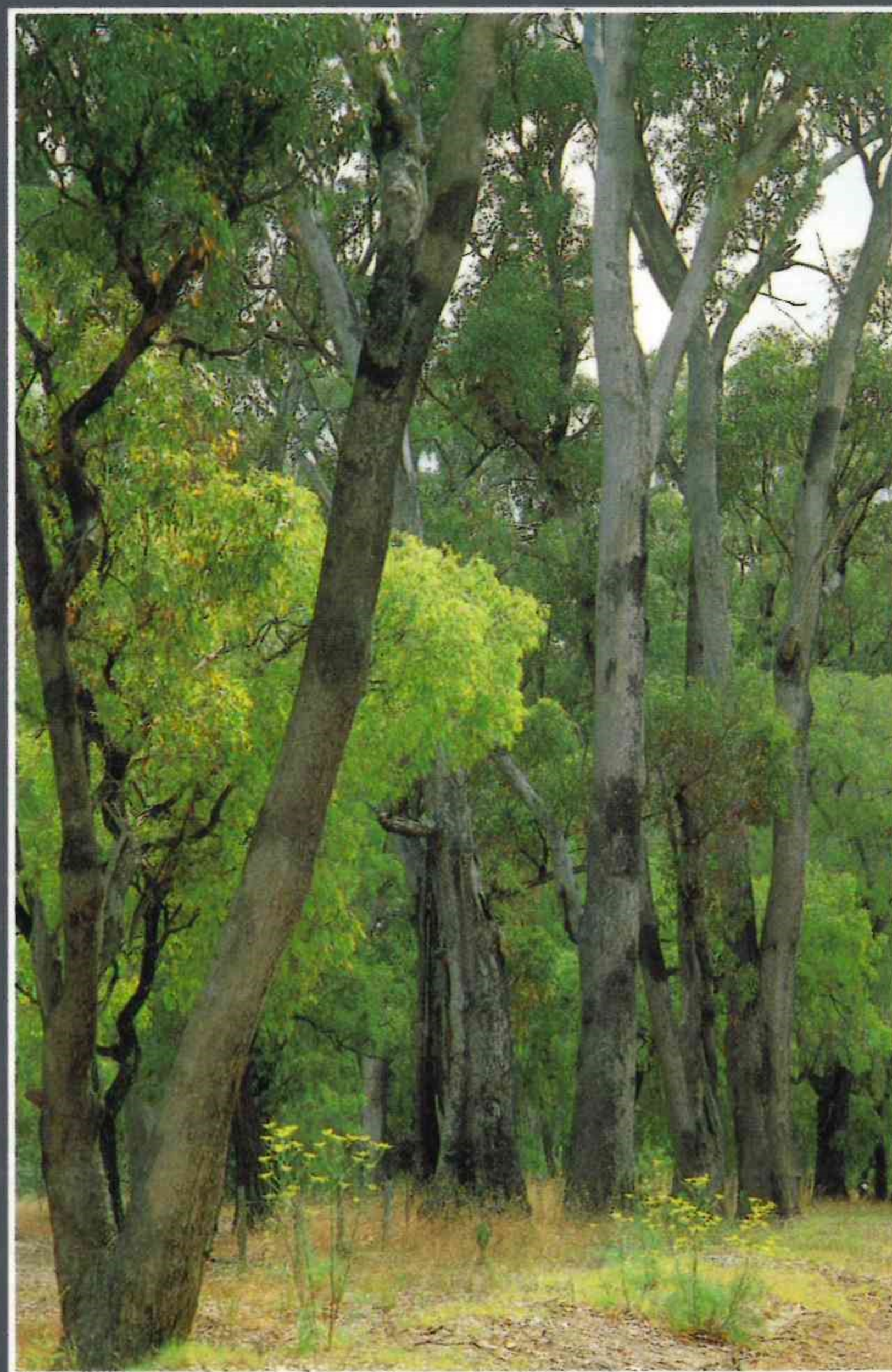


Central Forest Region

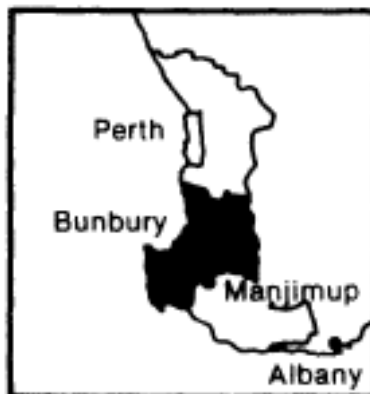


Department of Conservation and
Land Management, Western Australia

DECEMBER 1987

**CENTRAL FOREST REGION
REGIONAL MANAGEMENT PLAN**

1987-1997



MANAGEMENT PLAN NO. 10

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PREFACE

Regional management plans are prepared by the Department of Conservation and Land Management on behalf of the Lands and Forest Commission and the National Parks and Nature Conservation Authority. These two bodies submit the plans for final approval and modification, if required, by the Minister for Conservation and Land Management.

Regional plans are to be prepared for each of the 11 regions administered by the Department of Conservation and Land Management (CALM).

This plan for the Central Forest Region partly replaces the General Working Plan No. 87 (Forests Dept. W.A. 1982) which dealt with State forests in the south-west. In addition, this plan covers all land and water in the region vested under the CALM Act, together with wildlife responsibilities included in the Wildlife Conservation Act.

In addition to the regional plan, more detailed management plans will be prepared for certain high value or high conflict areas - e.g., some national parks - or for certain exploited or endangered species, e.g., kangaroos and the Noisy Scrub Bird. These 'area management plans' and 'wildlife management programs' will provide more detailed information and guidance for management staff.

The time frame for this regional plan is ten years, although review and restatement of some policies may be necessary during this period.

This management plan was submitted by the Department of Conservation and Land Management and adopted by the Lands and Forest Commission on 9 December 1987 and the National Parks and Nature Conservation Authority on 11 December 1987, and approved by the Hon Minister for Conservation and Land Management on 14 December 1987.

OBJECTIVES AND PRINCIPLES

The objectives of this regional management plan are:

To describe the land and wildlife resources managed by CALM in the Central Forest Region.

To present a land use plan for land managed by CALM in the region, based on the departmental system of land classification and the principles of multiple use.

To outline the departmental policies and management guidelines on which day-to-day management of land, wildlife and resources in the region are based.

To provide for public involvement in land-use planning and management by CALM.

To provide a planning and management framework for CALM responsibilities in the region, upon which more detailed operational plans can be based, and into which policy changes or research findings can be readily incorporated.

The principles upon which this plan has been prepared are:

The plan must comply with the requirements of the State Conservation Strategy for WA.

Land will be managed in such a way as to promote or achieve the purpose for which it was vested, e.g.

in the case of indigenous State forest or timber reserves, to ensure multiple use and sustained yield of the resource for the satisfaction of long-term social and economic needs [CALM Act Section 56 (1) (a)];

in the case of State forest or timber reserves planted with exotic species, to achieve the optimum yield in production consistent with the satisfaction of long-term social and economic needs [CALM Act Section 56 (1) (b) 1];

in the case of national parks, to fulfil as much of the demand for recreation by members of the public as is consistent with the proper maintenance and restoration of the natural environment, the protection of indigenous flora and fauna and the preservation of any feature of archaeological, historic or scientific interest [CALM Act Section 56 (1)(c)];

in the case of nature reserves, to maintain and restore the natural environment and to protect, care for, and promote the study of indigenous flora and fauna [CALM Act Section 56 (1)(d)].

All management operations are to be economical and environmentally sensitive.

The processes of land use planning and wildlife and resource management are to be assisted by public participation, particularly at the regional level.

In addition, the following principles set down in the State's timber strategy apply also to the preparation of this regional management plan:

There is to be an equitable reservation of forest areas for conservation, recreation and production, and these areas are to have security of tenure and purpose.

All areas of forest managed for timber production are also to be managed to provide for other values of the forest and all areas harvested are to be regenerated.

ASSOCIATED DOCUMENTS

This regional management plan should be read in conjunction with two other key documents:

Timber Production in Western Australia - A Strategy to take WA's South-West forests into the 21st Century (CALM 1987).

Strategies for Conservation and Recreation on CALM lands in Western Australia - the conservation, environmental protection and recreation strategies of W.A.'s Department of Conservation and Land Management (CALM 1987).

PART 1. THE DEPARTMENT OF CALM AND ITS PLANNING AND LAND USE MANAGEMENT PROCESSES

THE DEPARTMENT

Origin of the Department and the Controlling Bodies

The Conservation and Land Management Act, 1984, was proclaimed on 22 March 1985 and as a result the Forests Department, National Parks Authority and the Wildlife Section of the Department of Fisheries and Wildlife were amalgamated to form the Department of Conservation and Land Management (CALM). The Act also established two controlling bodies: the Lands and Forest Commission (LFC) in which State forest and timber reserves are vested; and the National Parks and Nature Conservation Authority (NPNCA) in which national parks, nature reserves, marine parks and marine nature reserves are vested. It also established a Forest Production Council to advise the Minister on matters pertaining to production from State forest and timber reserves.

Administrative Structure

EXECUTIVE DIRECTOR

The Department is headed by an Executive Director who is also a member of the Lands and Forest Commission, an ex-officio member of the National Parks and Nature Conservation Authority and Chairman of the Forest Production Council.

POLICY DIRECTORATE AND OPERATIONS DIRECTORATE

The Policy Directorate is headed by the Executive Director and comprises the General Manager and Policy Directors who are responsible for forests, national parks and recreation, and nature conservation. Its major task is to devise policy and liaise with the Operations Directorate about policy implementation. The Operations Directorate comprises the General Manager and five Divisional Managers (research, administration and finance, services, forest resources, and operations) who are responsible for the Departmental branches and regions.

REGIONS

The State is divided into 11 CALM regions, each with a high degree of autonomy. They are Kimberley, Pilbara, Gascoyne, Goldfields, Greenough, Wheatbelt, South Coast, Southern Forest, Central Forest, Northern Forest and Metropolitan Regions, as shown in Map 1.

Objectives of The Department (the Corporate Plan)

The first section of the corporate plan of the Department of Conservation and Land Management states:

In recognising that Western Australia has a beautiful and diverse natural environment which provides material, aesthetic and spiritual benefits and that the natural environment is an essential component of the quality of life for West Australians, a statement of mission adopted for the Department of Conservation and Land Management as stated in the Departmental corporate plan is:

To provide for the use of the natural environment without detracting from possible future use.

The scope of the Department's responsibilities is represented by its charter which is:

To conserve Western Australia's wildlife and manage public lands and waters entrusted to the Department for the benefit of present and future generations.

The Department's primary objectives are:

Management:

To protect, restore and enhance the value of resources entrusted to the Department so as to meet, as far as possible, the diverse expectations of the community.

Conservation:

To conserve the indigenous plant and animal species and environmental processes in natural habitats throughout the State.

Production:

To provide and regulate the supply of renewable resources on a sustained yield basis for the satisfaction of long term social and economic needs, and in a manner that minimises impact on other values.

Recreation:

To facilitate the public enjoyment of the natural attributes of public lands and reserved waters in a manner that does not compromise conservation and other management objectives.

Knowledge:

To seek a better understanding of the natural environment and to promote awareness and appreciation of its values.

Land Management Planning

The CALM Act (Section 33) requires the Department to manage land covered by the Act in accordance with a 'management plan'.

Management plans are the responsibility of the NPNCA and LFC, but are prepared through the agency of the Department.

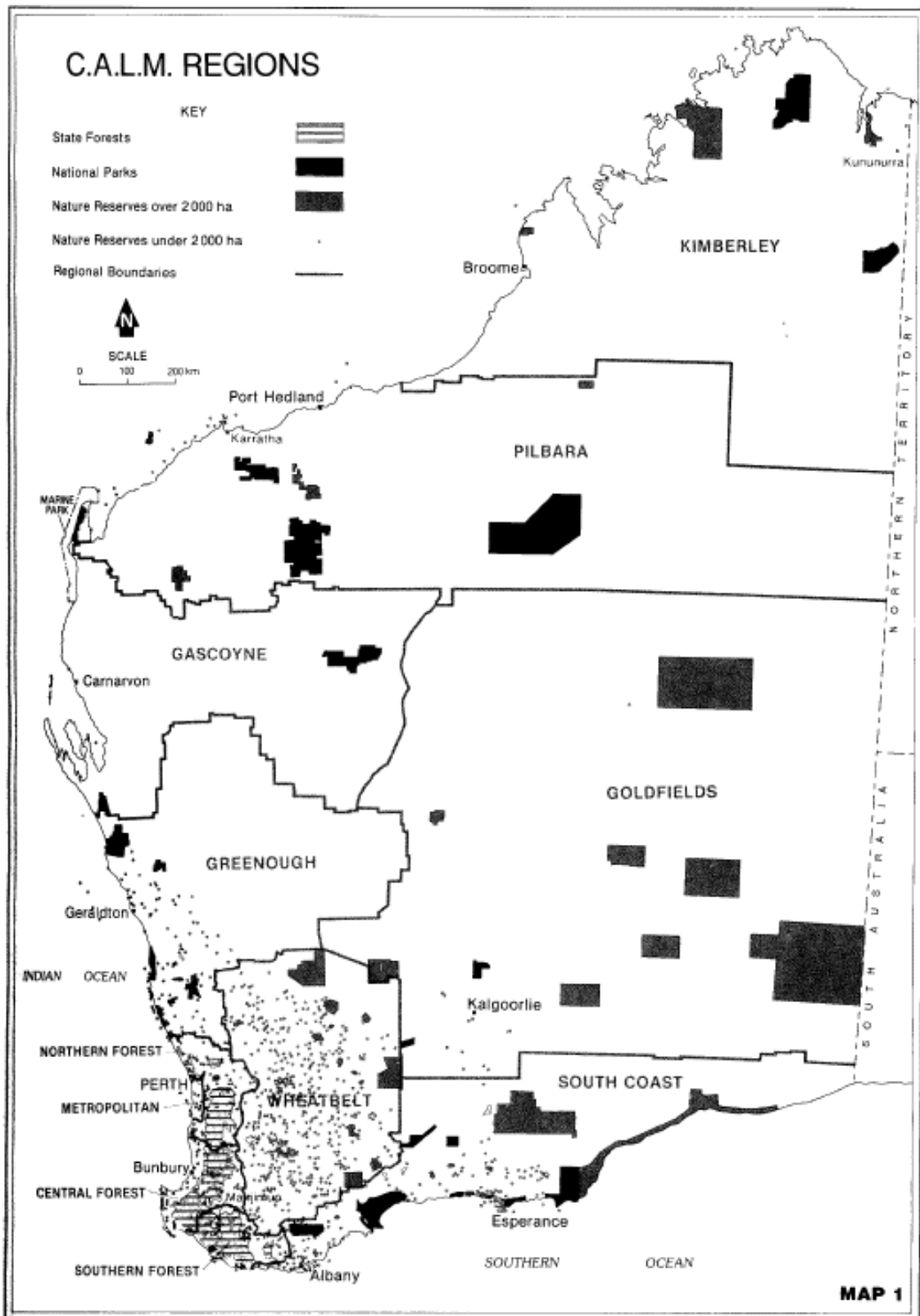
Sections 55-58 of the CALM Act specify that management plans must:

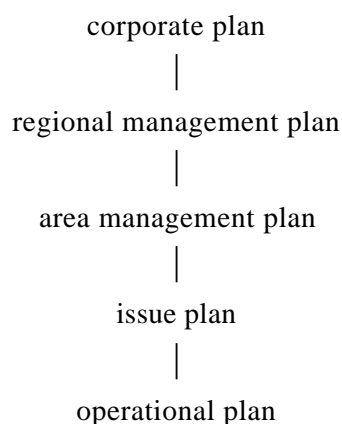
- statement of policies or guidelines to be followed;
- provide a summary of proposed operations;
- not exceed a ten-year term;
- be open for public comment for a minimum of two months before submission to Government;
- promote the achievement of the purpose for which the land was vested;
- pursue particular objectives for each category of land.

The style and order of development of management plans is a matter determined by Departmental policy. CALM Policy Statement No. 1 (Planning) states that management plans will contain clear statements on:

- The purpose and background of the plan;
- the resource information on which the plan is based;
- management problems, and discussion of options where appropriate;
- management proposals, including sections on implementation and monitoring;

CALM has developed five main types of plans for management of its land. Their hierarchical relationship is shown as follows:





The Department's strategic plan (the first part of the corporate plan) establishes the link to land management plans.

It consists of broad policy statements (see Appendices 1 and 2) for all major aspects of land use for all land and water vested in the NPNCA, the LFC and the Executive Director of CALM in Western Australia.

Regional management plans deal with land management planning at a regional level. They will be prepared for each Departmental administrative region. Map 1 shows the CALM regional boundaries.

When a regional management plan is approved, it will conform to Section 55 of the CALM Act and provide sufficient information for all NPNCA, LFC and Executive Director land in the region to be adequately managed until more detailed area management plans are available.

Area management plans cover a specific area or set of areas, often of common purpose (vesting) such as one or more national parks, marine parks, nature reserves, marine nature reserves, State forest, or other reserves. These are the most detailed management plans prepared by CALM. Area management plans will be prepared where there are management details specific to an area that cannot be adequately covered by a regional management plan.

Regional and area management plans are subject to public review in the draft form.

In addition, the Department prepares issue plans, operational plans, manuals and prescriptions. These are used to implement regional and area management plans and are discussed in Part 5. Many of these documents are available for public reference in regional or district offices on request.

VESTING, TENURE AND PURPOSE OF LAND MANAGED BY CALM

This section describes the system of classification, reservation and vesting which applies to lands managed by the Department of Conservation and Land Management.

The Controlling Bodies and the Department

The proclamation of the Conservation and Land Management Act in 1985 established two controlling bodies (the National Parks and Nature Conservation Authority and the Lands and Forest Commission) in which land is vested. The Act also established the Department of Conservation and Land Management which is responsible for management of the land vested in the controlling bodies.

The membership of the controlling bodies is representative of the many community interests associated with the lands vested in them.

Categories of Land Currently Vested in the Controlling Bodies and Managed by the Department

The CALM Act currently (Sept 1987) lists seven categories of land to which the legislation applies. These are:

- State forest
- timber reserves
- national parks
- nature reserves
- marine parks
- marine nature reserves
- any other land vested in the Commission or the Authority

In addition, the Department also manages land held freehold in the name of the Executive Director.

Vesting and Management

State forests and timber reserves are vested in the Lands and Forest Commission. National parks and nature reserves are vested in the National Parks and Nature Conservation Authority. Miscellaneous reserves may be vested in either body.

The Department is responsible for management of lands vested in the Authority and the Commission. Management is carried out according to government policies, and as specified in management plans submitted by the controlling bodies and approved by the Minister for Conservation and Land Management.

Tenure

'Land tenure' is the term used to describe the form of right, or title to land. The two broad classes of land tenure are private land and Crown land. Crown lands which are managed by the Department fall into two broad categories: reserves and State forests.

Security of Tenure of Land

In Western Australia, the security of tenure of Crown land reserves varies, depending upon whether the reserve is Class A, B or C.

A Class reserve - tenure can be changed only by agreement of both Houses of the W.A. Parliament.

B Class reserve - tenure can be changed by the Governor of Western Australia without approval by Parliament. However, the reasons for any change must be reported to Parliament by the Minister for Lands.

C Class reserve - tenure can be changed by the Governor, without reference to Parliament. However, any changes must be published in the Government Gazette.

This system therefore determines the degree of difficulty involved in changing the tenure of Crown land.

Most national parks and nature reserves are A Class reserves. However, some parks and nature reserves were given B or C Class status when they were created many years ago and this status has persisted.

The security of tenure of State forest is the same as that of an A Class reserve. State forest is not a 'reserve', and therefore is not classed A, B or C. However, any change to the tenure of a State forest requires the agreement of both Houses of Parliament.

Purpose and Security of Purpose

There are a variety of purposes for which lands vested in the Authority or the Commission are managed. Different categories of land have a different purpose, for example, conservation, production or recreation.

Under existing legislation, secure purpose is already provided for lands managed for conservation and recreation (for example nature reserves and national parks). On the other hand, in State forest, which in the past has been zoned for a variety of purposes (i.e., multiple use), there has been no legislative mechanism to make these purposes secure.

Therefore, although State forest has security of tenure identical to an A Class reserve, the purpose for which a particular area of State forest is managed may be decreed at the level of a management plan prepared within the Department and approved by the Minister, but without approval of Parliament.

Changes to be Introduced

The current requirements for reservation, classification, and security of purpose for land managed by CALM have disadvantages.

For example:

- marine reservation is not adequately catered for;
- there is confusion where areas of different tenure are managed for the same purpose;
- some areas (especially small conservation and recreation reserves) are inappropriately classified;
- in some instances, the tenure of the land is secure, but the purpose of its management is not.

Subject to the amendment of the CALM Act, a new system is to be adopted. Under this system there will be seven categories of Crown land managed by CALM:

- nature reserve
- national park
- conservation park
- marine park
- State forest
- timber reserve

miscellaneous reserves

In addition, the Department will continue to manage land held freehold in the name of Executive Director.

Furthermore, it is proposed that State forests will have A Class security of purpose as well as tenure. This will mean that the procedure for removal of forest areas from public ownership will not change. In addition, the purpose for which they have been reserved (the multiple uses incorporating conservation, recreation, timber production and water catchment protection) will not be able to be changed without the agreement of both Houses of State Parliament.

The categories are defined in terms of vesting, tenure and purpose as follows:

NATURE RESERVE

Vesting: National Parks and Nature Conservation Authority

Tenure: A Class (B and C Class reserves will be progressively reviewed and changed to A Class where appropriate).

Purpose: Wildlife and landscape conservation, scientific study and preservation of features of archaeological, historic or scientific interest.

Comment: Nature reserves may be terrestrial or marine. These are areas in which wildlife values may not be commercially exploited and where forms of recreation which damage natural ecosystems are not permitted.

NATIONAL PARK

Vesting: National Parks and Nature Conservation Authority

Tenure: A Class (B or C Class parks will be progressively reviewed and changed to A Class where appropriate).

Purpose: Wildlife and landscape conservation, scientific study, preservation of features of archaeological, historic or scientific interest, together with recreational enjoyment by the public.

Comment: National parks may be terrestrial or marine. With the exception of beekeeping in some parks, commercial exploitation of flora and fauna is not permitted. Only those

recreational pursuits which do not adversely affect ecosystems and landscapes are permitted.

The classification of national park applies to areas which have national or international significance for scenic, cultural or biological values.

CONSERVATION PARK

Vesting: National Parks and Nature Conservation Authority

Tenure: A Class

Purpose: Identical to national park

Comment: Conservation parks differ from national parks only in their significance, size or condition. They are managed as if they were national parks. The difference is that these areas do not have major national or international significance, are relatively small in size or the landscape or biota has been affected by past land use. Conservation parks in forest areas will not be zoned to include areas where commercial timber production may occur.

