for the Tree Planting Trust Fund and \$124 000 for the payment of salaries covered by the Salaries and Allowances Act 1975 (refer to note 4).

The \$1 239 000 Tree Planting Trust Fund allocation is accounted for under the Forest Resources Program in that account whilst the other two allocations are accounted for under the recurrent account across all programs.

The estimates against the programs are indicators only as to how the appropriation is expected to be expended, bearing in mind that the estimates were prepared based on indications some 15-18 months prior to 30 June 1994. The single line appropriation enables the Department to rearrange expenditure priorities to meet changes in priorities during the year.

As mentioned in Note 2 the appropriation was overdrawn due to increased activity in Commercial Timber Logging and unbudgeted expenditure on Wildfire Suppression.

For 1993-94 expenditure previously charged to Corporate Services and Emergency Assistance was allocated to CALM's programs.

The main reason for the significant variation in expenditure in the Nature Conservation and Wildlife Management and Management for Tourism and Recreation Programs was the allocation of expenditure previously allocated to the Corporate Services and Emergency Assistance Programs as mentioned above.

The increase in activity in the Forest Resources Management Program is a reflection of the upturn in the housing sector of the State economy and the consequent increased demand for timber.

#### 4. AMOUNT AUTHORISED BY OTHER STATUTES

	Estimate	Actual
	\$	\$
Salaries and Allowances Act 1975	124 000	127 993

#### 5. CAPITAL WORKS

##### 5.1 Loan Liability

Loan liability at 30 June 1994 was \$127 799 662. The composition is:

	PRINCIPAL 30 JUNE 1993	NEW BORROWINGS	PRINCIPAL REPAID 1993-1994	PRINCIPAL 30 JUNE 1994
	\$	\$	\$	\$
WA Treasury Corporation loans	113 560 454	10 000 000	3 506 898	120 053 556
Loans taken over by WATC	453 337	-	117 624	335 713
Other borrowings guaranteed by Treasurer	30 462	-	24 006	6 456
Softwood Forestry Agreements 1966-1983	<u>7 646 484</u>	<u>-</u>	<u>242 547</u>	<u>7 403 937</u>
	121 690 737	10 000 000	3 891 075	127 799 662

Interest payments of \$13 648 080, loan guarantee levy of \$224 081 and the principal repayments shown have been included in the Recurrent Account statement.

## NOTES TO THE FINANCIAL STATEMENTS (Cont.)

### 5.2 Internal Funds

Internal funds in 1993-94 comprise:

Mining Compensation	2 243 612
Cash Order Movement and Other	588 108
Interest	<u>17 742</u>
	2 849 462

### 5.3 Capital Works Payments

Overall the Capital Works expenditure was not significantly different from the total estimate.

The increase in expenditure on establishment and tending of softwood forest and reduction in expenditure in sharefarming schemes reflects a policy decision made after the budget was framed to reduce establishment of new softwood plantations and increase fertilisation of existing plantations.

Expenditure on Improvements to Tourism Facilities for 1993-94 was \$835 379 less than 1992-93. This was due to major expenditure on the 'Perth Outdoors' tourism facilities improvement initiative being expended in 1992-93.

Expenditure on conservation land acquisition depends on suitable properties becoming available for purchase.

### 6. CONSOLIDATED FUND REVENUE

As mentioned in note 3.2 there has been an upturn in the housing sector of the state economy with a consequent increased demand for timber. This has resulted in revenues being higher than expected for the Log Royalties, Pine Sales and Hardwood Sales line items.

Other Departmental Revenue for 1993-94 was \$261 853 less than for 1992-93. This was due mainly to the treatment of insurance recoups for Workers Compensation claims.

In the past CALM has credited these recoups to Departmental Revenue whereas Treasurer's Instruction 208(1)(iii) provides for them to be offset against recurrent expenditure. The Treasurer's Instruction was followed in 1993-94.

### 7. SUPPLEMENTARY FINANCIAL INFORMATION

- Losses of public moneys and public or other property:

	1992-93		1993-94	
	\$	\$	\$	\$
Irrecoverable amounts	25 957		2 872	
Other	<u>5 186</u>	31 143	<u>422</u>	<u>3 294</u>
General (includes thefts reported to Police, lost property and stock-taking deficiencies)		<u>19 637</u>		<u>13 043</u>
		50 780		16 337

- Public and other property, revenue and other debts due to the State written off in accordance with Section 45 of the Financial Administration and Audit Act 1985.

	1992-93	1993-94
	\$	\$
Approved by the Executive Director	59 780	16 337
Approved by the Hon. Minister	-	-



## NOTES TO THE FINANCIAL STATEMENTS (Cont.)

- Revenue due but not collected at 30 June 1994 was \$8 738 876. There is a reasonable prospect of recovery all but \$22 800 of this amount.
- Consolidated fund recurrent and capital works expenditure claims on hand but unpaid at 30 June 1994 amounted to \$1 890 080.
- Commitments for which invoices had not been received by 30 June 1994 were \$749 065.
- A Receipts in Suspense Account is kept to hold moneys received pending identification of the purposes for which these moneys were received or identification of where the moneys are to be credited or paid pursuant to Section 9(2)(iv) of the Financial Administration and Audit Act 1985. The balance of the Receipts in Suspense Account at the end of the financial year was \$717 702.

The balance of the Receipts in Suspense Account is held at and invested by Treasury with the interest being credited to the Government of Western Australia.

### 8. EXPENDITURE BY STANDARD GROUPS

	Estimate \$'000	Actual \$'000
Salaries, Wages & Related Staff Costs	46 468	49 688
Other Operating Costs	69 559	74 657
Debt Servicing Costs	18 552	17 763
Grants, Subsidies and Transfer Payments	130	130
<b>TOTAL GROSS EXPENDITURE</b>	<b>134 709</b>	<b>142 238</b>

### 9. REMUNERATION OF SENIOR OFFICERS

	1992-93	1993-94
The total of fees, salaries and other benefits received or due and receivable for the financial year by Senior Officers of CALM:	\$ 806 200	\$ 812 103

The number of Senior Officers whose total of fees, salaries and other benefits received or due and receivable for the financial year, falls within the following bands:

60 000 - 70 000	4	1
70 000 - 80 000	4	6
80 000 - 90 000	1	2
110 000 - 120 000	1	NIL
120 000 - 130 000	NIL	1

### 10. RETIREMENT BENEFITS

	1992-93	1993-94
In respect of Senior Officers the following amounts were paid for the financial year.	\$	\$
Contributions to Government Employee Superannuation Act Scheme	83 346	79 845
Redundancy Payments	NIL	96 321

At 30 June 1994 9 employees of the Department were members of the Superannuation and Family Benefits Act Scheme.

No Senior Officers were members of the Superannuation and Family Benefits Act Scheme.

### 11. REMUNERATION OF AUDITOR

No fees were payable to the Office of the Auditor General for the financial year.



# Opinion of the Auditor General

**To the Parliament of Western Australia**

**DEPARTMENT OF CONSERVATION AND LAND MANAGEMENT  
FINANCIAL STATEMENTS FOR THE YEAR ENDED JUNE 30, 1994**

**Scope**

I have audited the accounts and financial statements of the Department of Conservation and Land Management for the year ended June 30, 1994 under the provisions of the Financial Administration and Audit Act 1985.

The Executive Director is responsible for keeping proper accounts and maintaining adequate systems of internal control, preparing and presenting the financial statements, and complying with the Act and other relevant written law. The primary responsibility for the detection, investigation and prevention of irregularities rests with the Executive Director.

My audit was performed in accordance with section 79 of the Act to form an opinion based on a reasonable level of assurance. The audit procedures included examining, on a test basis, the controls exercised by the Department to ensure financial regularity in accordance with legislative provisions, and evidence to provide reasonable assurance that the amounts and other disclosures in the financial statements are free of material misstatement. Significant accounting estimates were evaluated and the accounting policies and principles used were assessed to determine that they are consistent with the Treasurer's Instructions and applicable accounting standards.

The audit opinion expressed below has been formed on the above basis.

**Audit Opinion**

In my opinion,

- (i) the controls exercised by the Department of Conservation and Land Management provide reasonable assurance that the receipt and expenditure and investment of moneys and the acquisition and disposal of property and the incurring of liabilities have been in accordance with legislative provisions; and
- (ii) the Statements of Receipts and Payments and the notes thereto are based on proper accounts and present fairly the transactions for the year ended June 30, 1994.