MARINE PARK

Vesting: National Parks and Nature Conservation Authority.

Tenure: A Class

Purpose: Marine conservation and recreation, with areas zoned for commercial fishing on a sustained yield basis.

Comment: This classification is generally in accord with the internationally accepted concept of a managed resource area. It allows for management for conservation and recreation, plus controlled exploitation where appropriate.

STATE FOREST

Vesting: Lands and Forest Commission

Tenure: Identical to A Class, in that the agreement of both Houses of Parliament is required before tenure can be changed.

Purpose: Multiple use.

Comment: The major uses of State forest will be for water supplies, recreation, sustainable timber production and for wildlife conservation. State forests will also provide for public utilities and mineral production, where these activities are imposed.

TIMBER RESERVE

Vesting: Lands and Forest Commission

Tenure: Similar to C class

Purpose: Timber production

Comment: Timber reserve is a transitional classification. As timber reserves are evaluated, they will be reclassified as State forest, nature reserve or conservation park, as appropriate.

MISCELLANEOUS RESERVES

Vesting: Lands and Forest Commission or National Parks and Nature Conservation Authority

Tenure: Normally B or C Class

Purpose: These reserves have a wide variety of purposes, but normally are related to recreation or wildlife conservation. As with timber reserves, this classification is often transitional, and on further evaluation the classification can be changed to a more appropriate one.

Criteria for allocation of Land to CALM Categories

Where land is acquired by CALM, or where the classification of a particular area is under review, the following criteria are applied:

NATURE RESERVE

Areas to be managed for wildlife conservation and scientific study.

Have important conservation value, either as part of a reserve system, as a remnant or because of particular species.

No historical commitments to inappropriate uses or activities.

NATIONAL PARK

Areas to be managed for wildlife conservation, scientific study and public enjoyment.

Have important conservation, cultural and scenic values.

Nationally or internationally unique, in terms of landscape and/or biota.

Size must be sufficiently great to accommodate recreation or historical uses without significantly detracting from conservation values.

CONSERVATION PARK

Purpose identical to national park.

Areas generally are not nationally or internationally unique, in terms of landscape and/or biota.

These are areas generally less than 1000 ha in size and/or where wildlife conservation values have been affected by past activities or land use decisions.

MARINE PARK

Marine areas managed for conservation, study, public enjoyment and commercial fishing on a sustained yield basis.

Where zoning includes commercial fishing, a marine park must be large enough to allow this fishing without detracting from the overall conservation and recreational value.

STATE FOREST AND TIMBER RESERVE

Areas to be managed for multiple use, with the primary uses in most cases being sustainable timber production and protection of water catchments.

CALM Responsibilities on Lands Not Vested in the Controlling Bodies

CALM is responsible for the conservation and protection of native flora and fauna on all land and waters within the State boundaries, under Section 6 of the Wildlife Conservation Act.

Vacant Crown land and unvested reserves are nominally controlled by the Department of Land Administration. However, forest produce on vacant Crown land is controlled by CALM under Section 88 of the CALM Act. Forest produce includes trees, timber, firewood, honey, seed, rocks, stone and soil, but excludes minerals under the Mining Act 1978. The Bush Fires Board is responsible for fire prevention measures on vacant Crown land and unvested reserves under Section 10 of the Bush Fires Act.

Under Section 45 of the Bush Fires Act, CALM may take responsibility for the suppression of bush fires threatening State forest. Under an agreement with the Department of Land Administration, the Agriculture Protection Board has responsibility for the control of vermin and declared plants on vacant Crown land and unvested reserves.

CALM has the responsibility of administering regulations made under the Wildlife Conservation Act for the protection, management and control of nature reserves. Under section 130 of the CALM Act those provisions also apply to those reserves created under the Land Act for the conservation of flora and/or fauna, which are not vested in the National Parks and Nature Conservation Authority.

Under Section 139 of the CALM Act the forest produce on road reserves through State forest and timber reserves is controlled by CALM. However, Shires have the right to the timber from trees felled in bona fide road clearing or widening.

Under Sections 137 and 138 of the CALM Act, CALM may control the timber on particular reserves or gazetted catchments if the Governor so directs. Timber royalties derived from such reserves are usually apportioned between CALM and the vesting authority.

Under arrangements ratified by Section 151 of the CALM Act, CALM controls forest produce on Land Act timber reserves and Timber for Settlers reserves. The Department of Land Administration controls the land.

Acquisition of Private Land

As part of the State's timber and conservation strategies, CALM has a policy of seeking to acquire suitable land for forest development and for conservation values.

Exchange of land is also considered when the Department's assets will benefit from the transaction e.g. when land can be obtained for addition to a national park, or for forest production or conservation, and when the land given up in the exchange has no conservation values.

MULTIPLE LAND USE PLANNING AND MANAGEMENT IN CALM

Sustained Yield and Multiple Use

A major value of the land and reserve system managed by CALM is that it can provide indefinitely for a wide range of demands, or land uses.

This is because management is based upon two fundamental philosophies: sustained yield, and multiple use, and the integration of these philosophies into a systematic approach to land use planning and practical management.

The concept of sustained yield applies when natural resources are harvested for particular products valued by the community, for example, trees for timber, wildflowers for blooms or catchments for water supplies. For natural resources to survive in the long term, the rate of harvest must not exceed the rate of replenishment. There is both a statutory and a moral obligation on CALM to practice sustained yield management whenever natural resources are harvested.

All lands entrusted to CALM are managed for many uses. In other words, the management aim is to ensure that as wide a range of uses as possible are provided for, consistent with the designated purpose of the area. In most cases, different uses are compatible and it is a simple matter to ensure that they can take place on the same area at the same time.

For example, a nature reserve can provide harmoniously and simultaneously for wildlife habitat and some forms of recreation. Similarly, State forests can provide simultaneously for sustained yields of timber, fresh water, recreation, and most forms of wildlife habitat.

Multiple use planning becomes complex when demands on the same area of land conflict and cannot be practised simultaneously. When this occurs a priority use must be decided upon or activities rescheduled to prevent or minimise conflict.

General Principles for Land Use Planning in CALM

As a general principle, CALM attempts to provide for as many land uses as possible, so long as they are consistent with the primary purpose of the land. Most areas of land can be used simultaneously for many different purposes, without conflict or land degradation. Where this cannot be done, systematic land use planning is necessary. This involves:

identification of demands and conflicts;

- decisions on priority use;
- allocation of priority uses to areas;
- the preparation of a map showing proposed land uses and priorities.

A land use plan and map has two important functions. First, it provides the public with information about, and the opportunity to comment on and seek changes to, land use decisions. Secondly, it provides a basis for day-to-day management by CALM staff.

Aspects of Multiple Use Planning in CALM

DEMANDS

The community requires that seven principal values are provided from the lands entrusted to CALM. These are:

- wildlife (flora and fauna) conservation;
- landscape (scenic beauty and amenity);
- water;
- timber;
- recreation;
- minor resources (eg, honey, gravel, wildflowers);
- historical or cultural factors.

In addition, a number of 'imposed' activities must be provided for, e.g. community services and public utilities (roads, reservoirs, power lines), and minerals, where mining on CALM land has been approved under the Mining Act or Special Agreement Acts.

Finally, lands managed by CALM are an important 'resource' for research, scientific study and education, and provision must be made to ensure these activities can proceed.

PRIORITY ZONES

Every area within a land use plan proposed by CALM is allocated a priority use. This is the value which is most favoured by:

- the specific attributes of the ecosystem;
- the location, or accessibility of the area;
- public demand for various uses;
- the purpose for which the area is vested.

An area will often be suited to a number of uses.

Uses which can be carried out in addition to, and without conflicting with, the priority use are called compatible uses. Compatible uses can occur on the same area at the same time.

Uses that can be compatible with the priority use if practiced under certain constraints (ie., at certain periods or at very regulated levels) are referred to as conditional uses.

Uses which will always conflict with the priority use are referred to as incompatible uses. These cannot be permitted on the same area at the same time.

CALM follows two basic rules in the allocation of uses to an area:

any use allocated must be in accord with the tenure and purpose of the area;
and no use may be permitted which is detrimental to the priority use.

Within State forests, priority use areas were historically referred to as Management Priority Areas (MPAs). On other tenures, priority areas have been called zones. The term zone is now favoured for all tenures and will henceforth also be applied to State forests.

LAND USE PRIORITIES AND COMPATIBILITY

Six land use priorities (or zones) are recognised in the preparation of land use plans for CALM lands:

Nature conservation;
Recreation;
Protection (of water catchments or other forests values);
Production (zoned for water, timber or other products);
Mining (where this is 'imposed');
Public utility.

In Table 1 the compatibility between these uses is set out. Table 2 shows the broad relationships between land uses and reserve categories.

TABLE 1
COMPATIBILITY OF LAND USES

Priority Use Zone	Alternative uses			
	Nature Conservation	Protection	Recreation	Production
Nature Conservation		Compatible	Conditional	Not Compatible
Protection	Compatible		Conditional	Conditional
Recreation	Conditional	Conditional		Conditional
Production	Conditional	Conditional	Conditional	

TABLE 2
COMPATABILITY BETWEEN LAND USES AND RESERVE CATEGORIES

Land Use	Reserve Category				
	Nature Reserve	National Park	Conservation Park	Marine Park	State Forest
Nature Conservation	/	/	/	/	0
Recreation	0	0	0	0	0
Catchment Protection	/	/	/	N/A	/
Timber or Fishery Production	X	X	X	/	/
Water Production	X	0	0	N/A	/
Public Utility	X	0	0	0	0
Mining (See Text)	0	0	0	0	0

KEY

- / Compatible with objectives for reservation
- 0 Conditional to specific time, area or use constraints
- X Not compatible with objectives for reservation
- N/A Not applicable

PART 2. THE CENTRAL FOREST REGION, ITS ADMINISTRATION AND RESOURCES

THE REGION

CALM's Central Forest Region is bounded approximately by Yalgorup, Waroona and Murray River in the north and Darkan and Kulikup in the east. The southern boundary is the Southern Ocean from Augusta to Blackpoint, Vasse Highway and the Blackwood River. The western boundary is the Indian Ocean¹.

The population of the region at the time of the 1986 census was approximately 79 000, including Bunbury city, Collie, Busselton, Harvey and Donnybrook.

The Central Forest Region has an area of 1.80 million ha of which some 0.78 million ha (44 per cent) is CALM land and a further 0.04 million ha (2 per cent) is unvested land managed by CALM. The region includes all of six shires (Collie, Augusta- Margaret River, Busselton, Donnybrook-Balingup, Dardanup and Capel) plus the City of Bunbury and parts of eight shires (Waroona, Harvey, Boddington, Williams, West Arthur, Boyup Brook, Nannup and Bridgetown-Greenbushes).

This region includes almost half of the State's remaining jarrah forest and smaller areas of wandoo, karri and tuart forest. Over half of CALM's pine forest (mainly *Pinus radiata*) is within the region.

Much of the land managed by CALM is on developed water catchments including Wellington, and irrigation catchments such as Stirling, Logue Brook and Waroona.

Mining is one of the region's major industries, with significant production of bauxite, coal, mineral sands and tin.

Tourism is an important and rapidly growing industry in the region. There are numerous recreation sites managed by CALM throughout State forest and national parks.

1 Note that the responsibility for wildlife and potential marine reserves extends for 3 nautical miles - i.e. the limit of State territorial waters.

ADMINISTRATION

Staff

REGIONAL RESPONSIBILITIES

The Central Forest Regional Office is located in Bunbury. Regional and district staff under the direction of the regional manager are responsible for:

- the implementation of CALM policy;
- the provision of regional plans;
- the implementation and co-ordination of regional and district works programs, particularly to nominated priorities and standards;
- the management of personnel and finance; training and occupational safety;
- liaison with State and local government, private companies and the public;
- research, monitoring and inventory data collection.

DISTRICTS WITHIN THE REGION

The region is divided into five districts, as shown in Map 2.

Harvey District is the most northerly district of the region. Its principal operations are the management of jarrah and wandoo forest, coastal and hills pine forests, water catchments, conservation, recreation and liaison with bauxite mining companies. Part of Yalgorup National Park and Benger Swamp Nature Reserve are in this district. The Wood Utilisation Research Centre, including sawmill and kilns, is located in Harvey.

Collie District extends from Bunbury to the Albany Highway. Its responsibilities include management of jarrah and wandoo forest, pine forest, water catchment, conservation, recreation and liaison with coal mining companies.

Kirup District is located in the south-east of the region. Prime responsibilities of the district are the pine forests in the Blackwood Valley and Donnybrook Sunklands. Management of jarrah forest, nature reserves, and liaison with mineral sand and tin mining companies is also required .

Busselton District is centred at Busselton with sub-district headquarters at Margaret River and Ludlow. Leeuwin-Naturaliste and Scott National Parks are in this district. Management of pine forest and jarrah forest is also required. Liaison with mineral sand mining companies is required.

Nannup District is the most southerly district of the region. Prime responsibilities of the district are management of jarrah forest and pine forests in the Blackwood Valley and Donnybrook Sunklands. Gingilup Nature Reserve is in this district.

SPECIALIST BRANCHES

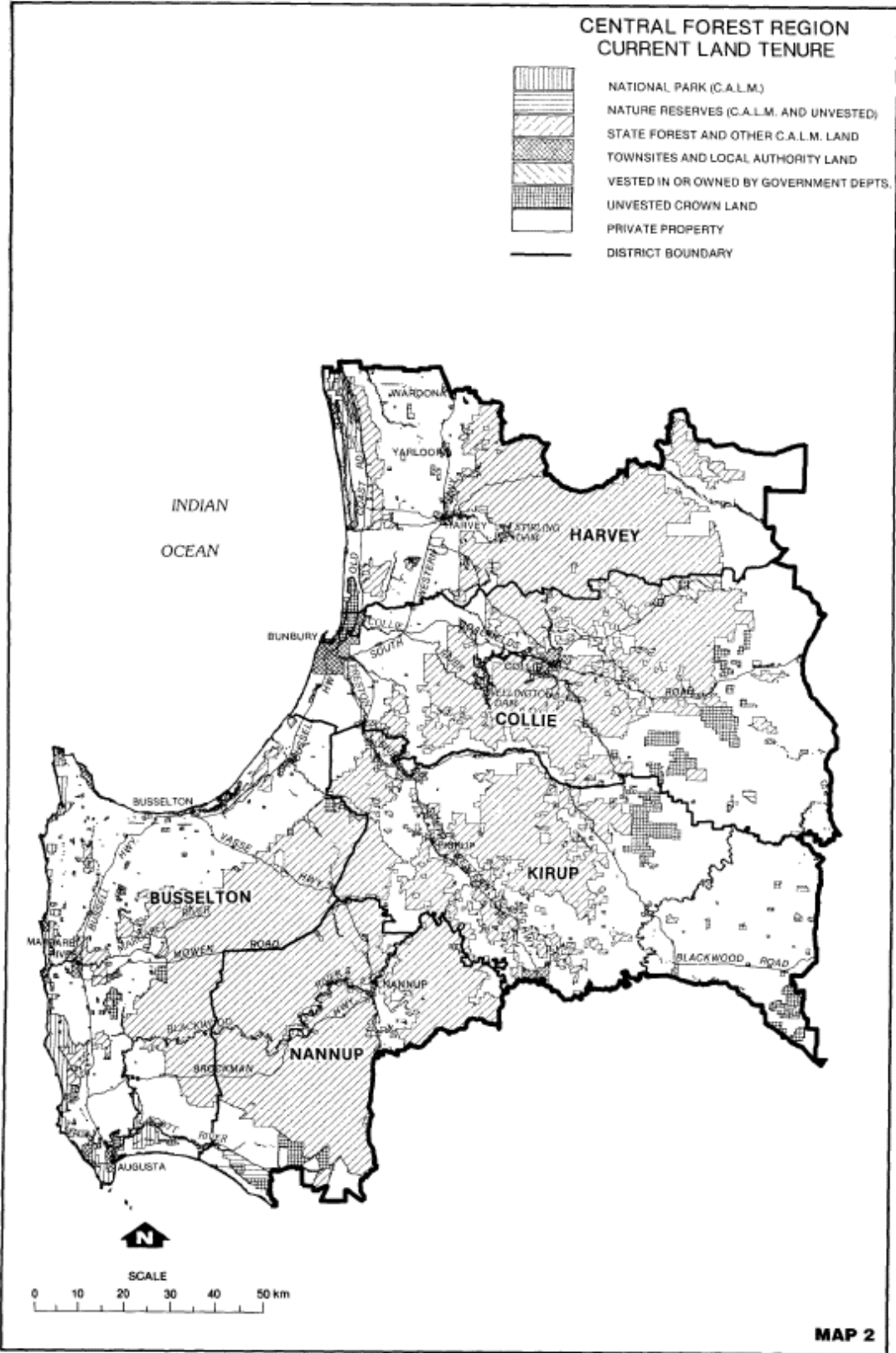
Research Division has a field station at Busselton. Inventory Branch has a field station at Bunbury. Most other Departmental branches have staff at Bunbury or Busselton, including Silviculture, Fire Protection, Environmental Protection, Personnel, Engineering Services, Timber Production, Information and Wildlife Protection Branches. Timber Industry Regulation Act staff are also located at Bunbury.

PERSONNEL

At 1 July 1987, 351 Departmental personnel were based in the region, as shown in Table 3.

TABLE 3
DEPARTMENT OF CALM PERSONNEL EMPLOYED IN THE
CENTRAL FOREST REGION AS AT 1 JULY 1987

Professional staff	24
Field staff	90
Administration and clerical staff	26
Wildlife officers	2
National Park Rangers	6
Wages Employees and Mechanics	180
Casual, seasonal, part-time staff	23
TOTAL	351



DEPARTMENTAL VEHICLES, PLANT, BOATS AND AIRCRAFT

Table 4 summarises the above resources based in the region as at 1 July 1987.

TABLE 4
DEPARTMENT OF CALM VEHICLES, PLANT, BOATS AND
AIRCRAFT IN THE CENTRAL FOREST REGION AS AT 1 JULY 1987

Motorcycles	7
Sedans and Utilities 4 x 2	83
Sedans and Utilities 4 x 4	62
Light Trucks	18
Heavy Trucks	40
Prime Movers	2
Graders	4
Tractors, Loaders	24
Dozers	2
Buses	5
Caravans	1
Boats	3
Aircraft	3
TOTAL	254

OUTSIDE ASSISTANCE

Administrative and technical assistance and direction is provided as required from Departmental Directors, the General Manager, Divisional and Branch Managers and support staff based mainly in Perth and Bunbury.

Assistance is provided to other regions during emergencies such as large fires, and to assist with specific routine projects. Bulldozers, graders, trucks, tractors are hired from outside sources, subject to budget provision, for routine work as well as for emergencies.

Local people and other agencies frequently assist with fire fighting.

Physical and Biological Resources

SYSTEM 6 STUDY

Much of the region is within the Environmental Protection Authority's System 6 or Darling System. This system was the subject of a detailed and systematic study which commenced in 1976 and resulted in a report by the EPA to government in 1983. As part of the study, an Atlas of Natural Resources was published by the Department of Conservation and Environment in 1980. The atlas includes geology and mineral resources maps by Biggs *et al.* (1980), landforms and soils maps by Churchward and McArthur (1980), and vegetation maps by Heddle *et al.* (1980).

CLIMATE

The region experiences a mediterranean climate characterised by a cool wet winter and a hot dry summer.

Average annual rainfall ranges from about 600 mm along the eastern boundary of the region, to a maximum of over 1250 mm between Harvey and Collie, as shown in Map 3.

A detailed account of the key climatic features of the region is given by the Bureau of Meteorology (1965). Some climatic data for Bunbury is presented in Map 3.

GEOLOGY AND GEOMORPHOLOGY

The region can be divided into five main geomorphic units or natural regions according to Beard (1981), based on Clarke (1926). These are: the Darling Plateau, Swan Coastal Plain, Leeuwin-Naturaliste Ridge, Blackwood Plateau, Scott Coastal Plain, as shown in Map 3. The Darling Scarp separates the Darling Plateau from the Swan Coastal Plain and Blackwood Plateau (Donnybrook Sunklands) and the Whicher Scarp separates the Blackwood Plateau from the Swan Coastal Plain.

The Darling Plateau is an ancient erosion surface which is at an average elevation of about 250 m above sea level in the region, with a range from under 100 m up to 574 m at Mt Saddleback. Composed of Precambrian crystalline rocks, it has been extensively laterised.

The Collie and Wilga Basins are depressions within the Precambrian bedrock, containing Permian sediments including coal measures.

Dissection of the plateau by rivers has led to a variety of valley forms, and soils including red and yellow earths and duplex soils, as described by Churchward and McArthur (1980).

The Swan Coastal Plain extends west from the Darling and Whicher Scarps to the Indian Ocean. It ranges up to about 60 m above sea level, and within it a number of geomorphic units can be identified: Quindalup Dunes (nearest the coast), Spearwood Dunes, Bassendean Dunes, Pinjarra Plain and Ridge Hill Shelf (at the foot of the Darling Scarp) (McArthur and Bettenay 1960). This coastal plain is composed of sedimentary rocks of Quaternary age at the surface. The maximum thickness of sediments may exceed 15 000 m.

The Leeuwin-Naturaliste Ridge is composed of Precambrian crystalline rocks capped by laterite and sand. Along the coast dune sand and limestone, overlying the Precambrian rocks, rise to over 200 m above sea level. Numerous caves are developed in the limestone.

The Blackwood Plateau, also known as the Donnybrook Sunlands, has a gently undulating surface covered by lateritic gravel and sand. It typically ranges from 80 m to 180 m above sea level and is underlain by Mesozoic sediments and Bunbury Basalt. Much of this area is poorly drained.

The Scott Coastal Plain has an average elevation of about 40 m above sea level and is a swampy area traversed by remnants of linear sand dunes developed approximately parallel to the coastline.

For further details about the geology of the region see the 1:250 000 scale geological maps prepared by Lowry (1967), Wilde and Low (1980) and Wilde and Walker (1982,1984). Landform and soil information for parts of the region are available from McArthur and Bettenay (1960); Northcote *et al.* (1967); Finkl (1976); McArthur *et al.* (1977); McArthur and Bartle (1980); Churchward and McArthur (1980).

HYDROLOGY

Major rivers passing through the region include the Blackwood, Collie, Harvey, Margaret, Preston and Brunswick Rivers. The Murray River is to the north of the region but its catchment extends into the region. Most of the flow on forested catchments is fresh. Agricultural clearing has increased the input of salts in many of the lower rainfall (under 900 mm/year) areas. Many of the rivers in the region have been dammed.

There are a number of significant swamps and lakes throughout the region, notably on the Swan and Scott Coastal Plains and in the Yourdamung area. Extensive areas are irrigated, notably between Dardanup and Waroona.