**G M ROBERTSON**  
**ACTING AUDITOR GENERAL**  
October 14, 1994.

# *Appendices*

APPENDIX 1  
TREND IN THE AREA OF NATIVE FOREST HARVESTED

	Jarrah Forest	Jarrah/Wandoo Forest	Karri Forest	
	ha	ha	Clearfelled or cut to seed trees ha	Thinned ha
1976-77	32 320	1 170	2 610	-
1977-78	26 020	740	4 450	-
1978-79	25 540	530	2 710	-
1979-80	25 150	860	2 110	60
1980-81	22 930	1 440	2 080	180
1981-82	24 680	610	2 180	320
1982-83	23 740	330	990	190
1983-84	21 540	580	1 490	260
1984-85	20 010	1 440	2 360	500
1985-86	22 640	650	1 590	340
1986	19 340	1 150	1 090	490
1987	17 180	1 380	1 310	700
1988	23 400	490	1 180	840
1989	15 130	200	1 510	910
1990	12 960	100	1 560	340
1991	10 910	-	1 920	230
1992	13 990	30	1 540	310
1993	14 250	40	1 630	80



APPENDIX 2  
AREAS OF EVEN-AGED KARRI REGENERATION

Year of Regeneration Area (ha)	Multiple Use Forest		Conservation Forest		Totals	
	Annual Total (ha)	Cumulative Area (ha)	Annual Total (ha)	Cumulative Area (ha)	Annual Total (ha)	Cumulative
Before 1900	60	60	1 200	1 200	1 260	1 260
1900-09	-	60	-	1 200	-	1 260
1910-19	140	200	30	1 230	170	1 430
1920-29	170	370	50	1 280	220	1 650
1930-39	5 800	6 170	460	1 740	6 260	7 910
1940-49	710	6 880	460	2 200	1 170	9 080
1950-59	560	7 440	160	2 360	720	9 800
1960-65	230	7 670	-	2 360	230	10 030
1966	160	7 830	-	2 360	160	10 190
1967	210	8 040	80	2 440	290	10 480
1968	690	8 730	130	2 570	820	11 300
1969	1 290	10 020	310	2 880	1 600	12 900
1970	80	10 100	-	2 880	80	12 980
1971	80	10 180	10	2 890	90	13 070
1972	1 110	11 290	1 380	4 270	2 490	15 560
1973	190	11 480	-	4 270	190	15 750
1974	140	11 620	30	4 300	170	15 920
1975	630	12 250	430	4 730	1 060	16 980
1976	1 770	14 020	50	4 780	1 820	18 800
1977	1 630	15 650	220	5 000	1 850	20 650
1978	1 630	17 280	310	5 310	1 940	22 590
1979	1 920	19 200	310	5 620	2 230	24 820
1980	2 090	21 290	120	5 740	2 210	27 030
1981	2 950	24 240	300	6 040	3 250	30 280
1982	2 310	26 550	150	6 190	2 460	32 740
1983	1 930	28 480	370	6 560	2 300	35 040
1984	1 750	30 230	470	7 030	2 220	37 260
1985	2 400	32 630	-	7 030	2 400	39 660
1986	1 910	34 540	-	7 030	1 910	41 570
1987	1 110	35 650	-	7 030	1 110	42 680
1988	1 460	37 110	-	7 030	1 460	44 140
1989	1 110	38 220	-	7 030	1 110	45 250
1990	1 300	39 520	-	7 030	1 300	46 550
1991	1 270	40 790	-	7 030	1 270	47 820
1992	1 400	42 190	-	7 030	1 400	49 220
1993	1 930	44 120	-	7 030	1 930	51 150
<b>Totals</b>	<b>44 120</b>	<b>44 120</b>	<b>7 030</b>	<b>7 030</b>	<b>51 150</b>	<b>51 150</b>

APPENDIX 3  
AREA OF STATE-OWNED CONIFEROUS PLANTATIONS AS AT 31-12-93

Planting Year	Pinus Radiata			Pinaster & Other Species			All Species	
	First Rotation (ha)	Replanted Areas (ha)	Cumulative Total (ha)	First Rotation (ha)	Replanted Areas (ha)	Cumulative Total (ha)	Year Total (ha)	Cumulative Total (ha)
<1959	779	-	779	3 990	43	4 033	4 812	4 812
1959	191	-	970	343	-	4 376	534	5 346
1960	469	-	1 439	302	-	4 678	771	6 117
1961	369	-	1 808	518	-	5 196	887	7 004
1962	384	-	2 192	392	-	5 588	776	7 780
1963	574	-	2 766	299	-	5 887	873	8 653
1964	547	-	3 313	593	9	6 489	1 149	9 802
1965	497	-	3 810	562	-	7 051	1 059	10 861
1966	642	-	4 452	881	-	7 932	1 523	12 384
1967	750	-	5 202	953	-	8 885	1 703	14 087
1968	751	-	5 953	1 262	-	10 147	2 013	16 100
1969	970	-	6 923	1 568	2	11 717	2 540	18 640
1970	998	-	7 921	1 336	-	13 053	2 334	20 974
1971	1 081	-	9 002	865	-	13 918	1 946	22 920
1972	1 117	-	10 119	1 086	-	15 004	2 203	25 123
1973	1 234	32	11 385	923	-	15 927	2 189	27 312
1974	1 320	-	12 705	482	-	16 409	1 802	29 114
1975	1 247	-	13 952	1 255	-	17 664	2 502	31 616
1976	1 494	-	15 446	1 101	-	18 765	2 595	34 211
1977	1 365	-	16 811	862	-	19 627	2 227	36 438
1978	2 014	13	18 838	490	-	20 117	2 517	38 955
1979	1 414	428	20 680	562	-	20 679	2 404	41 359
1980	1 588	12	22 280	947	-	21 626	2 547	43 906
1981	1 474	122	23 876	955	6	22 587	2 557	46 463
1982	1 597	87	25 560	690	6	23 283	2 380	48 843
1983	1 344	47	26 951	706	-	23 989	2 097	50 940
1984	1 955	3	28 909	514	8	24 511	2 480	53 420
1985	1 773	162	30 844	519	2	25 032	2 456	55 876
1986	1 155	-	31 999	612	-	25 644	1 767	57 643
1987	1 556 (734)	155	33 710 (734)	785	84	26 513	2 580 (734)	60 223 (734)
1988	1 881 (1 376)	148	35 739 (2 110)	174	-	26 687	2 203 (1 376)	62 426 (2 110)
1989	1 118 (469)	461	37 318 (2 579)	47	28	26 762	1 654 (469)	64 080 (2 579)
1990	849 (689)	366	38 533 (3 268)	-	6	26 768	1 221 (689)	65 301 (3 268)
1991	1 203 (1 127)	532	40 268 (4 395)	6	18	26 792	1 759 (1 127)	67 060 (4 395)
1992	1 850 (1 844)	578	42 696 (6 239)	-	344	27 136	2 772 (1 844)	69 832 (6 239)
1993	762 (696)	950	44 408 (6 935)	-	546	27 682	2 258 (696)	72 090 (6 935)
<b>TOTAL</b>	<b>40 312 (6 935)</b>	<b>4 096</b>	<b>44 408 (6 935)</b>	<b>26 580</b>	<b>1 102</b>	<b>27 682</b>	<b>72 090 (6 935)</b>	<b>72 090 (6 935)</b>

Areas shown in brackets have been established under sharefarm agreements. They are included in the totals.

## APPENDIX 4 AREA OF STATE-OWNED/MANAGED BROADLEAVED PLANTATIONS AS AT 31-12-93

Planting Year	State-Owned & CALM-Managed		Privately Owned & CALM-Managed		Total
	<i>E. globulus</i> (ha)	Other Eucs.* (ha)	<i>E. globulus</i>		
<1987	59	-	8 612	-	8 671
1987	-	-	71	-	71
1988	1 946	(1 943)	15	-	1 961
1989	3 747	(3 730)	4	-	3 751
1990	758	(701)	24	-	782
1991	682	(678)	88	40	810
1992	1 014	(1005)	1	60	1 075
1993	139	(114)		1 630	1 769
<b>Total</b>	<b>8 345</b>	<b>(8 171)</b>	<b>8 815</b>	<b>1 730</b>	<b>18 890</b>

\*Includes 8 300 ha of Mallet (*E. astringens*) planted at Dryandra from 1930 to 1960.  
Areas shown in brackets have been established under sharefarm agreements. They are included in the totals.

## APPENDIX 5 TRENDS IN LOG PRODUCTION

Year Ended 30 June	HARDWOOD			SOFTWOOD			TOTAL		
	Crown Land (m <sup>3</sup> )	Private Property (m <sup>3</sup> )	Total (m <sup>3</sup> )	Crown Land (m <sup>3</sup> )	Private Property (m <sup>3</sup> )	Total (m <sup>3</sup> )	Crown Land (m <sup>3</sup> )	Private Property (m <sup>3</sup> )	Total (m <sup>3</sup> )
1829-1916*									18 783 700
1917-1969							46 841 700	15 844 500	62 686 200
1970	1 040 100	174 170	1 214 270	81 280	1 500	82 780	1 121 380	175 670	1 297 050
1971	1 058 910	160 400	1 219 310	86 250	1 590	87 840	1 145 160	161 990	1 307 150
1972	1 005 480	105 680	1 111 160	90 760	1 310	92 070	1 096 240	106 990	1 203 230
1973	959 940	101 980	1 061 920	100 420	1 010	101 430	1 060 360	102 990	1 163 350
1974	961 070	90 710	1 051 780	123 390	1 170	124 560	1 084 460	91 880	1 176 340
1975	967 270	87 890	1 055 160	129 090	60	129 150	1 096 360	87 950	1 184 310
1976	1 089 100	111 760	1 200 860	105 570	-	105 570	1 194 670	111 760	1 306 430
1977	1 308 630	106 520	1 415 150	120 860	330	121 190	1 429 490	106 850	1 536 340
1978	1 319 910	118 030	1 437 940	125 550	1 680	127 230	1 445 460	119 710	1 565 170
1979	1 312 570	123 540	1 436 110	176 940	6 130	183 070	1 489 510	129 670	1 619 180
1980	1 390 660	160 240	1 550 900	191 360	4 830	196 190	1 582 020	165 070	1 747 090
1981	1 391 960	158 980	1 550 940	201 550	2 990	204 540	1 593 510	161 970	1 755 480
1982	1 218 750	112 990	1 331 740	173 480	14 830	188 310	1 392 230	127 820	1 520 050
1983	1 049 180	97 290	1 146 470	176 620	5 650	182 270	1 225 800	102 940	1 328 740
1984	1 134 760	131 360	1 266 120	198 280	3 560	201 840	1 333 040	134 920	1 467 960
1985	1 290 010	169 930	1 459 940	225 950	18 040	243 990	1 515 960	187 970	1 703 930
1986	1 331 830	127 010	1 458 840	247 640	29 120	276 760	1 579 470	156 130	1 735 600
1987	1 338 700	158 860	1 497 560	266 770	24 830	291 600	1 605 470	183 690	1 789 160
1988	1 427 620	174 520	1 602 140	302 450	31 160	333 610	1 730 070	205 680	1 935 750
1989	1 432 530	135 380	1 567 910	318 530	56 750	375 280	1 751 060	192 130	1 943 190
1990	1 319 250	80 560	1 399 810	312 520	105 860	418 380	1 631 770	186 420	1 818 190
1991	1 170 230	116 580	1 286 810	301 250	85 640	386 890	1 471 480	202 220	1 673 700
1992	1 247 730	120 560	1 368 290	363 420	85 410	448 830	1 611 150	205 970	1 817 120
1993	1 258 250	116 070	1 374 320	412 540	94 660	507 200	1 670 790	210 730	1 881 520
1994	1 383 300	95 000	1 478 300	509 390	115 220	624 610	1 892 690	210 220	2 102 910

\* Estimated



APPENDIX 6  
TREND IN CHIPLOG PRODUCTION

Year Ended 30 June	CROWN LAND										Total Logs From Crown Land (m <sup>3</sup> )	Logs From Private Property (m <sup>3</sup> )	Total Logs From Crown Land & Private Property (m <sup>3</sup> )	Percentage Private Property To Total (%)		
	Residue		Logs from Thinning Regrowth Forest				Logs from Mature Jarrah & Karri Forests								Subtotal (m <sup>3</sup> )	
	Sawmill (t)	Forest (t)	Subtotal (t)	Marri (m <sup>3</sup> )	Karri (m <sup>3</sup> )	Other (m <sup>3</sup> )	Subtotal (m <sup>3</sup> )	Marri (m <sup>3</sup> )	Karri (m <sup>3</sup> )	Other (m <sup>3</sup> )	Subtotal (m <sup>3</sup> )					
1976								77 655	20 712	3	98 370	98 370				
1977	32 007		32 007					241 207	135 814		377 021	377 021				
1978	89 390		89 390					329 190	105 187		434 377	434 377				
1979	114 766		114 766					353 928	100 168		454 096	454 096				
1980	137 503		137 503	292	3 882	4 174	4 174	439 666	116 975	1 476	558 117	558 117	18 865	472 961		4.0
1981	187 501		187 501	1 794	17 565	19 359	19 359	386 664	105 604	3 448	495 716	495 716	53 197	615 488		8.6
1982	74 561		74 561	1 728	21 676	23 404	23 404	255 069	90 734		345 803	345 803	58 983	574 058		10.3
1983	77 486		77 486	3 137	23 702	26 839	26 839	284 670	100 608		385 278	385 278	16 116	385 323		4.2
1984	87 833		87 833	2 961	24 293	27 254	27 254	339 389	78 371		417 760	417 760	21 835	433 952		5.0
1985	88 297		88 297	2 263	22 176	24 439	24 439	400 828	71 613		472 441	472 441	57 598	502 612		11.5
1986	110 494		110 494	555	30 918	31 473	31 473	428 514	54 448		482 962	482 962	91 702	588 582		15.6
1987	88 111		88 111	500	55 753	56 253	56 253	444 076	52 364		496 440	496 440	64 914	579 349		11.2
1988	104 750	2 200	106 950	764	72 040	72 804	72 804	551 673	72 490		624 163	624 163	99 923	652 616		15.3
1989	102 321	5 270	107 591	4 214	77 911	82 125	82 125	459 775	71 397		531 172	531 172	112 884	809 851		13.9
1990	78 150	3 324	81 474	5 161	69 442	74 784	74 784	376 067	83 603		459 670	459 670	91 865	705 162		13.0
1991	178 659	18 382	197 041	25 379	59 869	85 248	85 248	349 820	77 465		427 285	427 285	51 021	585 475		8.7
1992	84 851	24 383	109 234	20 586	71 128	91 714	91 714	424 121	92 680		516 801	516 801	85 789	598 322		14.3
1993	74 535	14 719	89 254	35 084	72 676	107 802	107 802	420 548	111 015		531 563	531 563	96 635	705 150		13.7
1994	82 684	5 690	88 374	61 269	55 852	117 121	117 121	343 842	109 097		452 939	452 939	98 777	738 142		13.4
<b>Cum.Total</b>	<b>1 793 899</b>	<b>73 968</b>	<b>1 867 867</b>	<b>165 687</b>	<b>678 863</b>	<b>844 793</b>	<b>844 793</b>	<b>6 906 702</b>	<b>1 650 345</b>	<b>4 927</b>	<b>8 561 974</b>	<b>9 406 767</b>	<b>1 094 499</b>	<b>10 501 266</b>		<b>10.3</b>

Note: Logs from mature forest include forest residue.



APPENDIX 7  
TRENDS IN THE PRODUCTION AND USE OF SAWN TIMBER

Year Ended 30 June	Sawn Production		Total (m <sup>3</sup> )	Overseas Timber Exports (m <sup>3</sup> )	Apparent Local Use (m <sup>3</sup> )
	Hardwood (m <sup>3</sup> )	Softwood (m <sup>3</sup> )			
1970	425 295	16 893	442 188	96 275	345 914
1971	420 777	21 595	442 372	79 437	362 935
1972	379 006	21 733	400 739	101 191	299 548
1973	375 135	23 283	398 418	111 547	286 871
1974	374 899	26 534	410 433	98 200	303 233
1975	368 844	27 086	395 930	100 127	295 803
1976	383 010	16 258	399 268	94 136	305 132
1977	369 151	16 685	385 836	77 352	308 484
1978	347 111	18 669	365 780	58 833	306 947
1979	331 135	18 145	349 280	66 420	282 860
1980	331 411	21 400	352 811	71 955	280 856
1981	330 863	22 954	353 817	65 109	288 708
1982	320 915	22 190	343 105	48 448	294 657
1983	252 124	13 216	265 340	41 789	223 551
1984	258 861	14 723	273 584	N/A	N/A
1985	291 683	21 632	313 315	22 112	291 203
1986	295 160	33 816	328 976	21 497	307 479
1987	280 146	36 512	316 658	9 547	307 111
1988	270 723	47 929	318 652	9 356	309 296
1989	289 665	53 240	342 905	12 965	329 940
1990	265 587	56 962	322 549	20 035	302 514
1991	222 125	41 264	263 389	13 220	250 169
1992	216 673	42 703	259 376	19 936	239 440
1993	230 945	65 564	296 509	16 644	279 865

*Source of export statistics : Australian Bureau of Statistics*

APPENDIX 8  
TRENDS FOR W.A. OVERSEAS IMPORTS AND EXPORTS OF FOREST PRODUCE

Year Ended 30 June	Timber and Wood Manufacture		Essential Oils and Tannin	
	Imports (\$)	Exports (\$)	Imports (\$)	Exports (\$)
1970	10 968 170	9 568 246	447 015	317 553
1971	6 761 806	6 914 644	279 188	343 512
1972	5 578 819	8 809 273	371 749	348 762
1973	8 326 939	9 640 753	592 249	337 736
1974	11 738 861	11 136 170	691 723	433 627
1975	14 053 751	9 212 370	1 107 743	479 019
1976	19 960 421	10 816 236	504 846	214 918
1977	24 857 792	10 355 198	642 962	45 767
1978	24 039 952	13 434 413	913 289	41 422
1979	18 200 508	18 682 636	614 676	61 525
1980	26 801 716	12 857 407	643 045	255
1981	28 691 997	13 746 212	512 254	2 361
1982	26 068 548	11 270 550	572 629	NIL
1983	23 738 070	9 930 788	342 276	300
1984	N/A	N/A	N/A	N/A
1985	37 871 360	7 524 771	460 064	2 099
1986	37 858 904	7 875 694	403 522	318
1987	47 950 173	5 164 413	559 085	N/A
1988	52 762 401	6 386 708	N/A	N/A
1989	38 419 979	7 335 552	630 776	N/A
1990	41 600 052	9 674 191	476 152	N/A
1991	25 301 336	8 915 635	379 765	N/A
1992	29 877 000	15 417 000	681 000	N/A
1993	35 873 000	14 391 000	658 000	N/A