Substantial underground water resources are available within the region, notably from the Perth and Collie Basins (Wilde and Walker 1982), but some of this water is not fresh.

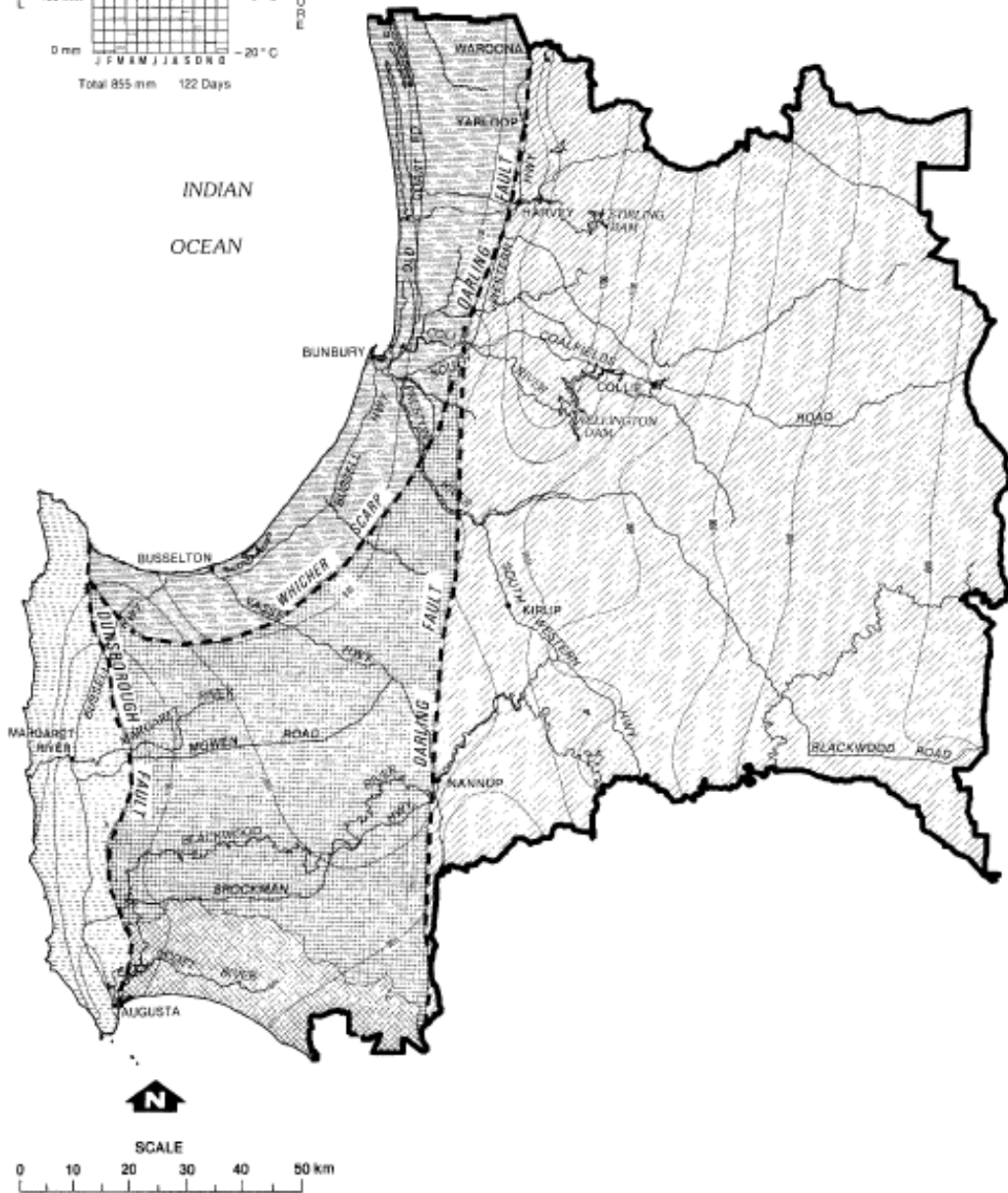
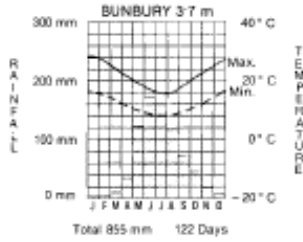
VEGETATION

The vegetation of the region has been mapped by Beard (1981) and Map 4 is based on that work.

Site-vegetation mapping by Heddle *et al.* (1980) is also available for most of the region. The latter mapping is to a large extent based on the landform, site, vegetation work by Havel (1968, 1975 a and b). Vegetation maps or plant species lists for parts of the region have also been produced by Smith (1972-73-74); Hodgkin (1975); Schwinghammer (1978); Fox *et al.* (1980); Dames and Moore (1980,1985); Fluor-Maunsell (1983); Fox and Dunlop (1984); Trudgen (1984); Christensen *et al.* (1985); Helleman *et al.* (1985); Napier (1985); South West Development Authority (1985); Worsley Alumina Pty Ltd (1985); Nichols *et al.* (1986), Watkins (1986); Frewer (1987).

CENTRAL FOREST REGION GEOMORPHIC UNITS AND CLIMATE

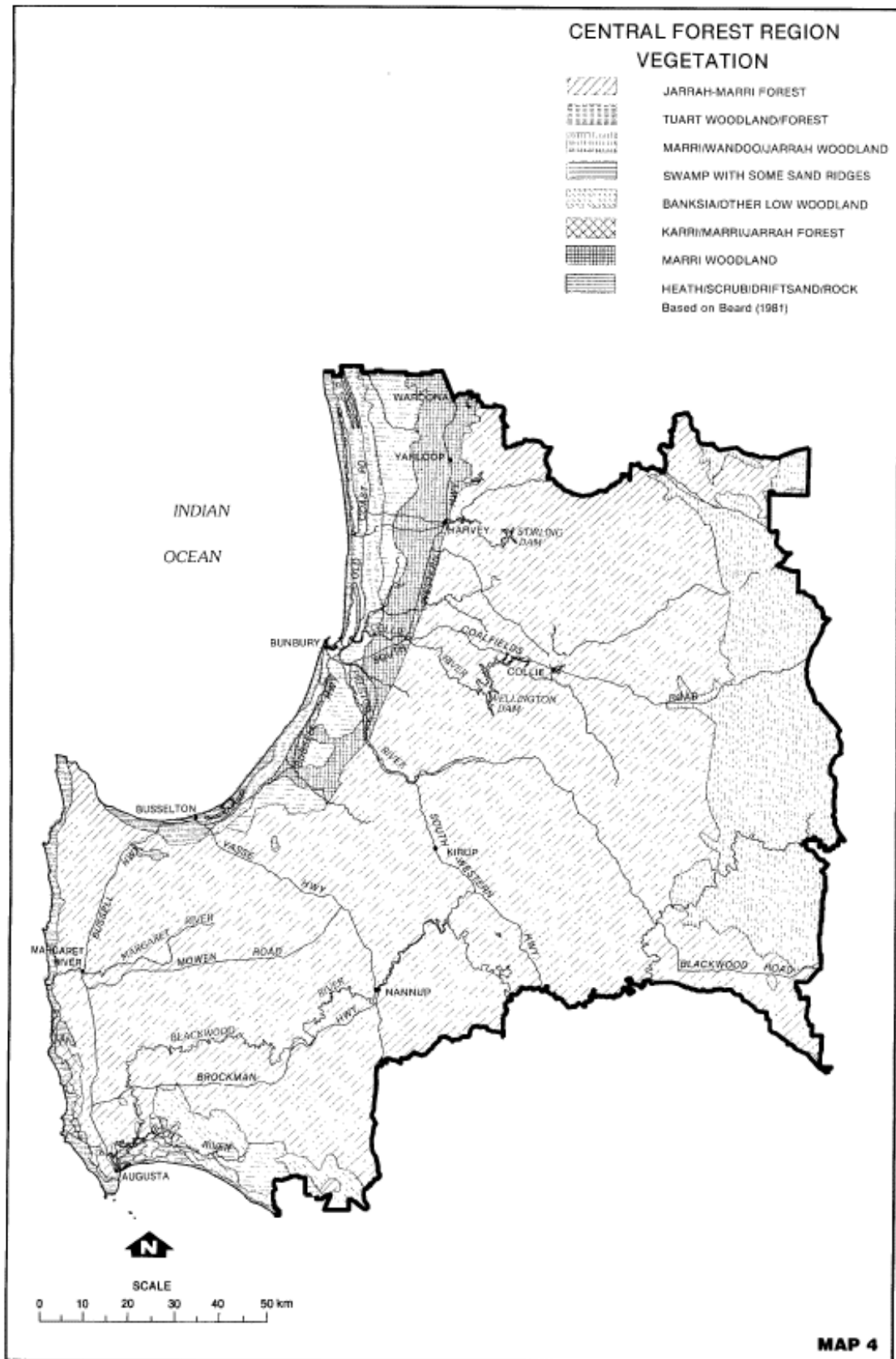
- KEY**
- SWAN COASTAL PLAIN
 - DARLING PLATEAU
 - BLACKWOOD PLATEAU
 - SCOTT COASTAL PLAIN
 - LEEUWIN-NATURALISTE RIDGE
 - ISOHYETS



MAP 3

CENTRAL FOREST REGION VEGETATION

-  JARRAH-MARRI FOREST
 -  TUART WOODLAND/FOREST
 -  MARRI/WANDOOQUARRAH WOODLAND
 -  SWAMP WITH SOME SAND RIDGES
 -  BANKSIA/OTHER LOW WOODLAND
 -  KARRI/MARRIJARRAH FOREST
 -  MARRI WOODLAND
 -  HEATH/SCRUB/DRIFTSAND/ROCK
- Based on Beard (1981)



MAP 4

A.P.I. MAPS

CALM air photo interpretation (A.P.I.) forest type maps have been prepared for much of the region. Table 5 shows the areas of the main site-vegetation types in the region, based on these maps and more recent work.

TABLE 5
SITE-VEGETATION TYPES IN THE CENTRAL FOREST REGION
AS AT 1 JANUARY 1986

	State Forest (a) (ha)	Other Crown Land (ha)	Private Property (ha)
Karri	3000	2000	1000
Jarrah, marri, etc.	647000	53000	206000
Wandoo	12000	6000	34000
Tuart	3000	3000	8000
Exotic eucalypts	-	-	4000
Pine	34000	-	5000
Other native vegetation	36000	40000	45000
Cleared	8000	15000	617000
Sand	-	1000	2000
Lakes, water	1000	10000	-
TOTAL	744000	130000	922000

Note (a) 'State forest' includes CALM Act timber reserve and freehold land in the name of the Executive Director. Townsites are included with other Crown land.
Vegetation data for other Crown land and private property is indicative only.

VEGETATION MAPPING BY BEARD

Beard's 1981:1000 000 scale vegetation map of the south-west identifies 13 vegetation systems in this region, within four botanical subdistricts. A vegetation system is a particular series of plant communities recurring in catenary sequence or mosaic pattern, linked to topographic, soil or geological features. Brief descriptions of the 13 vegetation systems are as follows:

Drummond Subdistrict (on Swan Coastal Plain)

Rockingham System

This system extends along the coast on the Quindalup Dunes, as far south as Myalup. It consists of dune sands and coastal limestone. Behind the coastal communities, there is a heath in which *Acacia cochlearis*, *Oleatia axillaris*, *Scaevola crassifolia* are conspicuous plants. Thickets of *Acacia rostellifera* are often present.

Spearwood System

This system is found inland of the Rockingham System. It consists of ridges of limestone, often mantled with yellow sand. The principal vegetation is eucalypt woodland. Numerous lakes and swamps occur in chains parallel to the coast. Species commonly present include tuart (*Eucalyptus gomphocephala*), jarrah (*E.matginata*) and peppermint (*Agonis flexuosa*) in woodland, and *Melaleuca preissiana*, *M. raphiophylla* and *Banksia littoralis* in swamps.

Bassendean System

This system stretches discontinuously for the whole length of the Swan Coastal Plain, inland of the Spearwood System. Low Banksia woodland is common on drier sites, dominated by *Banksia attenuata*, *B. menziesii* and *B. ilicifolia*. On moister sites jarrah-marri (*E. calophylla*) woodland with banksia and sheoak (*Allocasuarina fraseriana*) understorey is common.

Pinjarra Plain System

The plain occupies a more or less continuous band along the foot of the Darling Scarp, varying in width from 1 to 25 km. Marri woodland or forest was originally common with jarrah on higher ground. Flooded gum (*E. rudis*) occurs in the wetter parts. Ground subject to frequent flooding, such as at Benger Swamp, supports low woodland or forest of *Melaleuca raphiophylla*, thickets of *M. preissiana* or sedgeland.

Ridge Hill Shelf System

This system covers a narrow discontinuous band along the foot of the Darling Scarp. The principal element is forest of jarrah and marri often mixed with wandoo (*E. wandoo*) on heavier gravelly soils or sheoak on sandier soils.

Dale Subdistrict (Northern Darling Plateau)

Darling System

This comprises the Northern Jarrah Forest, which occupies the most humid portion of the Darling Plateau. The major catena in the system comprises:
open vegetation of 'granite' rock outcrops, protruding through the laterite mantle;
jarrah forest on the laterite plateau;

marri-wandoo woodland on the younger red soils of the scarp and the eastern valleys; flooded gum and paperbark (*Melaleuca raphiophylla*) along the water courses.

Minor catenas occur within the jarrah forest and have been documented by Havel (1975) as 'site-vegetation types' and mapped over much of the region by Heddle *et al.* (1980).

Bannister System

Occupies a north-eastern section of the region. The typical catena is jarrah-wandoo woodland on the ridges and marri-wandoo woodland on the slopes.

Williams System

This system is found in the north-east of the region. The proportion of lateritic ridges is less than in the Bannister System. Marri-wandoo woodland predominates, with York gum (*E. loxophleba*) on the lower ground and jarrah- marri-wandoo woodland on the ridges.

Menzies Subdistrict (Southern Darling Plateau)

Bridgetown System

This system extends north of the karri forest to near Collie. Jarrah-marri forest is the main element. In the west, yarri/blackbutt (*E. patens*) and bullich (*E. megacarpa*) occurs in some of the valleys and flooded gum and paperbark along some of the water courses. In swamps, particularly in the Collie Basin, low woodland of flooded gum, *Melaleuca preissiana* and/or banksia species are found.

Chapman System

Occupies the Sunkslands, west of the Darling Fault. The general cover is of jarrah-marri forest, frequently stunted. Low woodland of *Melaleuca preissiana* and banksia species occupy damp sites. Shallow uplands soils may carry stunted jarrah and black gin (*Kingia australis*).

Beaufort System

This system is found in the south-east corner of the region. Laterite residuals carry wandoo, jarrah and mallet (*E. astringens*). Slopes have marri and wandoo woodland. York gum, swamp yate (*E. occidentalis*) and scrub heath occur in valley floors.

Boranup System

Extends from Cape Naturaliste to Cape Leeuwin and along the south coast. On exposed western slopes *Pimelea fenuginea* heath or thicket occurs. With decreasing exposure peppermint and/or Banksia dominate. On stabilised dune, karri (*E. diversicolor*) and jarrah forest or woodlands of marri, yate (*E. cornuta*) or peppermint may be found.

Scott River System

Located between the Boranup and Chapman Systems, parallel and just inland from the south coast. Low woodland of jarrah and Banksia with Melaleuca and an understorey of small shrubs is common on sand dunes. Wetter areas have rush and sedges.

NATIVE FAUNA

Some information about the fauna of the region is available from Hodgkin (1975); Forests Department (1977); Christensen and Kimber (1977); Schwinghammer (1978); Christensen and Liddelow (1980); Dames and Moore (1980); Nichols (1980); Kimber and Christensen (1983); Nichols and Nichols (1984); Christensen *et al.* (1985); Worsley Alumina Pty Ltd (1985); Nichols *et al.* (1986) and Watkins (1986).

Based on the above, some common vertebrate species in various vegetation types are as follows:

Jarrah forest

Western grey kangaroo (*Macropus fuliginosus*), western brush wallaby (*Macropus irma*), southern brown bandicoot (*Isodon obesulus*), mardo (*Antechinus flavipes*), dugite (*Pseudonaja affinis affinis*), black tiger snake (*Notechis ater occidentalis*), silvereve (*Zosterops lateralis*), scarlet robin (*Petroica multicolor*), grey fantail (*Rhipidura fuliginosa*), white-tailed black cockatoo (*Calyptorhynchus baudinii*), Carnaby's cockatoo (*Calyptorhynchus latirostris*), tawny frogmouth (*Podargus strigoides*).

Karri forest

Mardo, grey-bellied dunnart (*Sminthopsis griseoventer*), bush rat, black tiger snake, purple-crowned lorikeet (*Glossopsitta porphyrocephala*), scarlet robin, New Holland honeyeater (*Phylidonyris novaehollandiae*), western rosella (*Platycercus icterotis*).

Wandoo woodland

Western grey kangaroo, western brush wallaby, common brush-tail possum (*Trichosurus vulpecula*), short nosed bandicoot, mardo, dugite, emu, purple-crowned lorikeet, western rosella, Port Lincoln ringneck (*Bamardius zonarius*), golden whistler (*Pachycephala pectoralis*), grey fantail, red wattlebird (*Anthochaera carunculata*), brown goshawk (*Accipiter fasciatus*), wedge tailed eagle (*Aquila audax*).

Coastal plain (tuart, peppermint, banksia, yate, swamps)

Western grey kangaroo, southern brown bandicoot, western brush wallaby, bush rat, dugite, emu, purple crowned lorikeet, Port Lincoln ringneck, scarlet robin, golden whistler, grey

fantail, red wattlebird, New Holland honeyeater, silvereeye, Australian raven (*Corvus coronoides*), silver gull (*Larus novaehollandiae*).

Wetlands and estuaries

Water rat (*Hydromys chrysogaster*), white faced heron (*Ardea novaehollandiae*), Australian pelican (*Pelicanus conspicillatus*), black swan (*Cygnus atratus*), Pacific black duck (*Anas superciliosa*), maned duck (*Chenonetta jubata*), eurasian coot (*Fulica atra*), darter (*Anhinga melanogaster*), silver gull, whistling kite.

Social and Economic Resources

HISTORY AND LAND USE

Aborigines

Aboriginal people occupied the area during at least the past 40 000 years. Further details are provided later in the plan.

Exploration

European exploration of the coastline dates from the 1620s (Leeuwin 1622; Nuyts 1627). Terrestrial exploration dates from 1829 when Perth was settled. J.S. Roe explored an area inland from Bunbury in 1830, and a number of parties explored between Bunbury and Augusta in 1831.

Agriculture

The dates of first European settlement at various locations within the region are believed to have been as follows: Augusta 1830 (Turner, Molloy, Bussell); Busselton 1832 (Bussell); Eelup near Bunbury 1830 (Scott); Australind 1841; Donnybrook 1842; Lake Clifton 1844 (Moore); Drakesbrook 1847 (Drake); Boyup Brook 1854; Bridgetown 1857 (Blechynden); Nannup 1859; Margaret River 1894; Collie 1897.

Agricultural development was relatively slow until about 1895 when settlement was accelerated by the goldrushes and development of the railway network. By 1918 the production of hay, sheep, dairy cattle, potatoes and fruit predominated. The first large-scale irrigation project in the State opened at Harvey in 1916, for orange growing. By 1939 larger areas were devoted to dairying, with the area of irrigated pasture increased by new dams at Drakes Brook and Samson Brook and the enlargement of Harvey Weir.

Currently, the main farming activities in the region are dairying, beef cattle, sheep, orchards, vegetables, potatoes, grapes, cereals, pigs and poultry. In recent times the area devoted to dairying and fruit growing has reduced and the area devoted to grapes and vegetables increased.

Water Production

Water production from this region is mainly utilised for irrigation and began with the construction of Harvey Weir in 1916. No further developments took place until a burst of activity in the 1930s and 1940s saw the construction of Drakes Brook, Wellington, Samson and Stirling Dams and the raising of Harvey Weir. A lull followed until the construction of Logue Brook, Waroona and Glen Mervyn Dams and the raising of Wellington in the 1960s. In addition to these major structures with their large catchments all located in the northern half of the region there are, throughout the region, a considerable number of smaller structures and catchments developed for town water supplies. The first of these, Hester Dam, developed to supply Bridgetown, was constructed in 1918, and the most recent, Kirup Dam, in 1966.

Timber Production

The first sawmills in the region operated at Quindalup in 1854 (Yelverton) and Worsley and Karridale in 1883 (Davies). Other early sawmills included Crooked Brook (1890), Yarloop (1895),

Mornington (1898), Nanga Brook (1904) and Barrabup (1908). The first State forest in the region was dedicated in 1919 at Ludlow, followed by an area at Collie in 1920. By 1930 much of the current area of State forest was dedicated. Until about 1970 virtually all of State forest was available for timber production. Since then, increasing areas have been allocated to other uses.

Mining and Processing

Commercial deposits of tin were discovered near Greenbushes in 1888 and mining commenced the following year. Tantalite is also obtained from this mining operation. Coal was discovered near Collie in 1883, and mining commenced in 1898. Mineral sand deposits were discovered near Bunbury in 1949, and mining has continued since 1956 near Capel and Yoganup. In 1964 Laporte Titanium established a factory at Australind to process ilmenite mined near Capel. In 1968 Western Titanium established a plant at Capel to produce synthetic rutile. Bauxite mining has taken place at two locations in the region (Willowdale and Mt Saddleback) since 1984. Alumina refineries are established at Wagerup and Worsley. Gold was mined near Donnybrook between 1899 and 1908. A number of exploratory oil wells were drilled in the Perth Basin prior to 1982, including one in the Whicher Range which yielded non-commercial amounts of gas.

Conservation and Recreation

Possibly the first conservation reserves in the region were a number of cave reserves gazetted in the Leeuwin-Naturaliste Ridge between 1894 and 1907. The first national parks as such (parts of Yalgorup and Scott) were not gazetted until 1952 and 1959 respectively. Forests Department General Working Plan No. 85 of 1972 was the first to formally set aside some State forest areas for conservation and recreation.

LOCAL GOVERNMENT AND POPULATION

The region includes all of six shires (Collie, Augusta-Margaret River, Busselton, Donnybrook-Balingup, Dardanup and Capel) plus the City of Bunbury and parts of eight shires (Waroona, Harvey, Boddington, Williams, West Arthur, Boyup Brook, Nannup, Bridgetown-Greenbushes), as shown in Map 5.

The town of Waroona is on the north-western boundary of the region and Bridgetown is on the south-eastern boundary. The main towns within the region and their populations as at the census of 30 June 1981 were as follows (Australian Bureau of Statistics 1982):

Bunbury (city)	21749
Collie	7667
Busselton	6463
Harvey	2479
Donnybrook	1197

As the regional boundaries do not consistently follow shire boundaries, the population of the region is difficult to determine. Based on 1986 census data it was probably about 79 000 at that time.