*Source : Australian Bureau of Statistics*

APPENDIX 9  
 AREA OF PRESCRIBED BURNS 1991-92 TO 1993-94

	1991-92	1992-93	1993-94
<b>Indigenous Vegetation - Hand Burning (ha)</b>			
State forest			
• handburns	16 220	11 960	10 990
• slash and regeneration	6 060	13 110	12 790
• clearing burns	1 310	1 160	460
National parks	5 400	22 980	8 340
Nature reserves	8 950	2 280	1 240
Other Crown land and private property	750	1 100	260
<b>Total</b>	<b>41 690</b>	<b>52 590</b>	<b>34 080</b>
<b>Indigenous Vegetation - Aerial Burning (ha)</b>			
State forest	148 750	117 720	142 340
National parks	44 200	80 440	34 570
Nature reserves	19 750	nil	32 980
Other Crown land and private property	51 620	14 440	2 180
<b>Total</b>	<b>264 320</b>	<b>212 600</b>	<b>212 070</b>
<b>Softwood Plantation - Hand Burning (ha)</b>			
State forest			
• winter burning - hazard reduction/tops disposal	3 340	5 490	4 690
<b>Total</b>	<b>3 340</b>	<b>5 490</b>	<b>4 690</b>

APPENDIX 10  
 WILDFIRES 1991-92 TO 1993-94  
 NUMBER AND AREA BY LAND CATEGORY  
 NUMBER AND PERCENT BY CAUSE

	Number			Area Burnt (ha)		
	1991-92	1992-93	1993-94	1991-92	1992-93	1993-94
State forest						
• native hardwood	171	132	197	3 320	6 110	4 470
• softwood plantation	56	88	67	250	40	140
National parks	43	32	69	47 240	27 060	37 690
Nature reserves	34	25	25	113 590	53 340	38 570
Other Crown lands	61	66	71	107 310	49 350	101 430
Private property	81	66	118	7 610	8 300	16 900
<b>Total</b>	<b>446</b>	<b>409</b>	<b>547</b>	<b>279 320</b>	<b>144 200</b>	<b>199 200</b>
<b>CAUSES</b>						
	Number			Percent		
	1991-92	1992-93	1993-94	1991-92	1992-93	1993-94
Deliberately/illegally lit	181	213	246	41	52	45
Escapes - CALM burns	22	13	27	5	3	5
Escapes - other burning	36	34	51	8	8	9
Accidental - timber industry	4	2	10	1	1	3
Accidental - other industries	14	27	23	3	7	4
Accidental - recreationists	23	30	35	5	7	6
Lightning	114	42	51	26	10	9
Unknown	37	37	75	8	9	14
Other causes	15	11	25	3	3	5
<b>Total</b>	<b>446</b>	<b>409</b>	<b>543</b>	<b>100</b>	<b>100</b>	<b>100</b>

APPENDIX 11  
PURPOSES FOR PRESCRIBED BURNING BY FOREST REGION FOR 1993-94

Dominant purpose	Region	Autumn	Winter	Spring	Summer	Years since last burnt
Fuel reduction*	Swan	320	4 050	42 989	-	6-17
	Central Forest	5 145	63	83 973	-	4-13
	Southern Forest	5 703	52	12 498	6 495	4-17
		<b>11 168</b>	<b>4 165</b>	<b>139 460</b>	<b>6 495</b>	
Silviculture	Swan	84	100	738	-	NA
	Central Forest	710	-	17 186	-	NA
	Southern Forest	8 888	-	1 228	541	NA
		<b>9 682</b>	<b>100</b>	<b>19 152</b>	<b>541</b>	
Nature Conservation**	Swan	15	-	1 255	-	5-15+
	Central Forest	192	-	-	-	10+
	Southern Forest	5 473	-	-	-	10-27
		<b>5 680</b>		<b>1 255</b>		
Tourism and Recreation	Swan	146	-	2 335	-	5-12
	Central Forest	2 295	-	1 700	-	6-23
	Southern Forest	5 485	-	9 855	2 785	5-28
		<b>7 926</b>		<b>13 890</b>	<b>2 785</b>	
<b>Total (ha)</b>		<b>34 456</b>	<b>4 265</b>	<b>173 757</b>	<b>9 821</b>	
<b>Total (%)</b>		<b>15</b>	<b>3</b>	<b>78</b>	<b>4</b>	
<b>Notes</b>						
NA Not applicable						
* Fuel reduction burning also protects nature conservation values						
** Nature conservation burning also provides community protection benefits.						
<i>Data supplied pursuant to the Minister's Statement (24.12.92) under the Environmental Protection Act (1986) that the proposed amendments to the 1987 Forest Regional Management Plan and Timber Strategy may proceed.</i>						



## APPENDIX 12

### NUMBER OF PRESCRIBED BURNS CONDUCTED IN NATIVE FORESTS WITHIN FOREST REGIONS IN EACH SEASON FOR VARIOUS PURPOSES - 1993-94

Dominant purpose	Region	Spring		Summer		Autumn		No of escapes
		Aero	Hand	Aero	Hand	Aero	Hand	
Fuel reduction	Swan	17	5	-	-	1	1	4
	Central	24	19	-	-	4	2	1
	Southern	6	7	4	3	2	5	8
		<b>47</b>	<b>31</b>	<b>4</b>	<b>3</b>	<b>7</b>	<b>8</b>	<b>13</b>
Silviculture	Swan	-	5	-	-	-	2	-
	Central	6	7	-	-	-	4	-
	Southern	1	6	-	7	2	18	-
		<b>7</b>	<b>18</b>		<b>7</b>	<b>2</b>	<b>24</b>	
Nautre Conservation	Swan	2	3	-	-	-	1	-
	Central	-	-	-	-	-	1	-
	Southern	-	-	-	-	-	1	-
		<b>2</b>	<b>3</b>				<b>3</b>	
Tourism and Recreation	Swan	2	3	-	-	-	3	-
	Central		5	-	-	1	3	2
	Southern	6		3		2	5	2
		<b>8</b>	<b>8</b>	<b>3</b>		<b>3</b>	<b>11</b>	<b>4</b>
<b>Overall total</b>		<b>54</b>	<b>60</b>	<b>7</b>	<b>10</b>	<b>12</b>	<b>46</b>	<b>17</b>
<b>Aero Burns (% by season)</b>		<b>73</b>		<b>11</b>		<b>16</b>		<b>(9.0%)</b>
<b>Hand Burns (% by season)</b>			<b>52</b>		<b>8</b>		<b>40</b>	

*Data supplied pursuant to the Minister's Statement (24.12.92) under the Environmental Protection Act (1986) that the proposed amendments to the 1987 Forest Regional Management Plan and Timber Strategy may proceed.*

## APPENDIX 13

### AREA AND NUMBER OF WILDFIRES WITHIN THE THREE FOREST REGIONS - 1993-94

Region		State forest native hardwood	State forest softwood plantation	National parks	Nature reserves	Crown lands and private property	Total
Swan	Area (ha)	1 485	99	1 266	400	2 983	6 233
	Number	97	51	20	10	63	241
Central	Area (ha)	441	38	943	46	1 592	3 060
	Number	75	16	18	3	42	154
Southern	Area (ha)	2 509	-	25 003	-	541	28 053
	Number	24	-	9	-	14	47
<b>Totals</b>	<b>Area (ha)</b>	<b>4 435</b>	<b>137</b>	<b>27 212</b>	<b>446</b>	<b>5 116</b>	<b>37 346</b>
	<b>Number</b>	<b>196</b>	<b>67</b>	<b>47</b>	<b>13</b>	<b>119</b>	<b>442</b>



## APPENDIX 14 WILDLIFE LICENCES ISSUED IN 1993-94

Fauna Licences		Licences Issued	Fauna Licences (Cont.)		Licences Issued
SCIENTIFIC			CROCODILES		
Scientific Collection (Reg 17)		212	Crocodile Farming (Reg 14)		3
Bird/Bat Banding (Reg 23)		121	Processing (Reg 7)		3
			Dealing (Reg 8)		2
EDUCATION & PUBLIC (to take) (Reg 15)		160	KANGAROO		
			Take Kangaroos for sale (Reg 6)		195
EDUCATION & PUBLIC (to hold) (Reg 16)		70	Deal in carcasses (Reg 8)		46
			Skin Dealing (Reg 10)		41
			Processing (Reg 7)		26
AVIAN FAUNA			EXPORTS INTERSTATE		
Keep & breed in captivity (Reg 12)		3 632	Skins of fauna (or other dead fauna)		338
Deal (Reg 13)		59	Fauna (live) other than emus		240
Breed for Commercial Purposes (Reg 14)		3	Fauna (live-emus)		281
Trap (Reg 11)		4			859
<b>Species Trapped Commercially</b>		<b>Number</b>	EXPORT OVERSEAS		
Twenty-eight Parrot		1 941	Skins of fauna (or other dead fauna) from WA		294
Western King Parrot		348	Emu eggs or products (personal items) from WA		70
Western Rosella		605	Fauna (avian) from WA (live)		25
					389
FAUNA			IMPORTS INTERSTATE		
Keep in Captivity (Reg 12A)		128	Skins of fauna (or other dead fauna) into WA		10
			Australian fauna (live)		425
EMUS			Live exotic birds and other animals		171
Emu Farming (Reg 14)		56			606
Dealing (Reg 8)		2	<b>Flora Licences</b>		
Dealing (Emu eggshells Reg 13)		20	COMMERCIAL PURPOSES		588
Skin Dealing (Reg 10)		6	COMMERCIAL PRODUCERS		346
Processing (Reg 7)		12	SCIENTIFIC / PRESCRIBED PURPOSES		939
			PERMITS TO TAKE DECL. RARE FLORA		60
					1 933

## APPENDIX 15 SUMMARY OF DAMAGE LICENCES ISSUED IN 1993-94

No of Licences Issued		Total No. of Each Species Authorised to be Taken	No of Licences Issued		Total No. of Each Species Authorised to be Taken
WATERFOWL			Port Lincoln Parrot		5 597
Wood Duck	35	761	Raptor (unknown)	1	scare only
Black Duck	3	45	Silver Gull	3	500
Pied Cormorant	3	22			+ scare only
Mountain Duck	2	50	Silvereyes	2	400
Magpie Geese	2	40	Wedge-tailed Eagle	1	scare only
Coots	1	5	Welcome Swallow	1	0
Grey Teal	1	50	Western King Parrot	3	60
			Western Rosella	1	10
AVIAN FAUNA OTHER THAN WATERFOWL & EMUS			White-tailed Black Cockatoo	3	25
Australian Raven	12	140	EMUS	43	2 172
Banded Lapwing	1	scare only			
Brolga	2	20	SEALS		
Corella LB	2	200	Australian Sealion	3	Scare Only
Galah	14	536			
Little Corella	25	500			

APPENDIX 16  
OFFENCES UNDER THE WILDLIFE CONSERVATION ACT AND REGULATIONS

Charges	Recomm'd Charges	Convictions	Fine \$	Cost \$	Dismissed	Letter of Warning	No Further Action	Pending
<b>WILDLIFE CONSERVATION ACT</b>								
Use of illegal devices in taking fauna	2	-	-	-	-	-	-	2
Illegal taking or possession of protected fauna	63	30	8 650.00	430.00	1	17	2	13
Illegal importation, selling or taking for sale of fauna	20	1	200.00	43.50	-	7	5	7
Offences relating to the taking or possession of rare or threatened fauna	-	-	-	-	-	-	-	-
Illegal taking of protected flora	37	6	1 700.00	452.66	-	12	1	18
Offences relating to the sale of protected flora	13	2	400.00	128.66	-	1	-	10
Taking declared rare flora without the Minister's consent	11	-	-	-	-	2	1	8
Offences against wildlife officers	12	-	-	-	-	1	-	11
Failing to comply with licence conditions	26	3	1 200.00	471.66	-	11	1	11
<b>WILDLIFE CONSERVATION REGULATIONS</b>								
Offences relating to the possession, control and disposal of avian fauna	5	-	-	-	-	2	1	2
Offences relating to activities on Nature Reserves	20	-	-	-	-	11	-	9
<b>TOTALS</b>	<b>209</b>	<b>42</b>	<b>14 650.00</b>	<b>2 026.48</b>	<b>1</b>	<b>64</b>	<b>11</b>	<b>91</b>

## APPENDIX 17 PUBLICATIONS PRODUCED IN 1993-94

### GENERAL

Annual Report of the Department of Conservation and Land Management 1992-93  
Arbor Day Poster  
Avon Descent Public Information (leaflet)  
C. E. Lane Poole Memorial Trust (leaflet)  
C. E. Lane Poole Award 1987 - Report to the Trustees  
*CALM Book News* (leaflet, 4 issues)  
CALM Briefing Paper 1/94 - Conservation of Threatened Species and Threatened Ecological Communities  
CALM News (newspaper, 9 issues)  
CALM Internal Telephone Directory  
*CALMScience* Vol 1 No 1 (journal)  
CALM Uniform (catalogue)  
Carlotta Brook (map)  
Charnwood (map)  
Dryandra Woodland Draft Management Plan  
Enterprise Bargaining Bulletin No 4 November 1993  
*Growing Local Plants for Education* (booklet)  
Lake Jasper (map)  
*LANDSCOPE* Advertising Insert  
*LANDSCOPE* Calendar and Envelopes  
*LANDSCOPE* Magazine (4 issues)  
*Lookouts of the Karri Forest* (book)  
Lesueur National Park and Coomallo Nature Reserve Draft Management Plan  
Management Plan No 26 - John Forrest National Park - Analysis of Public Submissions  
Management Plan No 26 - John Forest National Park 1994-2004  
Matilda Bay Reserve - Have your Say (booklet)  
Quality Improvement Newsletter  
Seaweek Program  
Shoalwater Marine Park Poster  
To a Friend of the Trees (Certificate)  
Training and Development Manual 1994  
*What's in a Name* - Definitions of names used by CALM (booklet)  
*Will Comprehensive Regional Assessment Work?* (booklet)  
Yalgorup National Park Draft Management Plan  
Yanchep National Park Summer Activities Guide (leaflet)

### WILDLIFE MANAGEMENT

Crocodiles (leaflet)  
Dryandra Woodland Ecology Course Oct 93 (leaflet)  
Landnote No 1 1994: *Revegetation and Recolonization by Vertebrates of Fitzgerald River National Park Western Australia following the 1985 Wildfire*  
*Nuytsia* Volume 9 No 2 (journal)  
Operation Foxglove (booklet)  
Operation Foxglove (map)

### RECREATION MANAGEMENT

Badgingarra National Park Nature Trail (leaflet)  
Bell Gorge - Ibis Aerial Highway (leaflet)  
Carnac Island Visitor Guide (leaflet)  
Discovering the Hills Forest (leaflet)  
Discover the Wild Kimberley (leaflet)  
Dwellingup and Lane Poole Reserve (leaflet)  
Fitzgerald River National Park (leaflet)  
*Family Walks in Perth Outdoors* (book)  
Go Bush in the Hills Forest (leaflet)  
John Forrest National Park (leaflet)  
Kalbarri National Park (leaflet)  
Kalbarri National Park Geology (leaflet)  
Kalbarri National Park Mammals (leaflet)

Kalbarri National Park Amphibians and Reptiles (leaflet)  
Karrijini National Park (leaflet)  
Kennedy Ranges National Park (leaflet)  
Marrinup Forest Tour (booklet)  
Millstream-Chichester National Park (leaflet)  
Mt Augustus National Park (leaflet)  
Mt Hart Homestead (leaflet)  
Nambung National Park (leaflet)  
Shark Bay Marine Park (leaflet)  
*Shark Bay World Heritage Area* (newspaper)  
Windjana Gorge National Park - Ibis Aerial Highway (leaflet)  
Yanchep National Park - Summer Activities Guide (leaflet)  
Yanchep National Park: Autumn Activities Guide (leaflet)

### FOREST RESOURCES MANAGEMENT

A Plan for the Protection of South Coast Vegetation from Dieback  
CALM Briefing Paper 2/91 - Domestic Firewood, Craftwood and other Minor Forest Products in the South West  
Coniferous and Broadleaved Plantations of the South West (map)  
Fire Review Panel Report  
*Forests for the Future* (*LANDSCOPE* article leaflet)  
Forest Management Plan  
*Management Strategies For the South West Forests of WA*  
*Proposals to Amend the 1987 Forest Management Plans and Timber Strategy*  
Sandalwood (*LANDSCOPE* article leaflet)  
Seasoned with Fire (*LANDSCOPE* article leaflet)  
Seed Price List 1993-94  
Summer Firewood (leaflet)  
*Treekiller* (*LANDSCOPE* article leaflet)  
The Potential for the Integration of Tree Crops into Australian Agricultural Systems (speech)  
Winter Firewood (leaflet)

### SCIENTIFIC PUBLICATIONS AND REPORTS

Abbott, I. (1994). Distribution of the native earthworm fauna of Australia: a continent-wide perspective. *Australian Journal of Soil Research* 32: 117-126.  
Abbott, I. (1994). Review of the ecology and control of the introduced bark beetle *Ips grandicollis* (Eichhoff) (Coleoptera: Scolytidae) in Western Australia 1952-1990. *CALMScience* 1(1): 35-46.  
Abbott, I., Van Heurck, P. and Burbidge, T. (1993). Ecology of the pest insect jarrah leafminer (Lepidoptera) in relation to fire and timber harvesting in jarrah forest in Western Australia. *Australian Forestry* 56: 264-275.  
Applegate, G.B. and McKinnell F.H. (1993). The management and conservation status of *Santalum* species occurring in Australia. In: *Sandalwood in the Pacific Region*, ACIAR Proceedings No 49: 5-12. F.H. McKinnell (ed).  
Armstrong, J.A. (1993). *Phytophthora* and ecosystem decline: the case of the south-west of Western Australia. In: *Review of Phytophthora diseases in Australia*. Rural Industries Research and Development Corporation, 45-46.  
Armstrong, J.A. (1993). Remain CALM - it's only peer review at work. *Search* 24(4): 96-98.  
Armstrong, J.A. (ed.) (1993). 'CITES Plants Committee Report of Meeting, Chiang Mai, Thailand 26-28 October 1992'. Convention on International trade in Endangered Species of Wild Fauna and Flora. Lausanne, Switzerland, 47 pp.  
Armstrong, J.A. (1993). Claims have no scientific backing. *Warren Blackwood Times*, 5 May 1993, p.8.  
Armstrong, J.A. (1993). A breakdown of scientific communication. *Search* 24(10): 300.  
Armstrong, J.A. (ed.) (1994). 'CITES Plants Committee Report of Meeting, Brussels, Belgium 6-8 September 1993'. Convention on