Tenure

AREA STATEMENT

Table 6 summarises land tenure in the region as at 1 January 1987.

CALM ESTATE

Map 6 shows the current extent of CALM lands.

TABLE 6
LAND TENURE STATEMENT FOR THE CENTRAL FOREST REGION
AS AT 1 JANUARY 1987

	Area (ha)	%
CALM LAND		
- vested - State forest	685830	
- CALM Act timber reserve	40340	
- National parks	27510	
- Nature reserves	5440	
- Other reserves	1840	
- owned - Executive Director	18110	
Sub Total	779070	44%
UNVESTED LAND		
- Land Act timber reserves	3630	
- National parks	20	
- Nature reserves	660	
- Other reserves	10930	
- Vacant Crown land	42420	
Sub Total	57660	3%
OTHER GOVT LAND (a)		
- Land Act timber reserves	100	
- National parks	600	
- Nature reserves	380	
- Other reserves (b)	36640	
Sub Total	37720	2%
PRIVATE PROPERTY	922150	51%
TOTAL (c)	1796600	100%

Note: (a) Other Government land includes Commonwealth, State and local government land.

CENTRAL FOREST REGION LOCAL GOVERNMENT BOUNDARIES

KEY

- LOCAL GOVERNMENT BOUNDARIES
- STATISTICAL DIVISION BOUNDARIES
- C.A.L.M. ESTATE

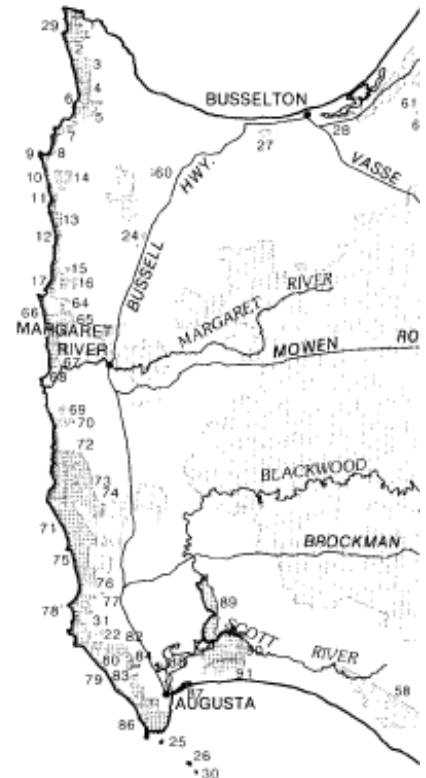


MAP 5

ID. No.	NAME	RESERVE No.	ID. No.	NAME	RESERVE No.
DISTRICT: BUSSELTON			DISTRICT: HARVEY		
1	LEEWIN NATURALISTE N.P.	A 15633	18	(YALGORUP N.P.)	A 22057
2	LEEWIN NATURALISTE N.P.	A 13404	37	YALGORUP N.P.	A 11710
3	LEEWIN NATURALISTE N.P.	A 20455	38	(BYRD SWAMP N.R.)	C 2517
4	LEEWIN NATURALISTE N.P.	A 8769	39	(WELLARD ROAD N.R.)	C 2547
5	LEEWIN NATURALISTE N.P.	A 8427	40	HARVEY FLATS N.R.	C 12049
6	LEEWIN NATURALISTE N.P.	A 13404	41	BULLER N.R.	A 22199
7	LEEWIN NATURALISTE N.P.	A 10922	42	KOOLJERRENNUP N.R.	A 23796
8	LEEWIN NATURALISTE N.P.	A 13404	43	KOOLJERRENNUP N.R.	A 23796
9	LEEWIN NATURALISTE N.P.	A 12507	44	CRAMPTON N.R.	C 24472
10	LEEWIN NATURALISTE N.P.	A 13404	45	BENGER SWAMP N.R.	C 34811
11	LEEWIN NATURALISTE N.P.	A 8429	46	BENGER SWAMP N.R.	C 34811
12	LEEWIN NATURALISTE N.P.	A 13404	47	BENGER SWAMP N.R.	C 34811
13	LEEWIN NATURALISTE N.P.	A 8429	48	BENGER SWAMP N.R.	C 34811
14	LEEWIN NATURALISTE N.P.	A 8429	85	(BYRD SWAMP N.R.)	C 2517
15	LEEWIN NATURALISTE N.P.	A 23286	92	(LANE POOLE RESERVE)	A 39827
16	LEEWIN NATURALISTE N.P.	A 20849	93	(LANE POOLE RESERVE)	A 39821
17	LEEWIN NATURALISTE N.P.	A 7406	94	(LANE POOLE RESERVE)	A 39823
22	(STOCKDILL ROAD N.R.)	C 1394	95	(LANE POOLE RESERVE)	A 39827
23	CAMEL N.R.	C 16144			
24	(WAL BURRA N.R.)	C 20296			
25	SEAL ISLAND N.R.	A 25645			
26	ST ALOUARN ISLAND N.R.	A 25645			
27	BROADWATER N.R.	C 27080	50	(WAKINUP N.R.)	A 9708
28	SABINA N.R.	A 31188	51	KULUKUP N.R.	A 18229
29	SUGARLOAF ROCK N.R.	A 31634	53	POWLALUP N.R.	A 25445
30	(FLINDERS BAY AND OTHER ROCKS N.R.)	A 39421	54	(SIX MILE ROAD N.R.)	C 26508
31	(STOCKDILL ROAD N.R.)	C 39485	55	(WILGA N.R.)	C 29121
60	HAAG N.R.	C 37010	56	RED HILL N.R.	A 30217
61	(RUABON N.R.)	C 33299			
62	(RUABON N.R.)	C 33299			
63	(RUABON N.R.)	C 33299			
64	LEEWIN NATURALISTE N.P.	A 22673			
65	LEEWIN NATURALISTE N.P.	A 22673	57	(EAST NANNUP ROAD N.R.)	A 22482
66	LEEWIN NATURALISTE N.P.	A 13404	58	GINGILUP SWAMP N.R.	C 30625
67	LEEWIN NATURALISTE N.P.	A 8430			
68	LEEWIN NATURALISTE N.P.	A 8694			
69	LEEWIN NATURALISTE N.P.	A 8432			
70	LEEWIN NATURALISTE N.P.	A 8433			
71	LEEWIN NATURALISTE N.P.	A 13404			
72	LEEWIN NATURALISTE N.P.	A 26035			
73	LEEWIN NATURALISTE N.P.	A 8434			
74	LEEWIN NATURALISTE N.P.	A 8435			
75	LEEWIN NATURALISTE N.P.	A 20548			
76	LEEWIN NATURALISTE N.P.	A 26036			
77	LEEWIN NATURALISTE N.P.	A 30826			
78	LEEWIN NATURALISTE N.P.	A 21451			
79	LEEWIN NATURALISTE N.P.	A 13404			
80	LEEWIN NATURALISTE N.P.	A 21451			
81	CLIFF SPACKMAN RESERVE (H)	A 8436			
82	CLIFF SPACKMAN RESERVE (H)	A 8436			
83	CLIFF SPACKMAN RESERVE (H)	A 8436			
84	CLIFF SPACKMAN RESERVE (H)	A 8436			
86	LEEWIN NATURALISTE N.P.	A 32376			
87	LEEWIN NATURALISTE N.P.	A 13984			
88	LEEWIN NATURALISTE N.P.	A 14779			
89	SCOTT N.P.	A 25373			
90	SCOTT N.P.	A 25373			
91	SCOTT N.P.	A 25373			
DISTRICT: COLLIE					
32	LAKE TOWERRENNING N.R.	C 24917			
33	BOOLADING N.R.	C 29604			
34	HADDETON N.R.	C 31913			
35	(EGRET COLONY N.R.)	A 38393			
36	(COLLIE RIVER N.R.)	C 38415			
49	WILD HORSE SWAMP N.R.	C 1740			
52	HADDETON GULLY N.R.	C 23886			
96	LANE POOLE RESERVE	A 39821			

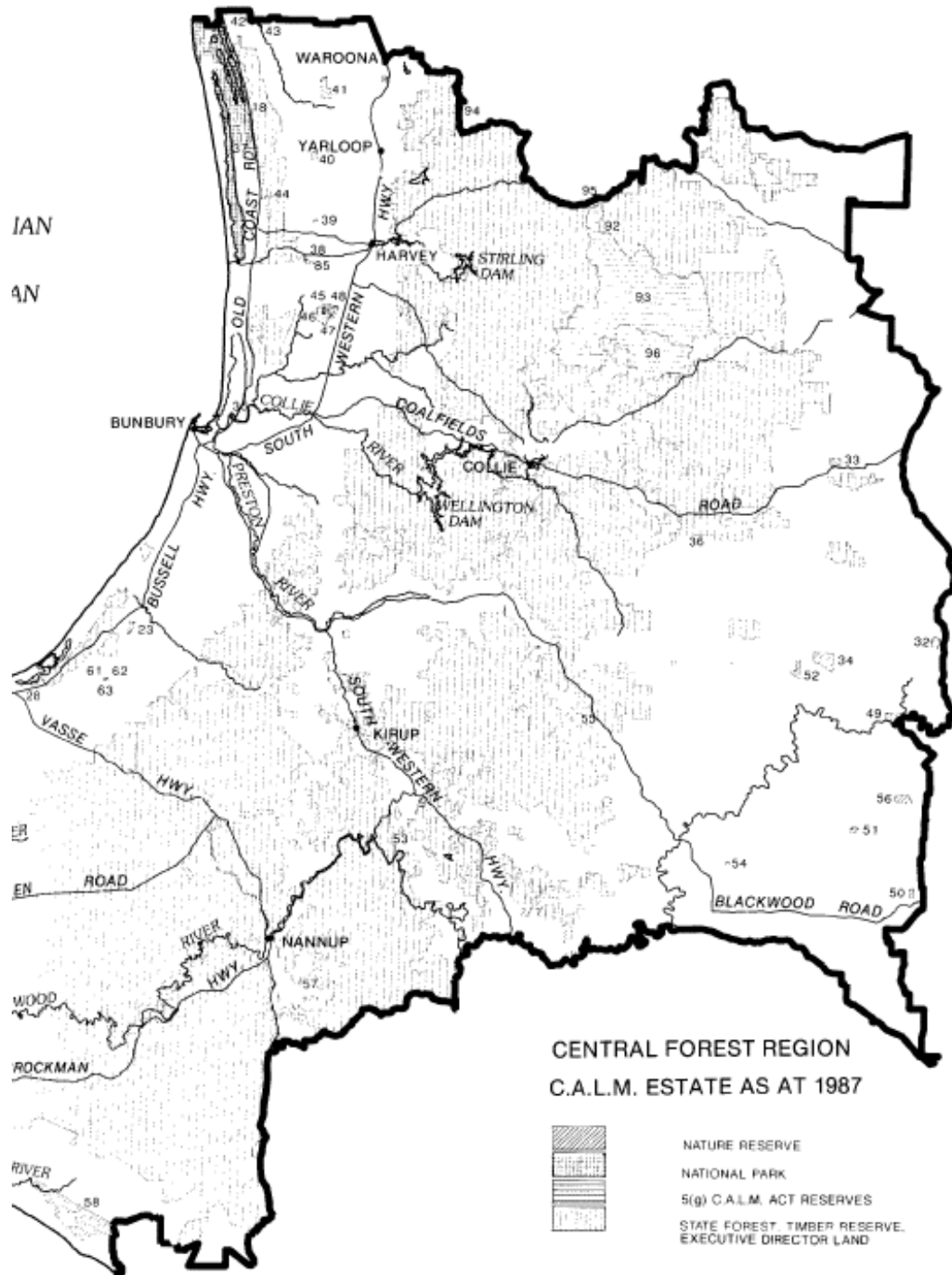
INDIAN
OCEAN

NOTES:
(a) PART OF LEEWIN NATURALISTE N.P.
N.P. — NATIONAL PARK
N.R. — NATURE RESERVE
NAMES WITHIN BRACKETS ARE UNOFFICIAL



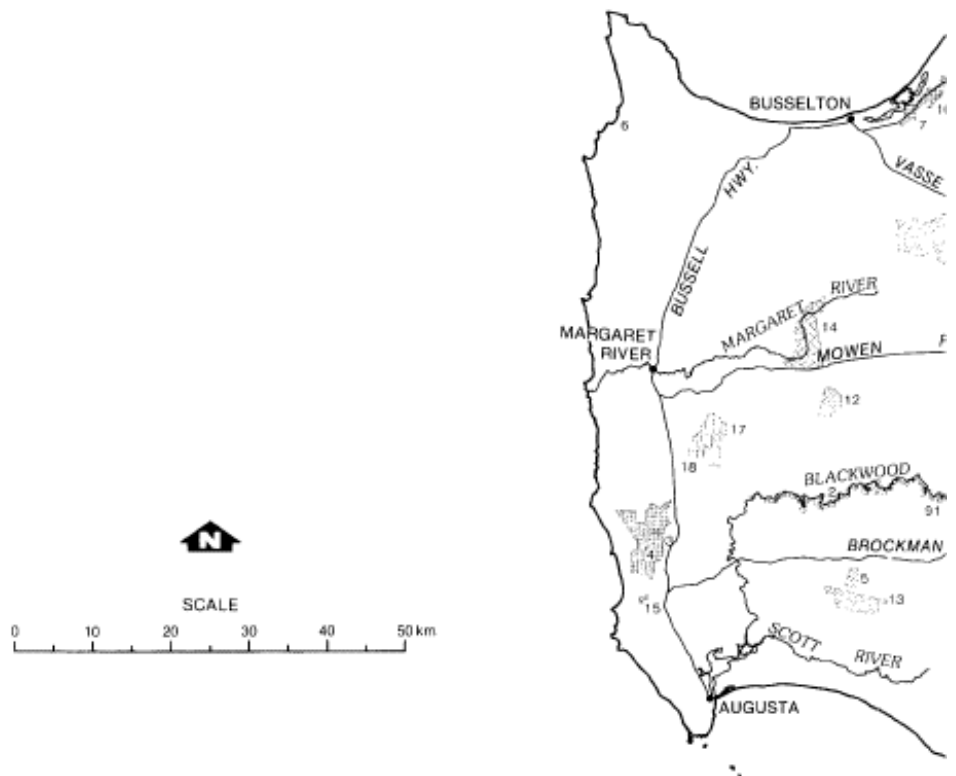
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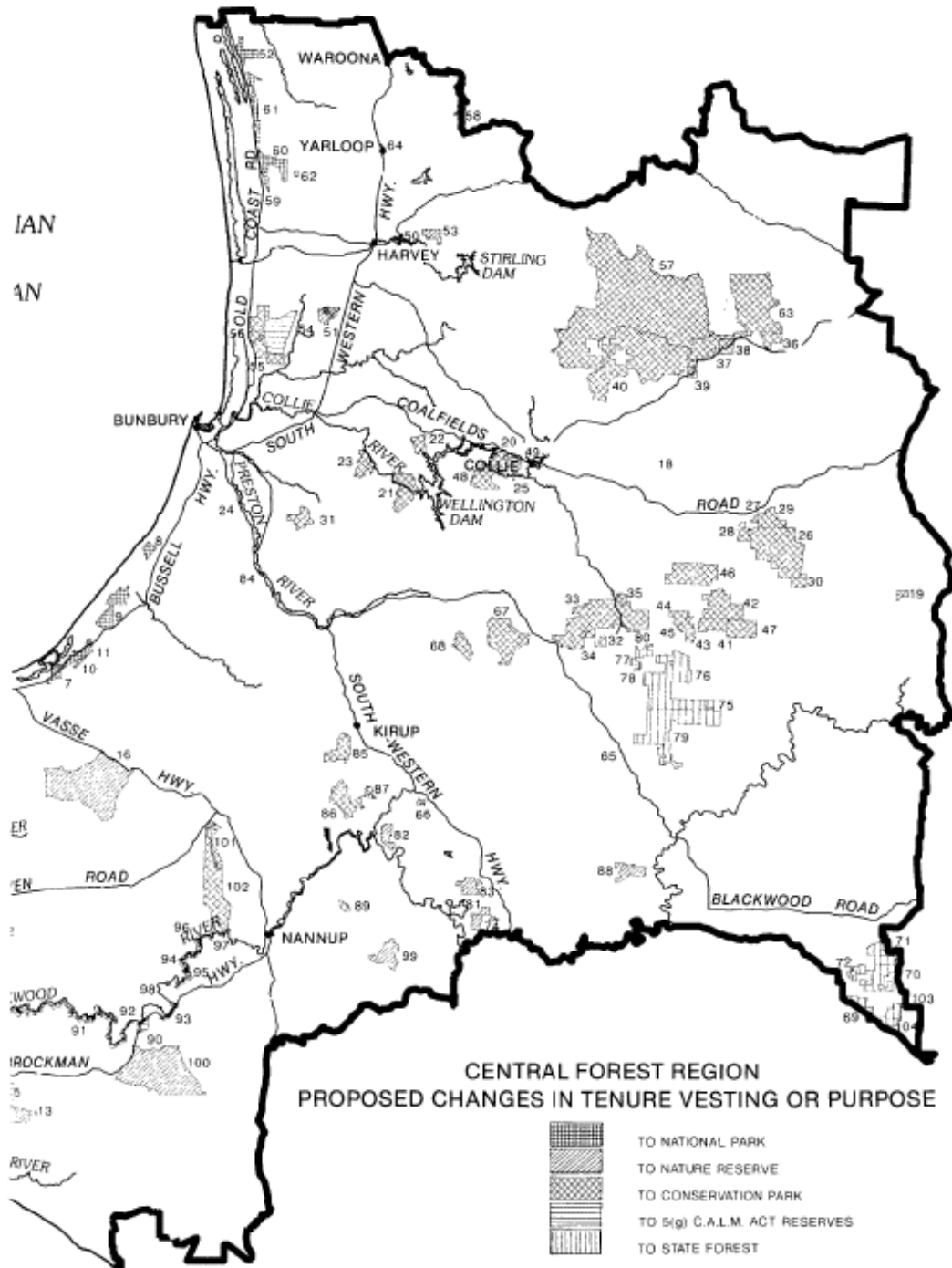




MAP 6

INDIAN
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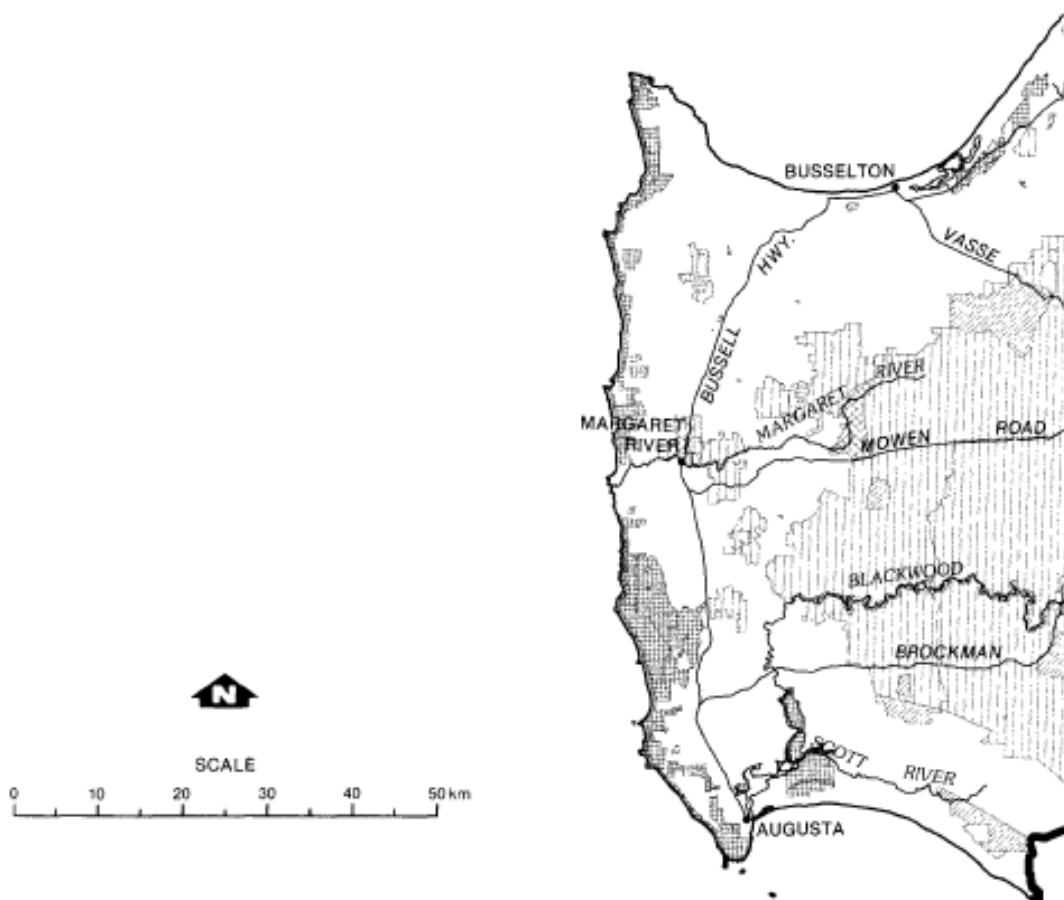




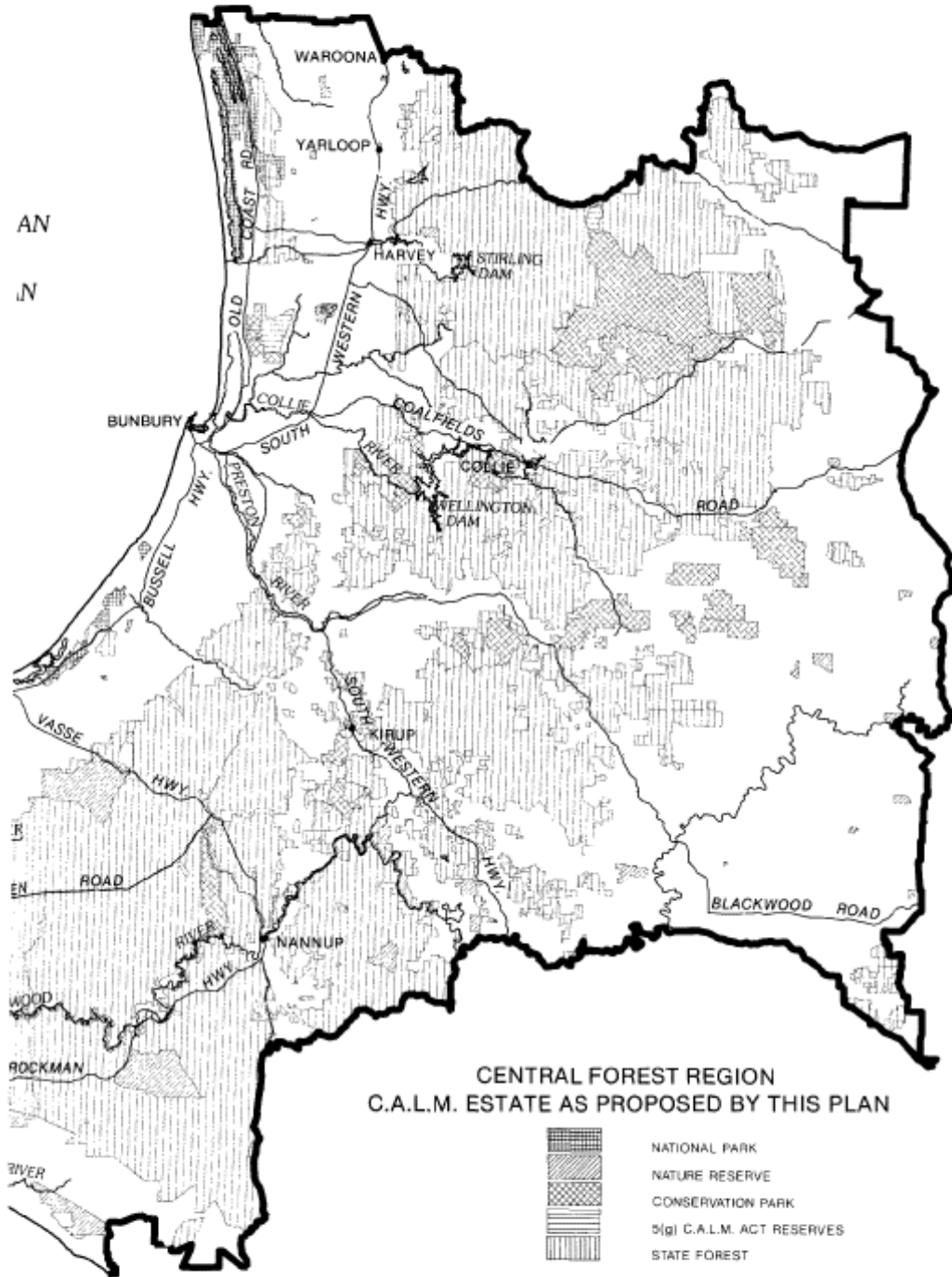
MAP 7

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MAP 8

PART 3. LAND USE CLASSIFICATION AND MANAGEMENT

LAND USE PROPOSALS

Present Land Use in the Region

The present land use plan for the region derives from the former Forests Department's General Working Plan No 87 for State forests and timber reserves, and from management plans prepared by the former National Parks Authority and Department of Fisheries and Wildlife.