- International Trade in Endangered Species of Wild Fauna and Flora. Lausanne, Switzerland, 60 pp.
- Armstrong, J.A. and Hooper, K. (1994). Nature's Medicine. *LANDSCOPE* 9(4): 10-15.
- Barbour, L. and Bartle, J. (1993). Oil in the leaves. *LANDSCOPE* 8(4): 49-53.
- Barker, W.R. and Rye, B.L. (1993). *Spyridium tricolor* (Rhamnaceae), a disjunct new species from the Great Australian Bight. *Journal of the Adelaide Botanical Garden* 15: 153-157.
- Bathgate, J., Shearer, B.L., Röhl, L. and Crane, C. (1993). Progress on control and management of canker on *Banksia coccinea*. *Floriculture Industry Newsletter* 28: 8.
- Bathgate, J., Shearer, B.L. and Röhl, L. (1994). *Cryptodiaporthe* sp: a new canker pathogen threatening *Banksia coccinea*. In: *Handbook of the Symposium on Plant Diseases in Ecosystems: threats and impacts in south-western Australia* (eds R T Wills and W A Cowling) p 19. Royal Society of Western Australia and the Ecological Society of Australia, Perth Western Australia.
- Bellgard, S.E., Shearer, B.L., Crane, C.E. and Smith, B.J. (1994). Morphological variability exhibited by *Phytophthora megasperma* retrieved from diseased areas of Western Australian bushland. In: *Handbook of the Symposium on Plant Diseases in Ecosystems: threats and impacts in south-western Australia* (eds R T Wills and W A Cowling) p 20. Royal Society of Western Australia and the Ecological Society of Australia, Perth Western Australia.
- Bunny, F.J., Hardy, G.E. St J., Shearer, B.L. and Colquhoun, I.J. (1994). Distribution of *Phytophthora citricola* on soil surface and at depth in the northern jarrah forest. In: *Handbook of the Symposium on Plant Diseases in Ecosystems: threats and impacts in south-western Australia* (eds R T Wills and W A Cowling) p 21. Royal Society of Western Australia and the Ecological Society of Australia, Perth Western Australia.
- Beard, J.S. and Kenneally, K.F. (1993). Dry coastal ecosystems of northern Australia. In: *Dry Coastal Ecosystems: Africa, America, Asia and Oceania*. Amsterdam: Elsevier, 239-258.
- Bradshaw, S.D., Morris, K.D., Dickman, C.R., Withers, P.C. and Murphy, D. (1994). Field metabolism and turnover in the golden bandicoot (*Isodon auratus*) and other small mammals from Barrow Island, Western Australia. *Australian Journal of Zoology* 42: 29-41.
- Brennan, G.K. and Pitcher, J.A. (1993). Equilibrium moisture contents of timbers commonly used in Western Australia. In: *Forest Products Research Conference* 3/2, 1-9.
- Brown, A.P. (1993). Western Australian native orchids: the masters of deceit. In: *The gazette of the Orchid Species* (N.S.W.) 1-7.
- Burbidge, A.A., Haberley, B., Halse, S., Lane, J. and Pearson, G. (1993). How many geese are enough? *LANDSCOPE* 9(1): 28-33.
- Burbidge, A.A. and Brown, A. (1993). Threatened with extinction. *LANDSCOPE* 9(1): 17-22.
- Burbidge, A.A. and Wyre, G. (1993). The conservation of reptiles in Western Australia. *Australian Zoologist* 29: 191-195.
- Burbidge, A.H. (1993). White-breasted robin at Neerabup. *Western Australian Bird Notes* 68: 1.
- Burbidge, A.H. (1994). Birds in the garden. *LANDSCOPE* 9(2): 10-16.
- Burbidge, A.H. (1994). Biological survey of the Carnarvon Basin. Department of Agriculture Carnarvon Office Pastoral Memo 18(2) 2-3.
- Chapman, A., Lander, N. and Macfarlane, T. (1993). (Editors and various articles) DELTA Newsletter 9.
- Chapman, A., Lander, N. and Macfarlane, T. (1994). (Editors and various articles) DELTA Newsletter 10.
- Chapman, A., Lander, N. and Macfarlane, T. (1994). Workshop on taxonomic descriptive databases, Perth, October 1993. *Australian Systematic Botany Society Newsletter* 78: 14-16.
- Christensen, P. and Liddelow, G. (1993). From buckshot to breakaways: wildlife habitats of the deserts. *LANDSCOPE* 9(1): 23-27.
- Coates, D.J., Carstairs, S.A. and Prince, R.I.T. (1994). Preliminary analysis of population genetics of Western Australian nesting green turtles using allozyme data. In: *Proceedings of the Australian Marine Turtle Conservation Workshop* (1990), 163-166.
- Court, A.B., Cowan, R.S. and Maslin, B.R. (1994). Mueller's "The plants indigenous to the colony of Victoria" - Is volume 2 effectively published? *Nuytsia* 9: 315-318.
- Crombie D.S. (1994). Disease and forest production in WA. In: *Handbook of the Symposium on Plant Diseases in Ecosystems: threats and impacts in south-western Australia* (eds R T Wills and W A Cowling) p 11. Royal Society of Western Australia and the Ecological Society of Australia, Perth Western Australia.
- Curry, S. (1993). Delightful daisies. *LANDSCOPE* 9(1): 41-45.
- Curry, S. (1993). William Dampier: voyages to New Holland. *LANDSCOPE* 8(4): 28-34.
- Curry, S. (1994). Wongan Hills: an island sanctuary. *LANDSCOPE* 9(2): 20-26.
- Curry, S. and Kelly, A. (1993). The swamp starflower, *Calytrix breviseta* subsp. *breviseta*. *LANDSCOPE* 8(4): 27.
- da Cunha, E.V.L., Armstrong, J.A., Gray, A.J., Hockless, D.C.R., Waterman, P.G. and White, A.H. (1993). 3-Monoterpenyl 2, 4-dioxygenated quinoline alkaloids from the aerial parts of *Eriostemon australasius* subsp. *banksii* (Rutaceae). *Australian Journal of Chemistry* 46, 1-8.
- Davis, J.A., Harrington, S.A. and Friend, J.A. (1993). Invertebrate communities of relict streams in the arid zone: the George Gill Range, central Australia. *Australian Journal of Marine and Freshwater Research* 44: 483-505.
- Davison E.M. (1994). Role of environment in dieback of jarrah. (Effects of waterlogging on jarrah, *P. cinnamomi* and infection of jarrah by *P. cinnamomi*). In: *Handbook of the Symposium on Plant Diseases in Ecosystems: threats and impacts in south-western Australia* (eds R T Wills and W A Cowling) p 6. Royal Society of Western Australia and the Ecological Society of Australia, Perth Western Australia.
- Davison E.M. and Tay F.C.S (1994). Incipient rot and rot in regrowth karri. In: *Handbook of the Symposium on Plant Diseases in Ecosystems: threats and impacts in south-western Australia* (eds R T Wills and W A Cowling) p 22. Royal Society of Western Australia and the Ecological Society of Australia, Perth Western Australia.
- Friend, G.R. (1993). Impact of fire on small vertebrates in mallee woodlands and heathlands of temperate Australia: a review. *Biological Conservation* 65: 99-114.
- Friend, G.R. and Williams, M. (1993). Fire and invertebrate conservation in Mallee-Heath remnants. Final report to WWF Australia on Project P144.
- Friend, J.A. and Friend, G.R. (1993). Conservation of the Red-tailed Phascogale (*Phascogale calura*). Final report to ANCA on ESP Project 22.
- Friend, J.A. and Whitford, D. (1993). Maintenance and breeding of the numbat (*Myrmecobius fasciatus*) in captivity. In: *The Biology and Management of Australasian Carnivorous Marsupials*, 103-124.
- Glossop, B.R. (1994). Estimated fuel savings for a passive solar timber drying kiln in Australia. *CALMScience* 1(1): 19-34.
- Halse, S.A. and Jensen, A. (1993). Riparian zone management in W.A. and S.A.: policy and practice. In: *Ecology and Management of Riparian Zones in Australia*, 143-156.
- Halse, S.A. and Munro, D.R. (1993). Survival and hunting mortality of Pacific black ducks and grey teal. *Journal of Wildlife Management* 57: 42-48.
- Hardy, G.E. St J., O'Brien, P.A. and Shearer, B.L. (1994). Control options of plant pathogens in native plant communities in south-western Australia. In: *Handbook of the Symposium on Plant Diseases in Ecosystems: threats and impacts in south-western Australia* (eds R T Wills and W A Cowling) p 15. Royal Society of Western Australia and the Ecological Society of Australia, Perth Western Australia.
- Harper, R.J. (1993). Soils and geomorphology of the Cairlocup area, Western Australia, and relationships with contemporary wind erosion. *ACLEP Newsletter* 2: 12-14.
- Harper, R.J. and Gilkes, R.J. (1994). Hardsetting in the surface horizons of sandy soils and its implications for soil classification and management. *Australian Journal of Soil Research* 32: 603-619.
- Harper, R.J. and McGrath, J.F. (1993). Perspectives for land evaluation for forestry in Western Australia. In 'Australian Forestry Council, Research Working Group 3 (Soils and Nutrition).' Proceedings Workshop Gympie, Queensland.
- Hasan, C.M., Armstrong, J.A., Gray, A.J., Hockless, D.C.R., Waterman, P.G. and White, A.H. (1993). 3-Monoterpenyl 2,4-dioxygenated quinoline alkaloids from the aerial parts of *Eriostemon australasius* subsp. *banksii* (Rutaceae). *Australian Journal of Chemistry* 46, 1-8.



- Hasan, C.M., Armstrong, J.A. and Waterman, P.G. (1994). Dihydrochalcones from the aerial parts of *Boronia inconspicua*. *Phytochemistry*, 36:3, 799-801.
- Hingston, R.A. (1994). Growth of *Populus deltoides* and some related clones in the south-west of Western Australia. *CALMScience* 1(1): 47-54.
- Hopkins, E.R. and Butcher, T.B. (1994). Provenance comparisons of *Pinus pinaster* Ait. in Western Australia. *CALMScience* 1(1): 55-105.
- Keighery, G.J. (1993). 'Whicher Flannel Flower' - An undescribed species of *Actinotus*. *Western Australian Wildflower Society Newsletter* 31: 1-2.
- Keighery, G.J. (1993). *Isotropis cuneifolia* ssp. "glabra" (Ironstone Lamb Poison). *Western Australian Wildflower Society Newsletter* 31(2): 2-3.
- Keighery G.J. (1993). *Borya laciniata*. *Western Australian Wildflower Society Newsletter* 31(3): 2.
- Keighery, G.J. (1993). Distribution, impact and biology of the other "watsonias", Chasmanthe (African Corn Flag) and *Crocsmia* (Montbretia) in Western Australia. *Plant Protection Quarterly* 8: 78-80.
- Keighery, G.J. (1993). Re-discovery of *Tetraria australiensis* C.B. Clarke (Cyperaceae). *Western Australian Naturalist* 19: 268.
- Keighery, G.J. (1993). Weeds of Western Australia's west coast offshore islands. In: Proceedings I: 10th Australian Weeds Conference and 14th Asian Pacific Weed Science Society Conference, 167-171.
- Keighery, G.J. (1993). Flora list Stirling Range National Park appendix to Stirling Range Book, CALM 52.
- Keighery, G.J. (1994). Tales from the dark side: plants that break the rules. *LANDSCOPE* 9(3): 17-21.
- Keighery, G.J. and Gibson, N. (1993). Biogeography and composition of the flora of the Cape Range peninsula, Western Australia. *Records of the Western Australian Museum*. Supplement 45: 51-85.
- Keighery, G.J., Gibson, N. and Coates, D.J. (1994). Future ecosystems - ecological balance. In: *Handbook of the Symposium on Plant Diseases in Ecosystems: threats and impacts in south-western Australia* (eds R T Wills and W A Cowling) p 17. Royal Society of Western Australia and the Ecological Society of Australia, Perth Western Australia.
- Keighery, G.J. and Keighery, B.J. (1993). Floristics of reserves and bushland areas of the Perth region (system 6) Parts 5-9. *Western Australian Wildflower Society* 85.
- Keighery, G.J., Newbey, K.R. and Hall, N.J. (1993). Vegetation and Flora in the biological survey of the Eastern Goldfields of Western Australia. Part 9: Norseman-Balladonia study area. *Records of the Western Australian Museum, Supplement* 42, 20-32 and 56-138.
- Kenneally, K F., Edinger, D.C. and McKenzie, N. (1993). Rainforests and bats: a *LANDSCOPE* expedition to the Mitchell Plateau. *LANDSCOPE* 9(1): 35-40.
- Khangura, R., Hardy, G.E. St J., and Wills, R.T. (1994). Fungi associated with cankers in Western Australian plant communities. In: *Handbook of the Symposium on Plant Diseases in Ecosystems: threats and impacts in south-western Australia* (eds R T Wills and W A Cowling) p 26. Royal Society of Western Australia and the Ecological Society of Australia, Perth Western Australia.
- Kinal, J., Shearer, B.L. and Fairman, R.G. (1993). Dispersal of *Phytophthora cinnamomi* through lateritic soil by laterally flowing subsurface water. *Plant disease* 77(11): 1085-1090.
- Kinnear, J. (1993). Predators and urban wildlife. In: *Urban Bush Management: proceedings*, 90-91.
- Komorek, B., Shearer, B.L., Smith, B. and Fairman, R. (1994). Phosphonate offers a practical method for the control of *Phytophthora cinnamomi* in native plant communities. In: *Handbook of the Symposium on Plant Diseases in Ecosystems: threats and impacts in south-western Australia* (eds R T Wills and W A Cowling) p 28. Royal Society of Western Australia and the Ecological Society of Australia, Perth Western Australia.
- Little, S.J. and Friend, G.R. (1993). Structure of invertebrate communities in relation to fire history of kwongan vegetation at Tutanning Nature Reserve. *CALMScience* 1(1): 3-18.
- Macfarlane, T.D. (1993). *Wurmbea calcicola* (Colchicaceae), a new species from Cape Naturaliste, south western Australia. *Nuytsia* 9: 233-236.
- Macfarlane, T.D., Chapman, A.R., and Lander, N.S. (1993). (Editors and various articles). DELTA Newsletter 8.
- Macfarlane, T.D. (1994). *Chamaexeros longicaulis* (Dasypogonaceae), a new species from Walpole, south western Australia, with additional notes on the genus. *Nuytsia* 9: 375-382.
- Marchant, N. (1993). False flowers. *LANDSCOPE* 8(4): 39-43.
- Maslin, B.R. (1994). Book review: Acacias of southeast Australia. *Muelleria* 8(2): 257.
- Maslin, B.R. and Cowan, R.S. (1993). A comment on the proposed division of Acacia. *ASGAP Acacia Study Group Newsletter* 69, 2.
- Maslin, B.R. and Cowan, R.S. (1994). C.R.P. Andrews' species of *Acacia* (Leguminosae: Mimosoideae): typification of the names. *Nuytsia* 9: 383-385.
- Maslin, B.R. and Cowan, R.S. (1994). William Vincent Fitzgerald's species of *Acacia* (Leguminosae: Mimosoideae): typification of the names. *Nuytsia* 9: 387-398.
- Maslin, B.R. and Cowan, R.S. (1994). C.F. Meissner's species of *Acacia* (Leguminosae: Mimosoideae): typification of the names. *Nuytsia* 9: 399-414.
- Maslin, B.R. and Weston, A.S. (1993). *Acacia setulifera*: a new Kimberley record of a rarely collected northern Australia Wattle. *Western Australian Naturalist* 19: 243-246.
- Mazanec, R.A. and Mason, M.L. (1993). Genetic variation in *Eucalyptus diversicolor* F. Muell. in Western Australia and potential gains from selection. *Forest Ecology and Management* 62: 285-301.
- McCaw, W.L. (1993). Effects of fuel-reduction burning on a *Eucalyptus obliqua* forest ecosystem in Victoria. *Australian Journal of Botany* 41: 413-414.
- McCaw, W.L. (1993). Wildfires: living with the threat. *LANDSCOPE* 9(1): 49-52.
- McComb, J.A., Stukely, M. and Bennett, I. (1994). Future ecosystems - use of genetic resistance. In: *Handbook of the Symposium on Plant Diseases in Ecosystems: threats and impacts in south-western Australia*. (eds R T Wills and W A Cowling) p 16. Royal Society of Western Australia and the Ecological Society of Australia, Perth Western Australia.
- McKinnell, F.H. (ed) (1993). *Sandalwood in the Pacific Region*: ACIAR Proceedings No 49.
- McKinnell, F.H. (1993). Australia's New National Forest Policy. *Unasylva* 175: 42-45.
- Murray, D.I.L., Wills, R.T. and Hardy, G.E.StJ. (1994). Cankers of native plant species from the south-west of Western Australia. In: *Handbook of the Symposium on Plant Diseases in Ecosystems: threats and impacts in south-western Australia* (eds R T Wills and W A Cowling) p 32. Royal Society of Western Australia and the Ecological Society of Australia, Perth Western Australia.
- Norman, J., Moritz, C., Limpus, C. and Prince, R. (1994). Population genetics as a tool for managing marine Turtle populations. *Proceedings of the Australian Marine Turtle Conservation Workshop* (1990), 101-117.
- Patrick, S.J. (1993). Distribution of declared rare flora *Grevillea saccata* populations between Wongonderra Road and Cooljarloo Road, west of the Brand Highway. Report to Tiwest Joint Venture and Department of Conservation Land Management.
- Patrick, S.J. and Stace, H.M. (1993). Field survey for new populations of *Anthocercis gracilis* May 1992 to November 1992. Report to Western Australian Water Authority and Department of Conservation and Land Management.
- Pearson, D. (1993). Distribution, status and conservation of pythons in Western Australia. In: *Herpetology in Australia*, 383-395.
- Pearson, D. and Jones, B. (1994). The Lancelin Island skink. *LANDSCOPE* 9(3): 39.
- Pearson, D. and Rolfe, J. (1994). Reptiles in the garden. *LANDSCOPE* 9(3): 28-34.
- Perry, G. and Brummitt, R.K. (1993). Observations on the provisions for conserving and rejecting names. *Kew Bulletin* 1993: 413-421.
- Piggott, J.P. (1993). Management of native woody vegetation on farms in Western Australia. In Scott, P.R. (ed.) *The Role of Trees in Sustainable Agriculture: A National Conference* - Reprints of the Western Australian papers, 27-47 Native Vegetation. Resource Management Technical Report 138, Department of Agriculture, Western Australia.