A number of changes to the previous plans are proposed in this regional plan. These changes will allow the introduction of proposed new categories, will improve the security of purpose for many areas and will change the name and vesting of other areas to better reflect the purpose for which they are managed.

Proposed Changes in Tenure, Vesting or Purpose

In accordance with the changes to the system of land vesting, tenure and purpose described in Part 2 of this plan, and subject to Parliamentary agreement, a number of changes are proposed to areas of land managed by CALM. These are shown in Table 7 and on Map 7.

The changes derive from the following sources:

Conservation reserve proposals. Relates to recommendations by the Conservation Through Reserves Committee (CTRC) and System 6 Committee as reviewed by the EPA (reports: 1975, 1976, 1983).

Land proposed for State forest or timber reserve (CALM Act). Areas still under consideration by the Department of Land Administration.

Unvested nature reserves being considered for vesting in the NPNCA.

Changes proposed by CALM in this management plan.

Map 8 shows the CALM estate proposed by this plan.

Although the majority of the areas which are proposed for reservation have already been designated in one form or another as conservation or recreation reserves, some are subject to existing mineral leases and others may contain mineral resources. It is proposed that these mineral claims be progressively evaluated by an appropriately constituted committee. The Reserves Review Committee will continue to progressively evaluate areas within the EPA System 6 area.

All proposals to change land tenure or to reserve vacant Crown land will be referred to the Lands and Forest Commission and the National Parks and Nature Conservation Authority, and will be subject to the normal review processes by the Department of Land Administration. This will involve consultation with affected government and local government authorities. Furthermore, it will be necessary for both Houses of Parliament to agree to any changes involving A class reserves or State forest.

The boundaries of the proposed parks and reserves and additional State forest areas shown on Map 8 are not final and may be adjusted during the consultation and legislative processes described above. In addition, boundary modification may be recommended in future area management plans.

Details of Proposed Major Changes

All proposed changes in tenure, vesting or purpose are listed in Table 7.

The most important or significant proposals are:

NEW OR EXPANDED NATURE RESERVES

It is proposed to vest a number of unvested nature reserves, other reserves and vacant Crown land as nature reserves with the NPNCA.

Eight areas of State forest (the Chester, Dalgarp, Greenbushes, Milyeannup, Mowen, Nollajup, Paget and Whicher Management Priority Areas) will be reclassified as nature reserves.

NEW OR EXPANDED NATIONAL PARKS

Leeuwin-Naturaliste national park will be enlarged by the addition of Boranup State forest and Yalgorup national park by the addition of adjoining State forest (Clifton, McLarty and Myalup Management Priority Areas). A new national park has recently been created at Ludlow.

CONSERVATION PARKS

Numerous areas of State forest (including some reserves and vacant Crown land) are proposed as conservation park. These include Bennelaking, Blackwood, Dardanup, Ellis Creek, Goonac, Lennard, Muja, Mullalyup, Noggerup, Preston, Rapids, St John Brook, Stene and Westralia.

Most of the Lane Poole Reserve which is currently a CALM 5g reserve, is also proposed for reclassification as conservation park.

Three small national parks are proposed for reclassification to conservation park. They are Bridgetown, Gwindinup and Wagerup.

Some of the land held freehold in the name of the Executive Director at Kemerton will be converted to conservation park.

ADDITIONAL STATE FOREST

Vacant Crown land at Camballan, Chowerup, Witchcliffe and Wournbelup is proposed for reservation as State forest.

Origin of Conservation and Recreation Priority Areas in State forest

All the core areas of the conservation and recreation priority areas set aside in State forest by the Forests Department in its General Working Plans 86 and 87 (Appendices 3 and 4, and Map 8 of GWP 87) are proposed for reclassification in this plan, either to nature reserve, national park or conservation park.

A small number of areas designated by the Forests Department as buffer zones will remain as State forest.

The reserve system developed by the Forests Department was based on the objectives of

- (i) setting aside representative ecosystems in all the main forest types, and
- (ii) ensuring that recreational demands in the forest could be met in the long term.

The reserve system was reviewed and endorsed by the Environmental Protection Authority in its land use studies of Systems 1, 2, 4 and 6 published in the period 1975-1983.

TABLE 7
PROPOSED CHANGES IN TENURE, VESTING AND PURPOSE IN THE CENTRAL FOREST REGION

ID No.	Area Name(a)	Current Classification (b)	Proposed Classification
BUSSELTON DISTRICT			
1	(Blue Rock Cave)	other reserve	national park
2	Blackwood	State forest	conservation park
3-4	Boranup	State forest	national park
5	Chester	State forest	NR vested in NPNCA
6	(Leeuwin-Naturaliste)	VCL	national park
7-11	Ludlow(c)	State forest	national park
12	Mowen	State forest	conservation park
13	Paget	State forest	NR vested in NPNCA
14	Rapids	State forest	conservation park
15	(Leeuwin-Naturaliste)	timber reserve	national park
16	Whicher	State forest	NR vested in NPNCA
17-18	Witchcliffe	VCL	State forest
COLLIE DISTRICT			
19	(Capercup Rd North)	NR unvested	NR vested in NPNCA
20	(Coalfields Rd)	NR unvested	NR vested in NPNCA
21-23	Lennard	State forest	conservation park
24	(North Boyanup Rd)	NR unvested	NR vested in NPNCA
25	(Wyvern Rd)	NR unvested	NR vested in NPNCA
26	Bennelaking	other reserve	conservation park
27-29	Bennelaking	State forest	conservation park
30	Bennelaking	VCL	conservation park
31	Dardanup	State forest	conservation park
32	Goonac	other reserve	conservation park
33	Goonac	State forest	conservation park
34-35	Goonac	VCL	conservation park
36-37	(Lane Poole Reserve)	WAWA land	conservation park
38-39	(Lane Poole Reserve)	other reserve	conservation park
40	Lane Poole Reserve	5g reserve	conservation park
41	Muja	other reserve	conservation park
42-46	Muja	VCL	conservation park
47	Muja	timber reserve	conservation park
48-49	Westralia	State forest	conservation park
HARVEY DISTRICT			
50	(Falls Brook)	NR unvested	NR vested in NPNCA
51	Benger Swamp	Executive Dir.	NR vested in NPNCA
52	Clifton	State forest	national park

53	Falls Brook	NR unvested	NR vested in NPNCA
54	Kemerton	Executive Dir.	5g reserve
55-56	Kemerton	Executive Dir.	conservation park
57-58	Lane Poole Reserve	5g reserve	conservation park
59-60	Myalup	State forest	national park
61	McLarty	State forest	national park
62	Riverdale	NR unvested	NR vested in NPNCA
63	Stene	State forest	conservation park
64	Wagerup	national park	conservation park

KIRUP DISTRICT

65	(Donnybrook-Boyup Rd)	NR unvested	NR vested in NPNCA
66	(Golden Valley)	Executive Dir.	5g reserve
67	Noggerup	State forest	conservation park
68	Preston	State forest	conservation park
69-72	(Wournbelup)	VCL	State forest
73-74	(Bridgetown)	national park	conservation park
75-79	Camballan	VCL	State forest
80	Goonac	other reserve	conservation park
81-83	Greenbushes	State forest	nature reserve
84	(Gwindinup)	national park	conservation park
85-87	Mullalyup	State forest	conservation park
88	Nollajup	State forest	NR vested in NPNCA
103-104	(Chowerup)	other reserve	State forest

NANNUP DISTRICT

89	(Ellis Creek)	State forest	conservation park
90	Blackwood	Executive Dir.	conservation park
91-98	Blackwood	State forest	conservation park
99	Dalgarup	State forest	NR vested in NPNCA
100	Milyeannup	State forest	NR vested in NPNCA
101-102	St John Brook	State forest	conservation park

- Note:** NR Nature reserve
VCL vacant Crown land
5g reserve under Section 5g of CALM Act.
- (a) Names in brackets are unofficial.
(b) Executive Dir. is land held freehold in the name of the Executive Director.
(c) Since this plan was drawn up most of the Ludlow area has been gazetted as national park.

Fate of Conservation and Recreation Priority Areas in State Forest

The Forests Department's General Working Plan 87 (Appendix 3) listed 64 flora, fauna and landscape MPAs. These fall within the Northern Forest, Central Forest and Southern Forest regions of CALM.

It is proposed that these areas be reclassified as follows:

- 16 will become national parks
- 14 will become nature reserves
- 34 will become conservation parks

General Working Plan 87 (Appendix 4) listed 7 recreation MPAs in State forest.

It is proposed that these be reclassified as follows:

- 2 will become national parks
- 5 will become conservation parks

The Department will in time produce 'area management plans' for each of these areas.

In the case of seven former flora, fauna and landscape areas in the Central Forest Region (Lennard, Mullalyup, Preston, Noggerup, Dalgarup, Mowen and Dardanup) the areas previously designated as 'buffer' will be retained as State forest and managed for multiple use. However, this management will be sympathetic with the values for which the core areas have been reserved.

Blackwood, a former recreation priority area, will also have the buffer excluded from reservation, but that area will be carefully managed to protect recreation values on, and adjacent to the Blackwood River.

Zoning of State Forest, Parks and Reserves

In addition to the proposed allocation of lands to the categories of nature reserve, marine park, national park, conservation park or State forest, areas may further be zoned to give priority to certain land uses in selected areas.

Areas may be zoned to emphasise conservation, protection, recreation or production. This process will be developed in detailed management plans for specific areas.

Apart from the Lane Poole Reserve where zoning was determined at time of creation, no management priority zones have yet been allocated for national park, nature reserve and conservation park. The zoning system for these areas will be determined later when their management plans are developed. At this time, pending changes to the CALM Act to permit this to be done, the possibility of giving zones A class security of purpose will be considered.

RESOURCES, ISSUES AND STRATEGIES.

The topics covered are:

- Land Dedication and Acquisition;
- Conservation of Flora, Fauna and Landscape;
- Cultural Areas;
- Protection;
- Recreation;
- Public Participation and Liaison;
- Production;
- Public Utilities.

The format is:

Introductory background information on resources and issues.

Regional strategies, which add specific details to the Departmental policy guidelines presented in Appendix 2.

Regional strategies are not ranked in order of priority. This is partly because it is intended that all strategies listed will eventually be implemented. But it also reflects the absence of a policy on ranking priorities on resource allocation within CALM. It is intended that such a policy be developed during the period of this plan.

Land Dedication and Acquisition

The classes of land controlled under the CALM Act are described in Part 1 and areas within the region are listed in Table 6. CALM also manages some unvested land (proposed for CALM Act

tenure) as shown in Map 7. Some CALM land is leased for grazing or other purposes under historical agreements. There are currently some 240 CALM Act leases covering about 18 300 ha in the region.

Regional Strategies

In addition to implementing Departmental policies and guidelines (see Appendices I and 2), during the period of this plan CALM staff in the region will:

- (i) monitor the availability of suitable private land for purchase e.g. for consolidation of national parks, augmentation of nature reserves, the development of forests, improved management of the CALM estate;
- (ii) engage in land exchanges where the benefits are worthwhile e.g. to improve boundary configurations, consolidate the CALM estate, improve access;
- (iii) renew or grant leases of CALM land where it benefits the Department's land use objectives, either directly or financially e.g. for grazing leases in pine forest fuel reduced buffers, leases for timber mills and camping grounds;
- (iv) further develop systems for administering land resources and servicing their management e.g. CALM information system, intergraph, cartographic and photogrammetric services;
- (v) implement as directed, the EPA (CTRC) reserve recommendations and other approved proposals for additions to CALM tenure, subject to provision of adequate additional funds and staff;
- (vi) liaise with the South West Region Planning Authority, through membership of the Technical Subcommittee, on land tenure and management matters concerning the Department.

Conservation of Flora, Fauna and Landscape

Conservation is defined as

.... the management of human use of the biosphere so that it may yield the greatest sustainable benefit to present generations while maintaining its potential to meet the needs and aspirations of future generations. Thus conservation is positive, embracing preservation, maintenance, sustainable utilisation, restoration and enhancement of the natural environment. Living resource conservation is specifically concerned with plants, animals and microorganisms, and with those non-living elements of the environment on which they depend. Living resources have two important properties the

combination of which distinguishes them from non-living resources : they are renewable if conserved; and they, are destructible if not. (I. U. C.N. (1980) in Dept. of Conservation and Environment (1987).)

CALM manages 819 000 ha of land in the region, of which 136 000 ha or 17 per cent has a nature conservation priority as shown in Map 8. The question of whether this area was adequate was examined by the Conservation Through Reserves Committee (for System 4) and the System 6 Committee. This culminated in the release of the EPA's 'Systems Red Books' in 1975-83. Numerous recommendations were made to improve the reserve system. Some of these recommendations have been implemented, but many have yet to be acted upon. A comparison between the EPA, Forests Department and CALM recommendations for these areas is provided in Appendix 3.

Security of purpose of conservation reserves, particularly those that do not have an A' classification, is a major issue. Greater security of purpose for State forest conservation areas can be provided by making them 'A' class reserves vested in the NPNCA. This is proposed in this plan.

LANDSCAPE

Land management can result in substantial changes to the landscape. Undesirable visual effects can be avoided or minimised through understanding and application of landscape management principles.

Attractive landscape features of the region include:

- Darling escarpment;
- river valleys, e.g. Harvey, Collie, Blackwood;
- Darling Ranges;
- lakes, e.g. Lake Preston, Lake Clifton;
- mountains, e.g. Mt William, Mt Lennard;
- cliffs and beaches, e.g. Leeuwin-Naturaliste;
- jarrah forest;
- tuart woodland;
- wandoo woodland;
- coastal plain.

Agencies which may have a deleterious effect on landscapes include:

- insects and fungal disease;
- logging;
- mining;
- prescribed burning;

wildfires;
public utilities.

Regional Strategies

In addition to implementing Departmental policies and guidelines (see Appendices 1 and 2), during the period of this plan CALM staff in the region will:

- (i) identify and map high quality landscapes in the region;
- (ii) apply formal landscape impact assessment to operational planning in designated high quality landscapes;
- (iii) include landscape planning in area management plans;
- (iv) locate site developments in sympathy with the landscape. Existing intrusive site developments will be redesigned or relocated as resources allow;
- (v) provide a landscape operations manual and complementary training to officers involved with recreation, parks and reserves, and planning;
- (vi) continue to completion the program of standardisation of signs in the region;
- (vii) liaise with adjoining landholders wherever a mutual interest in the conservation of a high quality landscape is apparent;

FLORA AND FAUNA

The Department Is responsible for flora and fauna on CALM land and for the protection of native flora and fauna throughout the State under the Wildlife Conservation Act. The latter Act gives the Department responsibilities on private property as well as on Crown land. Liaison is required with private landholders and other land management agencies to inform them of their obligations and offer advice and assistance on matters of conservation.

A major aim of management in areas whose primary function is wildlife conservation is to maximise diversity and species richness. In some reserves, management is directed to providing habitat for particular species or communities. Such reserves in the Central Forest Region will be progressively defined by CALM scientific staff.

In lands managed by the Department where wildlife conservation is not the primary purpose, management practices will aim to maximise wildlife values, as far as this is consistent with the primary land use.

Currently, 18 plant species known to occur within the region are gazetted as rare or in need of special protection (Table 8A). During the period of the plan, the list will be revised, in the light of continuing survey and research. There are also 16 species of rare vertebrates (Table 8B).

Some species are not rare, but are geographically restricted in distribution or have interesting 'outlying' remote populations possibly remnants of more extensive distribution patterns. One example of the latter is the occurrence of white mangrove (*Avicennia marina*) at Bunbury (Schwinghammer 1978). This is the only stand of mangrove between the Gascoyne River and Spencer Gulf in South Australia.

Knowledge of the existence and distribution of the thousands of native flora and fauna species in the region is considerable but not complete. High priority is given to investigating and protecting declared rare species and their habitats.

Harvesting, hunting or culling of endemic species, particularly kangaroos, ducks, parrots and wildflowers is another issue. Some fauna species have been favoured by land clearing and development and have become agricultural pests. Other species have been harvested commercially or hunted for decades.

TABLE 8A
GAZETTED RARE FLORA SPECIES KNOWN TO OCCUR WITHIN THE CENTRAL
FOREST REGION AS AT NOVEMBER 1987

<i>Aponogeton hexatepalus</i>	
<i>Banksia tneisneti</i> var. <i>ascendens</i>	
<i>Caladenia plicata</i>	
<i>Caladenia</i> sp. (Cape Naturaliste)	S.D. Hopper 4518
<i>Caladenia</i> sp. (Jarrah forest)	S.D. Hopper 3990
<i>Caladenia</i> sp. (Leeuwin-Naturaliste)	S.D. Hopper 4670
<i>Caladenia</i> sp. (coastal plain)	S.D. Hopper 3400
<i>Caladenia</i> sp. (Southern forest)	S.D. Hopper 3553
<i>Chamelaucium</i> sp. (Busselton)	G.J. Keighery 3655
<i>Chamelaucium</i> sp. (South coastal plain)	R.D. Royce 4872
<i>Danvinia</i> sp. (Scott River)	G.J. Keighery 3582
<i>Drakea jeanensis</i>	
<i>Drakea</i> sp. (south-west)	S.D. Hopper 3566
<i>Drakea</i> sp. (Great Southern)	S.D. Hopper 3461
<i>Eucalyptus</i> sp. (Cape Naturaliste)	K.H. Rechinger 58888
<i>Kennedia macrophylla</i>	
<i>Lambertia orbifolia</i>	
<i>Wurmbea</i> sp. (Cape Naturaliste)	S.D. Hopper 5871

TABLE 86
GAZETTED RARE FAUNA SPECIES KNOWN TO OCCUR WITHIN THE CENTRAL
FOREST REGION OR ADJOINING WATERS AS AT MARCH 1987

Common Name	Scientific Name
New Zealand fur seal	<i>Arctocephalus forsteri</i>
Woylie	<i>Bettongia penicillata</i>
Rufous bristle bird	<i>Dasyornis broadbenti</i>
Western quoll or chuditch	<i>Dasyurus geoffroii</i>
Leathery turtle	<i>Dermochelvs coriacea</i>
Red eared firetail finch	<i>Emblema oculatum</i>
Southern right whale	<i>Eubalaena australis</i>
Peregrine falcon	<i>Falco peregrinus</i>
Crested shrike-tit	<i>Falcunculus frontatus</i>
Humpback whale	<i>Megaptera novaeangliae</i>
Numbat	<i>Myrmecobius fasciatus</i>
Ground parrot	<i>Pezoporus wallicus</i>
Red tailed tropic bird	<i>Phaeton rubricauda</i>
Western ringtail	<i>Pseudocheirus peregrinus</i>
Carpet snake	<i>Python spilotos</i>
Freckled duck	<i>Stictonetta naevosa</i>

Regional Strategies

In addition to implementing Departmental policies and guidelines (see Appendices 1 and 2), during the period of this plan CALM staff in the region will:

- (i) continue to give gazetted rare flora first priority for flora management, and complete the regional register of declared flora for use by district officers. Attention will then turn to geographically restricted species and any other population of plants thought to be in need of special protection;
- (ii) continue to maintain confidentiality of locations of plant populations in the declared flora register;
- (iii) monitor populations of declared rare and geographically restricted plants;
- (iv) conduct systematic study of the management requirements for particular species or populations of flora;
- (v) conduct studies of particular flora management requirements;
- (vi) progressively develop management plans for all conservation reserves in the region. National parks and nature reserves will be first priority, interim protection plans will be produced in the meantime;
- (vii) take account of the conservation of wildlife in all prescriptions for operations on other CALM land (eg. State forest); where appropriate, areas amidst or adjoining production or protection operations will be protected for the benefit of wildlife;
- (viii) maintain close liaison with landholders, and other land management agencies and the general public regarding their responsibilities under the Wildlife Conservation Act;
- (ix) continue to conduct regular patrols in pursuit of suspected breaches of the Wildlife Conservation Act;
- (x) monitor particular wildlife habitats and important seasonal events in wildlife populations, eg. seasonal bird migrations, nesting, hunting seasons;
- (xi) conduct studies of fauna habitat, animal behaviour and management requirements subject to the Department's Statewide responsibilities and priorities;

(xii) co-operate with public groups and organisations which can contribute to the understanding, appreciation and conservation of our wildlife;

(xiii) continue to implement the Department's Kangaroo Management Program.

WETLANDS AND ESTUARIES

Wetlands occur as lakes, swamps, rivers, reservoirs and estuaries. Many of the wetlands in the region occur on the Swan Coastal Plain.

Major wetland areas managed by CALM are listed in Table 9.

Wetlands are threatened by pollution from run-off water, spread of weeds and recreational use.

TABLE 9
MAJOR WETLANDS MANAGED BY CALM IN THE CENTRAL FOREST REGION

	TENURE
LAKES AND SWAMPS	
Lake Preston	national park
Lake Clifton	national park
Benger Swamp	nature reserve
Gingilup Swamp	nature reserve
Wildhorse Swamp	nature reserve
Harvey Flats	nature reserve
RIVERS (PARTS OF)	
Harvey River	State forest
Brunswick River	State forest
Collie River	State forest
Margaret River	State forest
Blackwood River	State forest
ESTUARIES ETC (PARTS OF)	
Some CALM Act land adjoins estuaries, eg:	
Hardy Inlet	national park
Vasse Estuary	nature reserve

Regional Strategies

In addition to implementing Departmental policies and guidelines (see Appendices 1 and 2), during the period of this plan CALM staff in the region will:

- (i) Inventory of the wetland resource (CALM land and other) in the region;
- (ii) degraded wetlands as resources allow and consider the creation of new wetlands as appropriate, eg. after mining;
- (iii) oppose the degradation or alienation of wetlands on CALM land;
- (iv) liaise with private landholders and other agencies to promote wetland conservation, eg. Department of Agriculture, WAWA, local government bodies;
- (v) monitor the condition of wetlands.

MARINE CONSERVATION

There are currently no marine reserves under CALM management in the region. Parts of Leeuwin-Naturaliste and Yalgorup National Parks extend to the coastline, but are above high water mark.

Under the Wildlife Conservation Act, the Department is responsible for conservation of marine mammals and seabirds.

Regional Strategies

In addition to implementing Departmental policies and guidelines (see Appendices 1 and 2), during the period of this plan CALM staff in the region will:

- (i) evaluate marine areas in the region as possible marine reserves;
- (ii) protect and assist injured marine fauna, eg. whales, seals.

Cultural Areas

Areas of cultural importance occur on all CALM lands. Historic and Aboriginal sites are scattered throughout, while limestone caves are confined to the Leeuwin-Naturaliste ridge.

ABORIGINAL SITES

Aboriginal people occupied the region for more than 40 000 years and many important sites have been identified. These sites are most plentiful on the Swan Coastal Plain. All Aboriginal sites are protected by the Aboriginal Heritage Act.

Records of Aboriginal sites are not held by CALM but by the W.A. Museum.

Jarvis (1979) refers to a number of sites in the south-west of the State.

Reference to sites is made in the Draft Lane Poole Reserve Management Plan, Nichols *et al.* (1986) and also in the Draft Leeuwin-Naturaliste Management Plan, Frewer (1987).

Aboriginal sites can be threatened by a variety of activities. CALM operations need to be carefully planned to ensure disturbance to Aboriginal sites is avoided.

Regional Strategies

In addition to implementing Departmental policies and guidelines (see Appendices 1 and 2), during the period of this plan CALM staff in the region will:

- (i) collate all existing information on Aboriginal sites in the region and ensure that sites are placed on the Register of Aboriginal Sites at the W.A. Museum, maintain a confidential register in the regional office and each district.
- (ii) train staff in the recognition of Aboriginal sites, and continuously update registers as new sites are found.
- (iii) develop and apply management guidelines for Aboriginal sites in the region in liaison with the W.A. Museum, tertiary institutions and Aboriginal organisations;
- (iv) include an appraisal of the significance of the area to Aboriginals in operational planning;
- (v) where possible, include an account of traditional Aboriginal relationships with the land and its resources in information supplied to visitors to CALM land.

HISTORIC SITES

There are numerous sites of historic interest and value on CALM land in the region. These include old homesteads, stockyards, wells, examples of early fencing, old mines, railway formations and bridges.

There is no detailed set of records of historic sites in this region. Considerable work would be required to set up complete records for CALM lands in the region.

The locations of some sites are shown on Departmental maps. Existing management plans refer to sites within the area of interest. The National Trust (WA) and Heritage Commission (Commonwealth) both maintain registers of significant sites.

Below is a list of some historic sites identified on CALM land to date. The ones with asterisks are classified by the National Trust.

- *Wonnerup House (1837) Ludlow;
- *Old School (1847) and Teachers House (1885) Ludlow;
- *Southampton (1862);
- *Golden Valley (1895) Balingup;
- *Alexandra Bridge (1897);
- *Cape Leeuwin Lighthouse and Cottages (1895-6);
- *Waterwheel (c 1900) Cape Leeuwin;
- *Deepdene Cave (1881) Boranup;
- Other former tourist caves in the Leeuwin-Naturaliste Ridge;
- Ferndale House (c 1870);
- Old Forestry School Ludlow (1921);
- Ludlow Limepits;
- Hamelin Bay Jetty (1883);
- Ellensbrook House;
- Canebreak Well;
- Camp site used by sustenance workers at Myalup during the depression;
- Coal discovery site in Collie River near Allanson.
- Old coal mines near Collie (Black Diamond, Cardiff-Neath, Centaur, Collieburn, Cooperative, Hebe, Phoenix, Premier, Proprietary, Stockton, Wallsend, West Collie, Western no. 1, 2, 3, 4; Westralia ('old' and 'new'), Wyvern);
- Old tin mines near Greenbushes;
- Remains of old saw mills and/or settlements (Argyle, Asquith, Barlee Brook, Claymore, Ellis Creek, Hadfield, Hoffman, Jarrahdene, Lyalls, Maryvale, Sabina, Samson, St John Brook, Tallanalla, Treesville, Waterous, Wellington, Willcock, Willowdale).

There are many threats to the preservation of historic sites, including visitors to CALM lands.

Regional Strategies

In addition to implementing Departmental policies and guidelines (see Appendices 1 and 2), during the period of this plan CALM staff in the region will:

- (i) keep a register of historic sites containing all the available information in each district office and the regional office, and actively maintain these registers supported by advice from the Heritage Commission and National Trust;
- (ii) develop management guidelines for historic sites in the region in consultation with the Heritage Commission, National Trust, W.A. Museum, tertiary institutions and historical societies;
- (iii) seek ways and means of restoring and maintaining historical sites, giving consideration to voluntary assistance from the public;
- (iv) expend resources on those sites of greatest significance and most threatened by deterioration.
- (v) open historic sites to the public (consistent with ensuring their preservation), continue to provide information to visitors, with improvements progressing in the order determined by public demand.

CAVES

Caves are found in limestone on the Leeuwin-Naturaliste Ridge and other areas of limestone. There is a large number of 'wild' caves in the Leeuwin-Naturaliste National Park and Boranup forest, many of which are small but potentially accessible. There are also probably some caves (rock hollows) in granitic rocks in the east of the region.

The four well known caves in the region (not on CALM land but surrounded by it) are Jewel Cave near Augusta, Mammoth and Lake Caves near Margaret River and Yallingup Cave. All four are open to tourists, and about 110 000 people visit them each year. During the early 1900s up to 13 caves were accessible to tourists, of over 350 caves in the Leeuwin-Naturaliste Ridge.

Management plans have been prepared for two sets of caves in the region i.e. Yallingup caves (Australian Speleological Foundation 1978) and Giants and Golgotha caves (Webb 1982).

Regional Strategies

In addition to implementing Departmental policies and guidelines (see Appendices 1 and 2), during the period of this plan CALM staff in the region will:

- (i) convene a Cave Management Committee with membership to include CALM, speleological groups and others with a responsibility for cave management.

The Committee's functions will include recommending cave management practices, classifying the intensity and types of use of caves, regulating access to caves;

- (ii) base cave management on a classification system which reflects their conservation status and accessibility: tourist, adventure and wild caves;
- (iii) ensure the location of wild caves will be known only to members of the Committee and held in confidence;
- (iv) foster public safety by appropriate means eg. limiting access according to skills and equipment, a notification system, information on safe access, signs and a rescue capability for emergencies;
- (v) levy a fee on cave users to defray cave maintenance costs;
- (vi) seek a strengthening of Departmental powers under the CALM Act to manage and protect caves;
- (vii) manage field operations to prevent damage to caves.

Protection

The Department is responsible for the protection of CALM lands from fire, disease, weeds, pests and pollution; and for the rehabilitation after harmful effects from these or other agencies.

FIRE

Fire is a natural phenomenon of the local environment because of summer drought and lightning storms. It was used deliberately by Aborigines before European settlement, but since the advent of

European settlement, fires seem to have become more common. Certainly, over the last 150 years values have changed and it is considered generally undesirable for uncontrolled wildfires to burn on or out of CALM lands.

The Departmental policy on fire is given in detail in Appendix 2. In essence it requires that:

- all possible steps will be taken to prevent bushfires;
- an effective organisation will be maintained to detect and suppress fires;
- liaison will be maintained with local bush fire brigades and control officers;

where appropriate, fire suppression will be made easier and safer by the practice of cyclic prescribed burning;

a continuing research program into fire ecology and fire control will be given high priority.

Fire management, particularly in heavy forest country, is a controversial issue. The Department expects that all of its fire policies and practises will be the subject of public debate.

All of the Department's resources within the region are available for fire suppression. These are supported when necessary by resources from other regions.

In addition, there are considerable resources available through the volunteer bush fire brigades in the region (generally where wildfires threaten private property or life values), and the co-ordination and communication resources of the Bush Fires Board. Assistance from the Police and State Emergency Service has also been provided when life and property have been threatened.

Regional Strategies

In addition to implementing Departmental policies and guidelines (see Appendices 1 and 2), during the period of this plan CALM staff in the region will:

- (i) continue to maintain an efficient fire detection system and fire fighting force;
- (ii) where appropriate, reduce fuels by prescribed burning;
- (iii) develop interim protection plans for CALM national parks and nature reserves;
- (iv) consistent with the requirement to protect life, property and ecological values, introduce diversity into prescribed burning fire regimes;
- (v) avoid or minimise damage to rare and endangered species in fire-fighting operations;
- (vi) give priority to the protection of high value areas (pine plantations, private property, rare flora sites) and high risk areas (logging slash);
- (vii) plan fire protection requirements in advance of mining;
- (viii) develop aerial retardant techniques for suppression of fires in pine forests;
- (ix) maximise the amount of protection burning and grazing in pine forests;

- (x) develop neighbour and public interest in the fire protection needs of CALM lands.

DISEASE

The major plant disease of concern to the Department is dieback which is caused by the introduced fungus *Phytophthora cinnamoni*. This disease is fatal to many native plant communities on lateritic or poorly drained soils in the south-west of the State.

The effects of dieback disease can include:

- destruction of many native plants;
- increased salinity, degraded fauna habitat and aesthetic values;
- reduction in productivity of jarrah forest;
- increased water production.

Dieback disease cannot be eradicated once it is established at a specific site. Control measures therefore concentrate on preventing the disease from establishing or spreading, once established. The principal methods involved have included:

- proclamation of Disease Risk Areas (DRA) in State forests (currently 223 700 ha within the region is in DRA);
- a sophisticated photography and survey program for disease recognition and mapping;
- a major research program;
- devising and implementing disease hygiene measures;
- training staff and forest and park users in disease management;
- trials of operations (eg. logging) in DRA to enable impact to be determined.

Numerous other minor plant disorders are present on CALM lands in the region, including diseases caused by other species of *Phytophthora* and also *Armillaria*. These are monitored.

The area infected by dieback (to varying degrees of severity) in the region is estimated to be about 106 000 ha, some 14 per cent of the total area of State forest. Map 9 shows Disease Risk Areas and progress with dieback mapping.

Regional Strategies

In addition to implementing Departmental policies and guidelines (see Appendices 1 and 2), during the period of this plan CALM staff in the region will:

- (i) direct operations to areas where dieback mapping has been undertaken;

- (ii) assess all operations by a 7-Way Test (see Dieback Policy 1982);
- (iii) undertake a ground survey over areas without air photo dieback maps;
- (iv) improve self-policing of dieback hygiene by industry eg. logging, mining;
- (v) continue research into site vegetation and dieback impacts and revise prescriptions accordingly;
- (vi) continue to develop practical hygiene monitoring systems for all operations;
- (vii) seek to improve public understanding of the dieback problem on CALM lands, through education and involvement;
- (viii) improve media awareness of disease spread problems.

WEEDS AND PESTS

Weeds are plants (usually self-sown exotics) growing where they are not wanted. Pests are troublesome or destructive animals (including insects) either exotic (feral) or native.

Weeds are often introduced on to public lands from adjoining private property, public roads or other areas of public use. They can affect native plants and animals, Departmental operations and neighbours. The Department has responsibility to eradicate, control or contain declared weeds and animals on CALM lands in specified shires or areas, under Section 37 of the Agriculture and Related Resources Protection Act. The main weed of concern is blackberry (*Rubus fruticosus*). Other declared weeds in the region include apple of sodom (*Solanum hermannii*) and St John's wort (*Hypericum perforatum*).

Feral animals such as the cat (*Felis catus*), fox (*Vulpes vulpes*), rabbit (*Oryctolagus cuniculus*) and pig (*Sus scrofa*) cause widespread environmental problems on CALM lands.

Native fauna such as the red capped parrot (*Pteropus hypomelanus*) and grey kangaroo (*Macropus fuliginosus*) and biting insects can be pests for CALM neighbours.

Jarrah leaf miner (*Perthida glyphopa*) is the most damaging insect pest of jarrah in the region. The area of CALM land infested appears to be increasing rapidly. Currently, there are no economically feasible methods of control of this pest.

Regional Strategies

In addition to implementing Departmental policies and guidelines (see Appendices 1 and 2), during the period of this plan CALM staff in the region will:

- (i) continue to prescribe an annual program to control exotic weeds and pests, in conjunction with the Agriculture Protection Board;
- (ii) monitor and review methods of control to maximise the effect and minimise the cost of the program;
- (iii) control procedures will be designed to minimise adverse effects on native fauna and flora;
- (iv) control efforts will be coordinated with neighbours.

REHABILITATION

Rehabilitation includes the processes necessary to return disturbed land to a predetermined surface, land use or level of productivity.

Rehabilitation may be required after any site disturbance such as mining, gravel pit working, roadworks, logging, clearing, disease or pest attack, activity or fire. Historic buildings may require restoration.

The need for rehabilitation of disturbed sites depends upon the capacity of the site to restore itself and/or the degree of acceptable departure from natural processes.

The plant species used for rehabilitation should be local species wherever possible, and have resistance to dieback disease, fire and environmental stresses eg. drought and nutrient deficiencies. Integration with the aesthetics of, and the operations on, surrounding lands is necessary.

Most of the rehabilitation site work on CALM land is undertaken by the agency responsible for the site disturbance, eg. gravel pit rehabilitation by Main Roads Department, timber industry and shires. Recent Special Agreement Acts for mining on State forest require rehabilitation of mined areas.

Plants and/or seed are often supplied and planted by the Department. In recent years rehabilitation work on CALM land has been of the following order, in this region:

- rehabilitation of mining areas 210 ha/year (bauxite 80 ha, coal 50 ha, mineral sands 50 ha, tin 30 ha);
- Forest Improvement and Rehabilitation Scheme (FIRS) 150 ha/year;
- rehabilitation of gravel and other pits 40 ha/year;

rehabilitation (planting) of dieback areas 15 ha/year.

Many areas of CALM land disturbed long ago remain unrehabilitated, eg. gravel pits throughout the region. These areas will remain in a degraded condition until resources can be provided for their rehabilitation.

Also much of the coal and tin mining rehabilitation undertaken in the 1960s and early 1970s is of an unacceptable standard.

Regional Strategies

In addition to implementing Departmental policies and guidelines (see Appendices 1 and 2), during the period of this plan CALM staff in the region will:

- (i) prepare rehabilitation prescriptions for all disturbances of CALM lands;
- (ii) continue to inventory CALM lands to quantify the areas and locations of disturbance that require rehabilitation;
- (iii) direct new disturbance and rehabilitation to previously disturbed and unrehabilitated sites wherever possible;
- (iv) establish schedules of Agreed Working Arrangements between CALM and mining companies;
- (v) aim to rehabilitate and restore natural ecosystems;
- (vi) update rehabilitation prescriptions on the basis of research.

Recreation

The direct expenditure by tourists in Western Australia in 1984/85 was \$342 million, including \$51 million in the South West statistical division (W.A. Tourism Commission, 1985).

The number of recreational visits to national parks and State forests in the region probably exceeds 500 000 per year and is expanding rapidly. Recreation opportunities on CALM land are shown on Map 10.

Important aspects for management are:

- camping;
- day use;
- motorised recreation;
- horse riding;
- pets;
- swimming, fishing and boating;
- hunting.

CAMPING

Camping is a traditional activity on many of the Department's lands. CALM campsites are shown on Map 10.

Camping may be either an adjunct to backpacking or vehicle based. Backpack camping is permitted in most areas of State forest and national parks, but is not allowed in nature reserves or developed water supply catchment areas other than at approved sites. Vehicle based camping is allowed in other areas at designated sites. Development of such sites should reflect the appropriate demand for use of the site.

Issues of importance are:

- provision of suitable camping areas;
- minimising conflicts with day users;
- managing and maintaining camp sites.

Regional Strategies

In addition to implementing Departmental policies and guidelines (see Appendices 1 and 2), during the period of this plan CALM staff in the region will:

- (i) maintain public enjoyment of the natural environment as the main purpose of Department campsites. Generally CALM campsites will not cater for extended stays or campers requiring every facility;
- (ii) provide separately for day visitors and overnight campers, wherever possible;
- (iii) wherever possible, manage by commercial lease where a formal, fully provided campsite already exists on CALM land;
- (iv) introduce camping fees to all national parks (where it is practical to collect them) and use the revenue to improve facilities;
- (v) continue the program of upgrading campsites. Priority will be given to the maintenance and improvement of existing campsites before new sites are developed;
- (vi) propose new campsites usually only in the context of an area management plan;
- (vii) provide information on camping opportunities in the Central Forest Region to the public.

DAY-USE

Most recreational pursuits on CALM lands are carried out during the course of one day. These include picnicking, barbequeing, bushwalking, running, jogging, cycling, photography, painting and climbing. These activities can take place either at developed recreation sites or at more dispersed sites.

CALM recreation sites are shown on Map 10.

Recreation developments such as rifle ranges, motor cycle clubs and those at dams also occur on leases on CALM lands.

Major issues are:

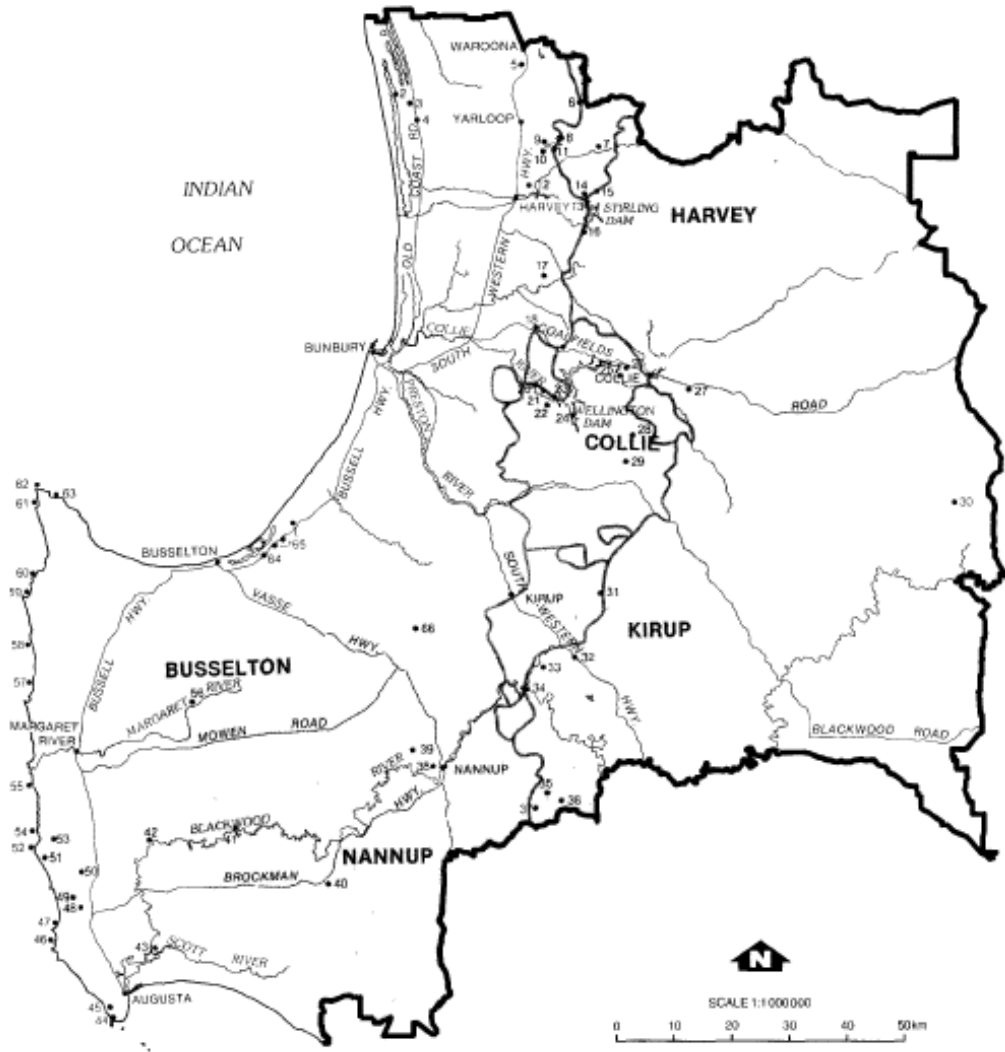
- Location and design of facilities;
- the provision of facilities, eg. toilets, walking trails, barbeques, parking areas;
- facilities for the disabled;
- maintenance of sites;
- visitor safety; commercial tourist operations.

Regional Strategies

In addition to implementing Departmental policies and guidelines (see Appendices 1 and 2), during the period of this plan CALM staff in the region will:

- (i) regularly assess the adequacy of day-use recreation sites;
 - (ii) consult local government authorities when proposed changes to recreation sites affect their interests and responsibilities;
 - (iii) seek to participate in regional studies relating to the recreation use of natural lands, eg. Wellington Dam/Harris River;
 - (iv) periodically survey visitors to CALM lands to ascertain their views;
 - (v) maintain all sites to a uniformly high standard;
 - (vi) try new methods and materials to improve the quality of sites and reduce maintenance costs, eg. visitors encouraged to take their rubbish home;
 - (vii) when upgrading sites, include improved traffic control, and provision for the disabled;
 - (viii) consult organised groups and commercial recreation operations needing special facilities or access and negotiate their requirements;
- treat public safety with paramount importance in site design and maintenance;
- (x) provide new recreation areas, including provision of facilities and walking trails, where necessary and appropriate, as resources for their development and maintenance become available.