- Pigott, J.P. and Gray, C.M. (1993) (eds). *Watsonia Workshop*, Proceedings of workshop held at the Department of Conservation and Land Management, Perth August 4, 1993. *Plant Protection Quarterly* 8: 76-105.
- Pigott, J.P. and Gray, C.M. (1993). Management and distribution of *Watsonia* spp. in Western Australia - results from a survey to land management authorities. *Watsonia Workshop*, Proceedings of workshop held at the Department of Conservation and Land Management, Perth August 4, 1993. *Plant Protection Quarterly* 8: 93-95.
- Pigott, J.P. and Gray, C.M. (1993). Outcomes of the *Watsonia* Workshop. *Watsonia Workshop*, Proceedings of workshop held at the Department of Conservation and Land Management, Perth August 4, 1993. *Plant Protection Quarterly* 8: 104-105.
- Pigott, J.P. and Gray, C.M. (1993). *Watsonia* workshop: proceedings of a workshop held at the Department of Conservation and Land Management (CALM) on August 4 1993. *Plant Protection Quarterly* 8: 76-105.
- Prince, R.I.T. (1993). Western Australian marine turtle conservation project: an outline of scope and an invitation to participate. *Marine Turtle Newsletter* 60, 8-14.
- Prince, R.I.T. (1993). The flatback turtle (*Natator depressus*) in Western Australia: New information from the Western Australian Marine Turtle project. *Proceedings of the Australian Marine Turtle Conservation Workshop* (1990), 146-149.
- Prince, R.I.T. (1994). Update: Sea turtles in Western Australia. *Marine Turtle Newsletter* 64, 18-19.
- Prince, R.I.T. (1994). Status of the Western Australian marine turtle populations: The Western Australian Marine Turtle Project 1986-1990. *Proceedings of the Australian Marine Turtle Conservation Workshop* (1990), 1-14.
- Robinson, C. and Wills, R.T. (1994). Threats of plant disease to the wildflower industry, tourism and beekeeping. In: *Handbook of the Symposium on Plant Diseases in Ecosystems: threats and impacts in south-western Australia* (eds R T Wills and W A Cowling) p 13. Royal Society of Western Australia and the Ecological Society of Australia, Perth Western Australia.
- Ruprecht, J.K. and Stoneman, G.L. (1993). Water yield issues in the jarrah forest of south-western Australia. *Journal of Hydrology* 150: 369-391.
- Rye, B.L. (1994). A contribution to the taxonomy of the Tiliaceae of Western Australia. *Nuytsia* 9: 415-420.
- Sampson, J.F., Collings, B. and Coates, D.J. (1994). Mixed mating in *Banksia brownii* Baxter ex R. Br. (Proteaceae). *Australian Journal of Botany* 42: 103-111.
- Sarker, S.D., Gray, I.A., Waterman, P.G. and Armstrong, J.A. (1994). Coumarins from two *Asterolasia* species. *Journal of Natural Products* 57-2, 324-327.
- Scott, J.K. and Pigott, J.P. (1993). Distribution of bridal creeper (*Myrsiphyllum asparagoides*) in Western Australia. In: Proceedings II. 10th Australian Weeds Conference and 14th Asian Pacific Weed Science Society Conference, 1993, Brisbane, 86-89.
- Scott, J.K. and Pigott, J.P. (1993). Distribution of bridal creeper *Myrsiphyllum asparagoides* in Western Australia. In: *Weed Morphology and Distribution*, 86-89. Proceedings of the 10th Australian Weeds Conference. Brisbane, September 1993.
- Shearer B.L. (1994). The major plant pathogens occurring in ecosystems of south-western Australia. In: *Handbook of the Symposium on Plant Diseases in Ecosystems: threats and impacts in south-western Australia* (eds R T Wills and W A Cowling) p 5. Royal Society of Western Australia and the Ecological Society of Australia, Perth Western Australia.
- Shearer, B.L., Fairman, R. G., Crane, C. and Grant, M. (1994). Impact of *Armillaria luteobubalina* infestation in coastal dune communities of south-western Australia. In: *Handbook of the Symposium on Plant Diseases in Ecosystems: threats and impacts in south-western Australia* (eds R T Wills and W A Cowling) p 35. Royal Society of Western Australia and the Ecological Society of Australia, Perth Western Australia.
- Shearer, B.L. and Dillon, M. (1994). Impact of *Phytophthora cinnamomi* infestation in *Banksia* woodlands on the swan coastal plain south of Perth. In: *Handbook of the Symposium on Plant Diseases in Ecosystems: threats and impacts in south-western Australia* (eds R T Wills and W A Cowling) p 36. Royal Society of Western Australia and the Ecological Society of Australia, Perth Western Australia.
- Stace, H.M., Armstrong, J.A. and James, S. (1993). Cytoevolutionary patterns in Rutaceae. *Plant Systematics and Evolution* 87, 1-28.
- Stace, H.M. and Patrick, S.J. (1993). Phenology and fire ecology of DRF *Anthocercis gracilis*. An interim report of experimental studies to Western Australian Water Authority and Department of Conservation and Land Management.
- Start, A.N. and Fuller, P. (1993). Grey honeyeater. *LANDSCOPE* 9(1): 53.
- Stoneman, G.L. (1993). Hydrological response to thinning a small jarrah (*Eucalyptus marginata*) forest catchment. *Journal of Hydrology* 150: 393-407.
- Stoneman, G.L., Crombie, D.S. and Whitford, K. (1993). Water relations and growth of thinned and fertilised *Eucalyptus marginata* (jarrah) stands. In: *Abstracts of the Australian Society of Plant Physiologists: 33rd Annual General Meeting* (1993), 1.
- Stoneman, G.L. and Dell, B. (1993). Growth of *Eucalyptus marginata* (jarrah) seedlings in a greenhouse in response to shade and soil temperature. *Tree Physiology* 13: 239-252.
- Thomson, C., Hall, G.P. and Friend, G.R. (1993) (eds). *Mountains of Mystery - A natural history of the Stirling Range National Park*. Department of Conservation and Land Management 189.
- Wardell-Johnson, G. (1993). Frogs in the garden. *LANDSCOPE* 8(4): 16-20.
- Wardell-Johnson, G. and Roberts, J.D. (1993). Biogeographical barriers in a subdued landscape: the distribution of the *Geocrinia rosea* (Anura: Myobatrachidae) complex in south-western Australia. *Journal of Biogeography* 20: 95-108.
- Wheeler, J.R. (1994). New species of *Hibbertia* (Dilleniaceae) from the northern wheatbelt area of Western Australia. *Nuytsia* 9: 427-437.
- Williams, A.A.E. (1993). New distribution records for the yellow palmdart *Cephenes trichopapla* and the orange palmdart *Cephenes augiades sperthias* from Western Australia. *Western Australian Naturalist* 19: 255-256.
- Williams, A.A.E. (1993). A new larval food plant for *Hesperilla donnysa albina* Waterhouse (Lepidoptera: Hesperidae) in Western Australia. *Australian Entomologist* 20: 70-71.
- Williams, A.A.E. and Atkins, A.F. (1993). Notes on the life history of *Taractrocerca papyria agraulia* (Hewitson) (Lepidoptera: Hesperidae). *Australian Entomologist* 20: 135-137.
- Williams, A.A.E. and Hall, G.P. (1993). New records of butterflies (Lepidoptera: Hesperioidea and Papilionoidea) from Bernier Island, Western Australia. *Australian Entomologist* 20: 45-46.
- Williams, A.A.E., Williams, M.R., Hay, R.W. and Tomlinson, A.G. (1993). Some distributional records and natural history notes on butterflies from Western Australia. *Victorian Entomologist* 23, 126-131.
- Williams, M.R. (1994). Bring back the butterflies. *LANDSCOPE* 9(3): 10-16.
- Wills, R.T., Conacher, A.R., Chapman, A.R. and Behn, G. (1994). Developing a GIS-based model to assist in the management and control of *Phytophthora cinnamomi*. In: *Handbook of the Symposium on Plant Diseases in Ecosystems: threats and impacts in south-western Australia* Royal Society of Western Australia and the Ecological Society of Australia, 37.
- Wills, R.T. and Cowling, W.A. (1994) (eds). *Handbook of the Symposium on Plant Diseases in Ecosystems: threats and impacts in south-western Australia*. Royal Society of Western Australia and the Ecological Society of Australia, Perth Western Australia.
- Wills, R.T. and Keighery, G.J. (1994). The ecological impact of plant disease on plant communities. In: *Handbook of the Symposium on Plant Diseases in Ecosystems: threats and impacts in south-western Australia* (eds R T Wills and W A Cowling) p 7. Royal Society of Western Australia and the Ecological Society of Australia, Perth Western Australia.
- Wilson, B.A., Newell, G., Laidlaw, W.S. and Friend, G. (1994). Impact of plant disease on animal ecology. In: *Handbook of the Symposium on Plant Diseases in Ecosystems: threats and impacts in south-western Australia* (eds R T Wills and W A Cowling) p 7. Royal Society of Western Australia and the Ecological Society of Australia, Perth Western Australia.