CENTRAL FOREST REGIO
RECREATION OPPORTUNIT



NOTE: This map shows C.A.L.M. managed recreation sites only. Other recreation sites and leases on C.A.L.M. land, but controlled by other authorities are listed below.


- Augusta-Margaret River Shire Caravan Park and Camping Area
- Augusta-Margaret River Shire Community Centre
- Collie Football and Athletics Field
- Collie Motorcycle Course
- Collie-Wellington Camping Area
- Hamelin Bay Holiday Resort
- Lawsna Recreation Camp
- Logue Brook Caravan Park


- Logue Brook Dam
- Ludlow Rifle Range
- Muja Open Cut Lookout
- Myalup Recreation Camp
- Nannup Golf Course
- Nannup Motorcross Track
- Nannup Rifle Range
- Samson Dam
- Waroona Dam

SCALE 1:1000000

0 10 20 30 40 50km

KEY

BIBULMIN TRACK (existing and proposed) 

C.A.L.M. ESTATE 

REST REGION OPPORTUNITIES



C.A.L.M. RECREATION SITES	RECREATION OPPORTUNITIES											
	BARBECUES	FISHING	SWIMMING	CANOEING	MARKED WALK TRAIL	TOILETS	DRINKING WATER	CAMPING	LOOKOUT	HANDICAPPED FACILITIES	BOAT LAUNCHING	CARAVAN PARK
1 YALGORUP—TIMS THICKET PICNIC SITE												
2 YALGORUP—PRESTON BEACH RD. PICNIC SITE	•		•			•						
3 YALGORUP—LAKE HAYWOOD PICNIC SITE	•					•						
4 WHITTAKERS MILL SITE	•											
5 HAMEL							•					
6 WILLOWDALE ARBORETUM	•											
7 HOFFMAN OLD MILL	•	•	•			•	•	•				
8 LOGUE BROOK DAM—THE ROCK	•		•				•					
9 SADDLEBANK PICNIC AREA	•	•	•									
10 KANGAROO NATURE TRAIL					•							
11 LOGUE BROOK DAM—CARAVAN PARK	•	•	•	•			•			•	•	
12 BLACKBOY PICNIC AREA	•				•							
13 HARVEY FALLS		•					•					
14 ROCKY CROSSING	•	•	•				•					
15 CLINDANNING RD. HARVEY RIVER	•	•					•					
16 STIRLING DAM	•	•		•	•		•		•			
17 HARVEY BIG JARRAH												
18 GERVASSE PICNIC AREA	•											
19 SANDPIT PICNIC AREA	•											
20 HONEYMOON POOL	•	•	•	•	•	•	•	•				
21 FERMS PICNIC AREA	•	•	•	•	•		•	•				
22 LENNARD DRIVE	•	•	•	•			•					
23 WELLINGTON DAM—WALL	•				•	•	•	•	•			•
24 WELLINGTON DAM—BANKS			•				•					
25 PALMER RD. PICNIC SITES (2)	•	•										
26 SCENIC DRIVE—WESTRALIA BLOCK	•	•										
27 STOCKTON	•	•	•	•							•	
28 LYALL'S PICNIC AREA	•											
29 GLEN MERVYN DAM	•	•	•	•		•	•	•			•	
30 TOWERHILLING LAKE	•	•	•	•		•					•	
31 GRIMWADE POOL	•	•	•									
32 GOLDEN VALLEY	•				•	•		•	•			
33 FERDALE PICNIC SITE	•	•					•					
34 WRIGHTS BRIDGE	•	•	•	•		•	•	•				
35 KARRI GULLY	•				•	•						
36 BRIDGETOWN—JARRAH PARK (2)	•				•	•						
37 WILLOW SPRINGS ARBORETUM	•											
38 NANNUP ARBORETUM	•						•					
39 BARRABUP POOL	•	•	•	•			•	•				
40 CANEBREAK	•				•	•						
41 SUE'S BRIDGE	•	•	•	•		•	•	•			•	
42 WARNER GLEN	•	•	•	•							•	
43 SCOTT RIVER SKI AREA	•	•	•	•		•						
44 WATER WHEEL	•	•			•	•						
45 SKIPPY ROAD	•											
46 COSY CORNER	•	•	•			•						
47 HAMELIN BAY	•	•	•	•		•	•	•		•	•	
48 BORANUP CAMPGROUND	•					•	•					
49 BORANUP SCENIC LOOKOUT	•					•		•				
50 BORANUP DRIVE PICNIC SITES	•											
51 POINT RD. CAMPGROUND	•					•		•				
52 CONTO FIELD	•				•	•		•		•		
53 BORANUP BEACH	•	•	•									
54 CONTO SPRING	•		•			•						
55 BOB'S HOLLOW	•	•										
56 CANE BRAKE POOL	•	•	•			•	•	•				
57 ELLEN BROOK	•				•	•						
58 MOSES ROCK	•	•										
59 INJIDUP	•	•	•			•	•					
60 CANAL ROCKS	•	•									•	
61 SUGARLOAF	•											
62 CAPE NATURALISTE					•	•		•				
63 BUNKER BAY	•	•	•			•		•				
64 LAYMAN PICNIC SITE	•				•	•						
65 LUDLOW FOREST PICNIC SITES	•											
66 CLAYMORE	•											

MAP 10

MOTORISED RECREATION

Under this heading is included four-wheel drives, trail bikes, unlicensed off-road vehicles, pleasure driving and rallying.

Licensed vehicles of any kind are permitted on public roads on CALM lands and normal road traffic rules apply. Exceptions are restricted access roads in Disease Risk Areas, nature reserves and parts of some national parks. There are numerous management tracks on CALM lands. These tracks are not maintained for public use.

Car and motorcycle rallying is permitted in some areas of State forest by special arrangement with the Department, but not in national parks or nature reserves.

Information about off-road vehicles is presented in the Department of Conservation and Environment poster 'Off-Road Vehicles and the Environment' (1985) and pamphlet 'Joining a club' (1986).

There are two main issues associated with motorised recreation. The first of these is physical damage to the environment, by causing erosion, spreading dieback disease, damaging vegetation and disturbance to wildlife caused by noise and dust.

The second is conflict with other user groups. Many recreational activities require peace and solitude in natural environments and are not compatible with intensive vehicular use of the same areas.

Visitor safety is also important.

Regional Strategies

In addition to implementing Departmental policies and guidelines (see Appendices 1 and 2), during the period of this plan CALM staff in the region will:

- (i) plan for the various kinds of motorised recreation by identifying suitable areas and routes;
- (ii) continue to liaise with motoring recreation and sporting groups to plan special events and access to CALM land;
- (iii) restrict access to areas where vehicles are unwanted. e.g. recreation sites, dieback areas, sites with fragile vegetation or soil;
- (iv) educate drivers through signs, printed information, direct contact, the media, and by the provision of facilities suited to their needs;

- (v) monitor motorised recreation by attending events and conducting traffic surveys;
- (vi) negotiate with high impact motorised recreationists for a degree of indemnity against environmental damage;
- (vii) provide for the ordinary motoring visitor to CALM land by issuing district maps, self-guided tours, maintaining road signs and constructing vantage points;
- (viii) when resources allow, provide a weekend presence in district Offices and patrols of popular routes and locations to assist drivers;
- (ix) wherever possible, publicise and signpost unusual road hazards, eg. fires, log trucks.

HORSE RIDING

Horse riding is a common recreational pursuit on CALM lands.

Horses can create problems through spread of weeds (through their droppings), trampling of native vegetation and erosion of trails. They may also spread dieback. Conflicts between horse riders and other recreators can occur.

Horses are generally not permitted on developed water catchments, DRA or nature reserves. In national parks and conservation parks horses may be permitted in specially designated areas.

Regional Strategies

In addition to implementing Departmental policies and guidelines (see Appendices I and 2), during the period of this plan CALM staff in the region will:

- (i) in consultation with equestrian organisations, identify and develop areas in which horseriding can occur safely and enjoyably;
- (ii) identify areas where horses are not permitted and publicise the reasons;
- (iii) liaise with equestrian groups to seek co-operation in the maintenance of horse trails;
- (iv) monitor the impacts of horseriding, and if degradation is occurring, periodically use alternative areas or routes;

- (v) assist commercial equestrian ventures to responsibly use CALM land by negotiating appropriate terms and conditions.

PETS

Many recreationists and people who work on CALM land take their pets, often dogs, with them when they travel.

They can cause problems, particularly by annoying other people in camping grounds or picnic areas, as well as disturbing native animals and vegetation.

Pets under control are normally permitted on CALM Land which is managed for multiple use, but are not permitted on developed catchments (W.A. Water Resources Council 1985) or nature reserves. Subject to provisions below, they may be allowed in specified zones of national parks and conservation parks.

Seeing eye dogs accompanying blind persons are allowed in national parks.

Licensed gun dogs are allowed in game reserves during the duck shooting season. The only game reserve in the region is Wild Horse Swamp Nature Reserve in West Arthur Shire.

Regional Strategies

In addition to implementing Departmental policies and guidelines (see Appendices I and 2), during the period of this plan CALM staff in the region will:

- (i) identify areas where people may bring their pets, and inform the public;
- (ii) identify areas where pets are not allowed and explain the reasons;
- (iii) develop a code of practice for pet owners on CALM lands;
- (iv) co-ordinate the zoning and publicising of areas where pets are permitted;

SWIMMING BOATING AND FISHING

Swimming, wading, boating, fishing, marroning and crabbing are all activities which occur in the region.

Details of permitted activities are given in Table 10.

TABLE 10
WATER-BASED RECREATION ACTIVITIES PERMITTED ON
CALM LAND IN THE CENTRAL FOREST REGION

Recreation Activity	Nature Reserve	National Park	Conservation Park	Other State Forest
POWER BOATING	No Except (b)	Yes, where use already exists (f)		Yes Except Catchments (a)
CANOEING, ROWBOATS, SAILING	No Except (b)	Yes Except Catchments and specified areas (a)		Yes Except Catchments (a)
FRESH WATER FISHING MARRONING (d)		No Except (b)	Yes Except Catchments (a) and as determined by area management plans	Yes Except Catchments (a)
CRABBING PRAWNING		No Except (b)	Not applicable	Not applicable
SWIMMING WADING		No Except (b) (c)	Yes Except Catchments (a)	Yes Except Catchments (a)
DUCK SHOOTING		No Except (e)	No	No

- Note**
- (a) Some of these activities are permitted on certain catchments e.g. undeveloped catchments or irrigation dams. Consult the W.A. Water Resources Council publication 'Recreation in Darling Range Catchments' brochure for details.
 - (b) Recreation activity and professional fishing are not permitted in nature reserves. However, some traditional activities may continue as set out in the management plan for a particular reserve.
 - (c) Wading is permitted in game reserves to retrieve ducks.
 - (d) Fishing is permitted only under the relevant Fisheries Act Regulations, unless restricted or prohibited under a management plan.
 - (e) Permitted only in designated game reserves, during season.
 - (f) Power boating is generally permitted in the sea, river and estuary waters adjoining CALM lands. These waters are controlled by the Department of Marine & Harbours boating regulations. Boating is prohibited on some water bodies of special significance.

Information about recreation in catchment areas is presented in the W.A. Water Resources Council booklet 'Recreation on Reservoirs and Catchments in Western Australia' (1985) and pamphlet 'Recreation in the Darling Range Catchments' (1985).

Further information about various water-based recreation activities is available from:

Forests Department leaflet 'Foresters at Work - Fishing' (n.d.);
Fisheries Department 'Recreational Fishing. A Guide to the Rules' (1985);
Fisheries Department 'Trout in Western Australia' (1982);
Department of Sport and Recreation 'Canoeing guides No. 1-9' (n.d.);
Department of Marine & Harbours - boating regulations.

Important issues with respect to the management of water-based recreation are:

minimising conflicts between user groups;
protecting the environment from damage through over-use or inappropriate use.

Regional Strategies

In addition to implementing Departmental policies and guidelines (see Appendices 1 and 2), during the period of this plan CALM staff in the region will:

- (i) consider existing patterns of use and potential future demand to determine which activities are appropriate for each site;
- (ii) develop plans to separate conflicting uses. This can be done by separating them physically or by restricting activities to particular times e.g. water skiing and fishing;
- (iii) consult water recreation and sporting groups. Co-ordinate site use and development with user groups e.g. Canoe course on Harvey River, skiing on Stockton water body.
- (iv) integrate camping, day-use recreation sites and water-based recreation opportunities and facilities wherever possible e.g. lower Collie valley;
- (v) publicise alternative sites for users whose traditional recreation is considered to be inappropriate at a particular location;
- (vi) monitor the effects of water-based recreation on the environment in and around the water and modify plans in the light of any changes;

- (vii) continue close liaison with WAWA on the issue of recreation in catchments to ensure compatibility of recreation plans with all land management objectives e.g. Wellington Dam/Harris River development;
- (viii) check water-based recreation sites periodically for safety hazards;
- (ix) identify and promote sites for watching waterbird activity.

HUNTING

Shooting of ducks and quail on designated game reserves is the only form of recreational hunting permitted on CALM lands.

The rules for duck shooting are summarised in the latest edition of CALM 'Duck Shooter's Guide' (1987). There is one game reserve in the region, i.e. Wildhorse Swamp Nature Reserve in West Arthur Shire.

The length of the game season and the duck species able to be taken in any season are determined by the Minister for Conservation and Land Management.

Regional Strategies

In addition to implementing Departmental policies and guidelines (see Appendices 1 and 2), during the period of this plan CALM staff in the region will:

- (i) monitor the condition of game reserves to determine the effects of hunting on wildlife habitat;
- (ii) closely monitor the effect of hunting on the population of game species and other wildlife;
- (iii) report on all management considerations to be taken into account in the annual review of the hunting season;
- (iv) assist Wildlife Protection Branch with the enforcement of regulations on game reserves in the region.

Public Participation and Liaison

There is keen public interest and concern for the management of public land and ecosystems in the State. CALM promotes this through education, interpretation, public participation and extension services.

COMMUNITY EDUCATION AND INTERPRETATION

CALM wishes to promote community awareness, appreciation, understanding and active concern in the management of resources on public lands and waters. This is done by the provision of information, use of the media, educational programs conducted for schools and community interest groups and the provision of interpretive facilities such as self-guiding information tours.

Most CALM staff have some involvement in community education and interpretation work. There is a regional parks and reserves officer and a part-time recreation officer in each district.

A range of printed material on natural area appreciation, recreation facilities, camping, maps, and technical information is available at Departmental offices.

Most national parks and the Lane-Poole Reserve are staffed on all days throughout the year, and provide a significant recreation and conservation service to the public.

Arbor Day is promoted at schools, to increase the awareness of the value of trees. Tree planting and maintenance activities are often conducted.

Regional Strategies

In addition to implementing Departmental policies and guidelines (see Appendices 1 and 2), during the period of this plan CALM staff in the region will:

- (i) promote increased public awareness and positive attitudes to conservation and land management issues in the region;
- (ii) further develop appropriate information, education and interpretive programs;
- (iii) develop comprehensive regional and district libraries to assist staff providing public advice and extension services;
- (iv) develop a Departmental herbarium for public access;
- (v) maximise CALM staff presence in the field at weekends, to improve public access;
- (vi) train staff in outdoor expedition and natural environment interpretation skills;

(vii) develop demonstration forests for public use;

(viii) develop interpretive trails in national parks and other areas of high public use.

COMMUNITY INVOLVEMENT

The CALM Act (Sections 14, 57-59) makes statutory provision for public participation in the preparation of management plans. Some public involvement in other Departmental planning matters is also desirable. The Department wishes to be involved in local communities and provide assistance where appropriate.

Examples of community involvement include:

staff involvement on local tourist bureaux and with agricultural shows;
advice about landscaping and tree planting in townsites;
co-operation with schools e.g. work experience, Arbor Day;
advisory committees, 'Friends of the park' and volunteer groups.

Public participation, however, requires considerable staff resources to plan, implement, review and follow-up. Volunteer programs require staff time for supervision and materials for the implementation of works programs.

Regional Strategies

In addition to implementing Departmental policies and guidelines (see Appendices I and 2) during the period of this plan CALM staff in the region will:

- (i) via draft area management plans, provide an opportunity for the public to participate by the contribution of facts, advice or criticism;
- (ii) provide opportunities for public representation on advisory committees, formed at the Minister's discretion, to advise on the implementation of management plans for particular areas;
- (iii) develop informal programs to allow interested individuals and groups to become involved in appropriate land management projects on CALM lands;
- (iv) consult and seek advice from groups or individuals with interests and expertise relevant to the management of CALM land or resources. The public are encouraged to contact Departmental officers if they feel they can constructively participate in some way.

INFORMATION AND ADVISORY SERVICES

The public, public utilities, farmers and business people are provided with a wide range of information and advice from the Department on matters of conservation and land management.

Information and advice can be provided at district, regional or Departmental level. Enquiries can also be referred to other Departments or authorities as appropriate.

Regional Strategies

In addition to implementing Departmental policies and guidelines (see Appendices 1 and 2), during the period of this plan CALM staff in the region will:

- (i) prepare a framework for a broader dissemination of information and services;
- (ii) deliver information products in a form which maximises the effectiveness of available staff and resources e.g. extension kits, recreation directories, resources lists;
- (iii) maximise coverage by concentrating efforts on community groups rather than individual requests.

Production

Numerous activities associated with the production of natural resources occur on CALM lands, for example: forest produce (timber, wildflowers, seed and honey), basic raw materials such as gravel, minerals and water.

WATER

Catchments are managed to optimize both the quantity and quality of water produced. CALM land on gazetted catchments and water reserves are jointly administered by CALM and WAWA.

The quantity of water collected varies according to seasonal rainfall, soil storage and natural use by forests and agricultural crops. High impact dieback disease, forest thinning operations and clearing increase water yield.

Water quality is affected by colour, turbidity, salinity, chemical pollutants, bacteria and viruses. Increased salinity is the most serious potential threat to water resources in the region. In low rainfall

zones excessive clearing for agriculture releases soil-stored salts. Water quality in the Collie and Blackwood Rivers has been seriously degraded in this way.

The Resource

Surface water supplies on the main catchments in the region are shown in Table 11. Significant underground water supplies also exist on the Swan Coastal Plain.

Some details about the principal dams in the region are presented in Table 12. The Water Authority's plans for future developments are presented in the latest version of their Sources Development Plan and also in their publication 'Planning future sources for Perth's water supply' (WAWA, 1986).

In two catchments in the region, one developed (Wellington) and one undeveloped (Warren), clearing controls have been imposed by WAWA. Logging and clearing of indigenous vegetation within these catchments can only be carried out under a WAWA licence and based on guidelines relating to salinity hazard zones A, B, C and D.

In addition there is an area south of the Wellington catchment within which no further Crown land can be released for development, under a Cabinet directive of January 1978. This directive greatly restricts land exchanges in the area.

Map 11 shows some of the catchments and groundwater management areas within the region.

TABLE 11
HYDROLOGICAL DETAILS FOR SOME OF THE CATCHMENTS
IN THE CENTRAL FOREST REGION

River	Catchment area above (likely) damsite		Mean annual flow	Mean annual salinity level
	km ²	% Cleared	m ³ 10 ⁶	mg/L TDS
Harvey	380	0	113	200
Brunswick	213	25	78	230
Collie	2830	23	185	750
Preston	603	40	97	250
Margaret	443	30	135	200
Blackwood	19300	85	620	1150

Data from Public Works Department (1979).

The data refers to the whole catchment, some of which may extend outside this region.

TDS - Total dissolved solids.

TABLE 12
SOME DETAILS ABOUT THE PRINCIPAL DAMS IN THE CENTRAL FOREST
REGION

Dam	Capacity in 3 x 10 ³	Supplying water to
Wellington	185000	Collie Irrigation Area, Great Southern
Stirling	57000	Harvey Irrigation
Logue Brook	24300	Harvey Irrigation
Waroona	14900	Waroona Irrigation
Samson Brook	9170	Waroona Irrigation and Town
Harvey Weir	9130	Harvey Irrigation and town
Drakes Brook	2290	Waroona Irrigation
Glen Mervyn	1490	Preston Valley Irrigation
Mungalup	681	Great Southern Towns
Millstream	490	Bridgetown

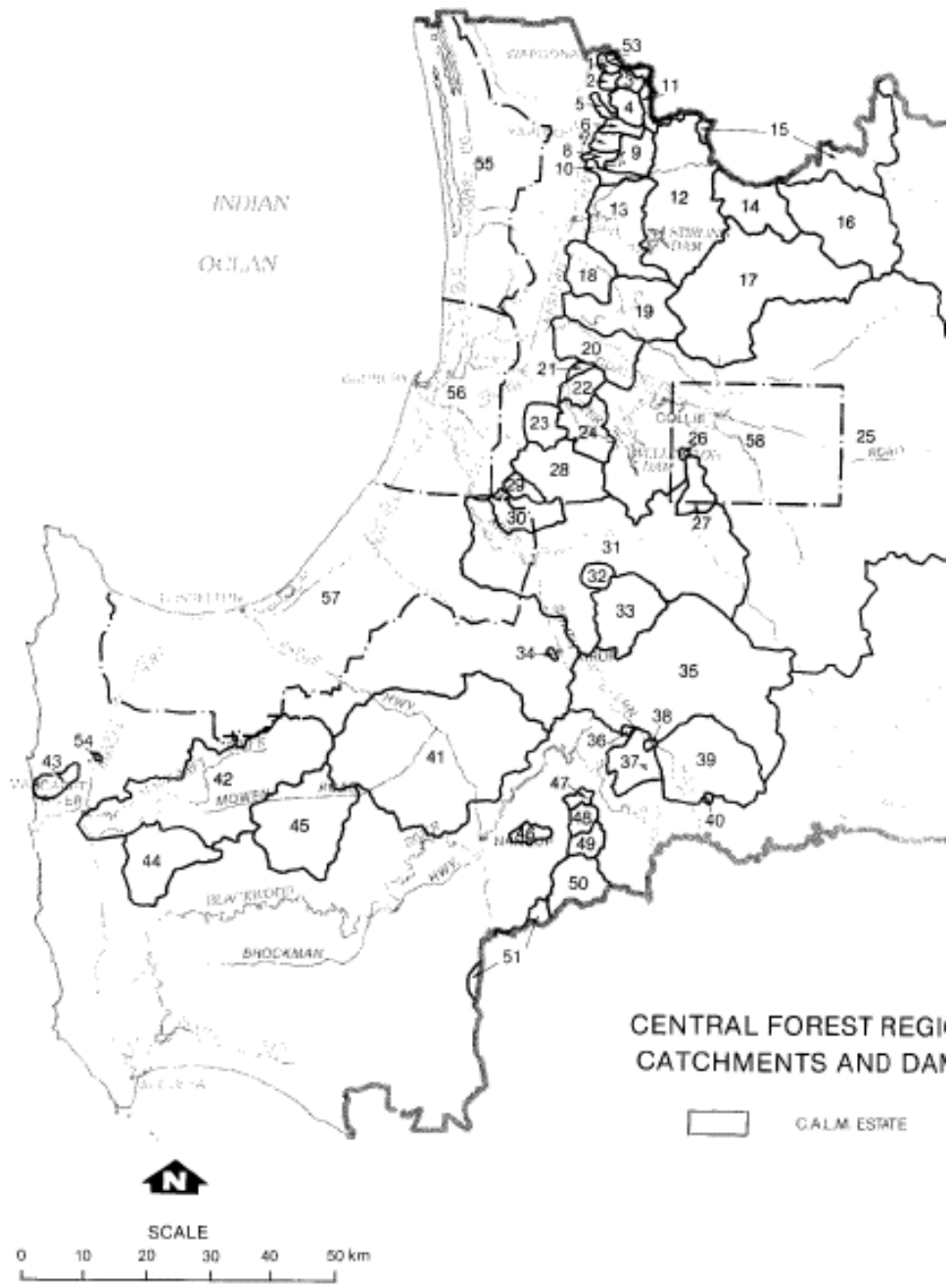
Data from Public Works Department (1984).

Regional Strategies

In addition to implementing Departmental policies and guidelines (see Appendices I and 2), during the period of this plan CALM staff in the region will:

- (i) continue close liaison between regional and district officers of CALM and WAWA;
- (ii) as required, develop management plans for catchments jointly with WAWA;
- (iii) accord the Department's land use zoning in the region with gazetted catchment boundaries and the salination risk zoning. This zoning will form the basis of all operational plans and prescriptions and will ensure that water resources conservation is the priority objective;
- (iv) allow recreation on catchments to proceed as determined by the W.A. Water Resources Council;
- (v) ensure that the extension of water-based recreation to other locations in catchments is consistent with the maintenance of water quality;
- (vi) maintain recreation developments on water reserves and gazetted catchments;

- (vii) ensure that logging and roading prescriptions contain erosion and pollution control measures;
- (viii) program prescribed burning to seasonally separate planned burns adjoining water reservoirs;
- (ix) continue to provide an afforestation service to WAWA on the Wellington catchment;
- (x) assist Research Division with hydrological studies of catchments as required. Research findings concerning catchment management will be disseminated.





REGION
D DAMS

TATE

CATCHMENT CLASSIFICATIONS

Surface catchments and ground water management areas in the south-west of the State have been classified as follows by the Water Authority for management purposes. Restrictions on recreation are indicated.

- Type 1a** Public Water Supply Area
- Type 1b** Groundwater Area
- Type 1c** Water Reserve
- Type 2a** Active catchment area—domestic supply.
 - (i) Small diversion dam. Access is only permitted, if at all, along open roads, marked walk trails, designated picnic areas, but not to the water area.
 - (ii) Large dam. Pedestrian access within 2 km from the water area is only permitted along open roads, marked walk trails and at designated picnic areas. Pedestrian access beyond 2 km is unrestricted.
- Type 2b** Active catchment area—irrigation. Access is permitted to all of the catchment, the water area, and to the dam wall.
- Type 2c** Active catchment area—domestic and irrigation. All are currently as for 2a (ii) large dams.
- Type 3** Water reserve. Potential water resource that has been gazetted.
- Type 4** Important potential surface water catchment area (not gazetted).
- Other** Not classified.

No.	CATCHMENT	TYPE	No.	CATCHMENT	TYPE
1	DRAKES BROOK	2b	30	JOSHUA CREEK	4
2	LOWER SAMSON	4	31	PRESTON RIVER	4
3	SAMSON BROOK P/H	2a(ii)	32	CHARLEYS CREEK	4
4	McKNOE BROOK	4	33	THOMPSON BROOK	4
5	BLACK TOM BROOK	4	34	KIRUP	2a(i)
6	BANCELL BROOK	2a(i)	35	BALINGUP BROOK	4
7	WATERLOUS FORMATION CK	4	36	BALINGUP	2a(i)
8	LOWER LOGUE	4	37	BORDONA GULLY	4
9	LOGUE BROOK	2b	38	DUMPING GULLY	2a(i)
10	CLARE BROOK	4	39	DALGARUP/HESTER BK	4
11	SAMSON	2c(i)	40	HESTER	2a(ii)
12	STIRLING	2c(ii)	41	ST JOHN BROOK	4
13	HARVEY	2c(i)	42	MARGARET RIVER	2a(i)
14	CHALK BROOK (MURRAY)	3	43	ELLEN BROOK	4
15	MURRAY RIVER	3	44	CHAPMAN BROOK	4
16	BELL BROOK (MURRAY)	3	45	ROSA BROOK	4
17	HARRIS RIVER	2c	46	TANJANERUP	2a(i)
18	WELLESLEY CREEK	4	47	MILLSTREAM	2a(i)
19	BELLA	2a(i)	48	CAMP CREEK	4
20	BRUNSWICK RIVER	4	49	GREGORY BROOK	4
21	SHENTONS ELBOW BK	4	50	DONNELLY RIVER	3
22	ROE RANGE BROOK	4	51	UPPER BARLEY BK (DONNELLY)	3
23	HENTY BROOK	4	52	WARREN RIVER	3
24	COLLIE RIVER (BUREKUP)	4	53	WARCONA	2b
25	WELLINGTON	2c(i)	54	COWARAMUP S.W.	2a(i)
26	MUNGALLUP	2a(i)	55	SOUTH-WEST COASTAL G.A.	1b
27	GLEN MERVYN	2b	56	BUNBURY G.A.	1b
28	FERGUSON RIVER	4	57	BUSSELTON-CAPEL G.A.	1b
29	CROCKED BROOK	4	58	COLLE G.A.	1b

HARDWOOD TIMBER

The timber industry is one of the State's major industries, employing more than 20 000 people directly and indirectly and having an annual turnover in timber and timber products of \$330 million as at June 1985.

The timber industry began in the earliest days of European settlement when forested areas were cleared for settlement and agriculture. The industry grew rapidly in the 1890s as export markets were developed.

High levels of cutting continued after the turn of the century. This period of heavy exploitation earned the State valuable export income, led to township development in the region and provided the roads and basic infrastructures that assisted the development of other industries.

Concern about forest exploitation highlighted the need for organised forest management which took effect when the Forest Act was passed in 1918. From that time areas of prime forest were permanently dedicated as State forest and conservation policies were developed and implemented.

Jarrah silviculture has been described by Bradshaw (1985). The jarrah forest is now largely unevenaged, as a consequence of early exploitation and selective logging. Forest structure is variable, ranging from old growth to pole and sapling stands. Silviculture is aimed at encouraging regeneration, or increasing growth rates on selected crop trees. High quality stands receive follow-up stand improvement after logging: removal of logging residue from the trunks of retained trees and the removal, by cutting and poisoning, of suppressed trees and competing species.

The Resource

The hardwood forests of this region can be broadly categorized into jarrah, wandoo, tuart or exotic eucalypts. The areas of these forest types are indicated in Table 5.

The volume of first grade sawlogs harvested from Crown land in the region in recent years has averaged 250 000 in 3 /annum, almost exclusively jarrah. Seventeen sawmills have been supplied with logs. Three mills at Collie, Yarloop and Nannup cut over 20 000 in 3 /annum.

From 1989 it is proposed to use about 160 000 tonnes/annum of residues from sawlogging and thinning operations for charcoal production. The charcoal will be used for silicon production.

Apart from sawlogs, other hardwood products from jarrah forests include SEC poles, rails and fenceposts, commercial firewood, and domestic firewood.

All important issues are addressed in the paper 'Timber Production in Western Australia' CALM (1987).

For further details about timber resources, future yields, the level of the cut, allocation of the cut and log pricing, see the above paper.

Regional Strategies

In addition to implementing Departmental policies and guidelines (see Appendices 1 and 2), during the period of this plan CALM staff in the region will:

- (i) implement the timber strategy described in 'Timber production in Western Australia' CALM (1987);
- (ii) achieve full occupation of the site after logging and maximise growth on retained trees or regeneration;
- (iii) endeavour to prevent the spread and impact of dieback disease and protect soil and water values during all logging operations;
- (iv) maintain the 'Code of Hardwood Logging Practice' which defines silvicultural, disease and environmental criteria for logging, within the context of CALM management policies and objectives;
- (v) prepare plans for sawlog harvesting each year;
- (vi) prepare harvesting plans for SEC pole operations and minor forest produce removal;

SOFTWOOD TIMBER

During the last five years an average of 1500 ha of pine has been planted each year by CALM in this region.

Land for pine planting is obtained by:

- Lease of agricultural land (e.g. Softwood Sharefarming Scheme);
- purchase of agricultural land (non-horticultural);
- exchange of agricultural land for Crown land;
- areas subject to clearing restrictions, or potential new projects such as the Peel-Harvey catchment.

The Resource

The area of State pine forests established in the region to December 1985 was approximately 35 000 ha. The majority of this (86 per cent) is *Pinus radiata*, most of which is located in the Blackwood Valley.

Some *P. pinaster* has also been planted on the poorer soils on the Swan Coastal Plain. *P. radiata* has been planted on the best available soils in the Darting Range, in the Donnybrook Sunklands and coastal plain.

For further details about timber resources, future yields, the level of the cut, allocation of the cut and log pricing, see the paper 'Timber Production in Western Australia' (CALM 1987).

Regional Strategies

In addition to implementing Departmental policies and guidelines (see Appendices 1 and 2), during the period of this plan CALM staff in the region will:

- (i) seek to obtain the necessary land and funds to establish pine forests as required in 'Timber Production in Western Australia (CALM 1987);
- (ii) review planting rates, establishment, tending and silvicultural techniques annually and implement appropriate changes;
- (iii) carry out research into silviculture, fertilising, and establishment of legumes to accelerate the production of pine sawlogs;
- (iv) develop cost effective methods for treating debris on areas for planting a second rotation;
- (v) maximise use of resource through the 'Code of Softwood Logging Practice';
- (vi) prepare harvesting plans each year;
- (vii) undertake education programs about softwood forestry by preparing brochures, holding information tours, developing demonstration forests and agroforestry trials.

MINING

Mining is one of the region's major industries with production valued at over \$440 million in 1984/85 (alumina \$260 million, coal \$109 million, mineral sands \$54 million, tin and tantalite \$12 million).

Mining (including exploration) is regulated by the Mining Act. It is through this Act that the Minister for Conservation and Land Management consents or does not consent to new mining activity, subject to conditions.

Mining provides valuable resources, substantial employment and development. There may also be substantial environmental costs, particularly from large open-cut mining operations. These may include increased salinity, turbidity or acidity of water supplies, spread of dieback and deleterious effects on landscape and conservation values. There may also be problems with rehabilitation after mining.

The Resource

Map 12 shows approved mining leases and claims, bauxite conveyor lines and refineries and current and proposed mining operations. The known mineral resources of the region are discussed in the explanatory notes provided with the geological maps produced by Wilde *et al.* (1980, 1982 and 1984), Lowry (1967) and for the System 6 study (Biggs *et al.* 1980). Access to minerals is provided under Special Agreement Acts or the Mining Act.

Currently, the major mining activities in the region are bauxite mining near Willowdale and Boddington, coal mining near Collie, mineral sands mining near Cape], and tin and tantalite mining at Greenbushes. Nearly all of this mining is on State forest. Exploration activity has taken place for other minerals such as oil and iron ore. Drilling and stream sediment prospecting for gold has taken place in the Saddleback area.

Regional Strategies

In addition to implementing Departmental policies and guidelines (see Appendices 1 and 2), during the period of this plan CALM staff in the region will:

- (i) where exploitation and mining occur on CALM land, prepare (in conjunction with the companies), agreed working arrangements for planning, clearing, mining, rehabilitation, monitoring, maintenance and fire protection;
- (ii) consolidate mining operations with agreed long-term strategies, aiming to reduce the range of ages of rehabilitation, thus allowing more efficient protection and future management;
- (iii) prescribe and implement hygiene mining operations to protect adjacent unmined ecosystems from dieback;
- (iv) evaluate rehabilitation after mining. Where acceptable standards are not met, prepare a program of post-rehabilitation management;

- (v) maintain effective liaison with mining companies, either through regular and direct contact or through established committees such as the Mining Management Planning Liaison Group (MMPLG) and Mining Operations Group (MOG);
- (vi) ensure working arrangements with Alcoa and Worsley Alumina are updated frequently and liaise with Northern Forest Region to maintain a consistent approach;
- (vii) upgrade prescriptions as research develops;
- (viii) ensure, via the Collie Coal Mines Rehabilitation Committee, that detailed plans for future coal mining and rehabilitation are provided and implemented satisfactorily by both companies;
- (ix) obtain from tin and mineral sand mining companies operating on CALM land a long-term conceptual plan, and five-year plans to cover mining and rehabilitation proposals.

BASIC RAW MATERIALS (GRAVEL, SAND, STONE)

The more important resources are sand, clay, limestone, stone for road aggregate and gravel. Many of these basic raw materials are also defined as minerals under the Mining Act, and certain resources are subject to mineral or exploration and/or mining leases.

The Department of Mines and CALM have procedures for joint administration of mineral and basic raw material resources.

In recent years over 25 000 m³ of basic raw materials have been recorded as extracted from CALM land in the region each year, mostly to local government authorities for roadworks.

Regional Strategies

In addition to implementing Departmental policies and guidelines (see Appendices I and 2), during the period of this plan CALM staff in the region will:

- (i) develop basic raw material plans for CALM lands, to meet long-term needs;
- (ii) for all CALM basic raw materials leases develop agreed working arrangements, in particular, ensure all lessees use efficient and cost effective methods that allow for maximum rehabilitation conditions e.g. the removal of topsoil before mining for subsequent use as a planting and natural seed germination medium.

WILDFLOWERS

Wildflower production is an important industry in this State with production valued at over \$2 million in 1980/81.

All native flora is protected and a licence is required before any wildflowers can be picked on private property as well as on Crown Lands. Three forms of licence are issued by CALM, which controls wildflower picking under the Wildlife Conservation Act:

commercial purposes licences, which allow the sale of protected flora taken on Crown land;
commercial production licences, which allow the sale of protected flora taken on private land;
scientific or prescribed purposes licences, issued to those people intending to take native plants, but not to sell them.

These licences allow the picking of all but gazetted rare flora.

Commercial wildflower picking under licence is permitted on State forest. Usually no picking is allowed within 50 m of public roads. Commercial picking is not permitted on nature reserve, national park and conservation park.

The main species collected in this region include *Boronia megastigma*, *Stirlingia latifolia*, *Anigozanthos manglesii*, *Podocarpus drouyniana*, *Helichrysum cordatum* and *Adenanthos obovatus*.

Commercial wildflower picking can have adverse effects on conservation values - through overpicking, trampling and disease spread, if not managed properly.

Regional Strategies

In addition to implementing Departmental policies and guidelines (see Appendices 1 and 2), during the period of this plan CALM staff in the region will:

- (i) develop and implement a monitoring system, and adjust management according to measured impacts on conservation values;
- (ii) identify areas which are unavailable for wildflower production;
- (iii) monitor costs of administration and supervision of this industry.

NURSERIES

The Department runs a number of nurseries to supply tree and shrub seedlings.

There is one Departmental nursery in the region, a pine nursery near Nannup.

The Nannup nursery supplies pine seedlings, mainly for Departmental use in this region. Some seedlings are also supplied to other CALM regions and the public. In recent years the annual production has been about 2 500 000 seedlings, of which about 5 per cent have been sold to the public.

Regional Strategies

In addition to implementing Departmental policies and guidelines (see Appendices I and 2), during the period of this plan CALM staff in the region will:

- (i) continue to manage a cost efficient nursery to produce seedlings for Departmental needs;
- (ii) continue investigating the feasibility of improving pine stock via propagation of cuttings;

APICULTURE

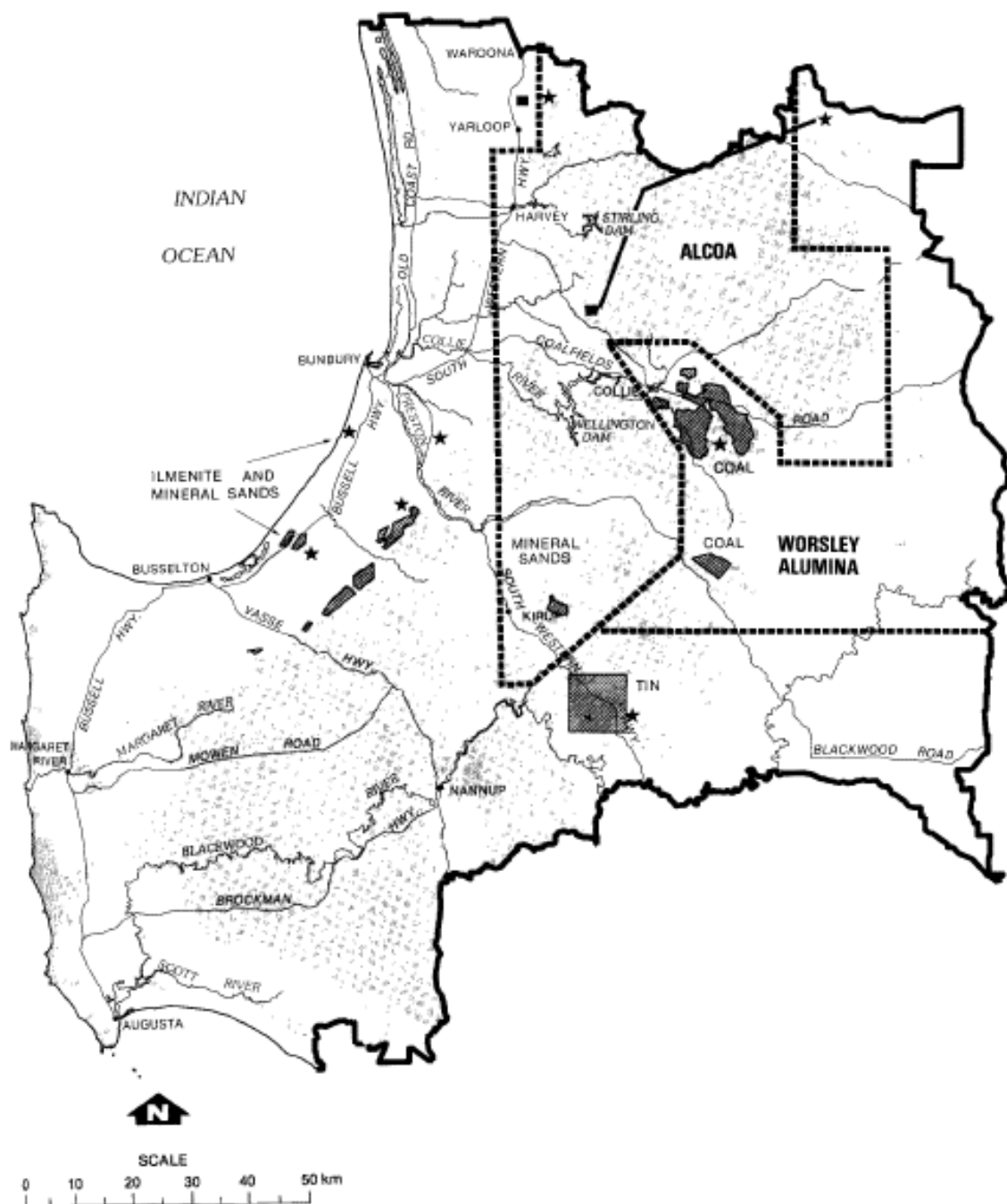
In 1985/86 annual production from apiary sites in this State has been of the order of 2 800 t of honey and 47 t of beeswax with a gross value of over \$2.4 million. Much of this production was from apiary sites on CALM lands. The Department acts as the central registration authority for apiary sites on all Crown lands.

The number of sites available on CALM lands is limited by management constraints such as the 3 km minimum spacing between sites, dieback hygiene requirements and forest regeneration activities.

Currently apiarists hold over 370 registered sites within this region, most of which are on CALM land. In addition, there are numerous sites on adjoining private property with the bees using CALM land. Feral bees are present throughout the region (Moore et al. 1983). The environmental effects of bees are the subject of current research.

CENTRAL FOREST REGION MINING

- KEY
- APPROVED BAUXITE MINING LEASES AND CLAIMS
 - ▨ OTHER APPROVED MINING LEASES AND CLAIMS
 - CONVEYOR LINES
 - REFINERIES
 - ★ MINING IN PROGRESS
 - ☆ MINING PROPOSED
 - ▭ C.A.L.M. ESTATE



MAP 12

Regional Strategies

In addition to implementing Departmental policies and guidelines (see Appendices 1 and 2), during the period of this plan CALM staff in the region will:

- (i) improve the administration of the honey production industry on CALM lands by the promotion of self regulation e.g. for notification, site security, hygiene;
- (ii) continue research into environmental effects;
- (iii) maintain the existing number of apiary sites by arranging relocation whenever existing sites are disturbed by e.g. mining, logging.

FISHING

Fishing (both amateur and professional) is controlled by the Fisheries Department. CALM, however, has responsibility for the conservation and protection of wildlife under the Wildlife Conservation Act and can control access by fishermen on CALM land and waters.

There is no commercial fishing in areas currently managed by this Department. Some fishermen, however, do require access through CALM land for parking or transporting their vehicles, boats, fishing gear or produce.

Amateur fishing in, or requiring access through, areas managed by CALM includes inland fishing for marron and trout as well as ocean and estuary fishing. Amateur fishing is permitted on CALM lands except nature reserves, under conditions established through the Fisheries Act, unless restricted or prohibited under a management plan. The rules for amateur fishermen are summarised in 'Recreational Fishing. A Guide to the Rules', Fisheries Department (1985).

Regional Strategies

In addition to implementing Departmental policies and guidelines (see Appendices I and 2), during the period of this plan CALM staff in the region will:

- (i) summarise data on amateur and professional fishing on CALM lands and waters in the region e.g. locations fished, target species, fishing effort, with a view to minimising impacts;
- (ii) summarise information about constraints on fishing e.g. Fisheries Regulations, restrictions on access -DRA, catchment;
- (iii) maintain liaison with the Fisheries Department and if necessary seek changes in fishing regulations and/or access.

Public Utilities

The main public utility organisations with responsibilities affecting CALM lands are:

The Water Authority;
State Energy Commission;
Local Government Authorities;
Westrail;
Telecom;
Main Roads Department.

The major public utilities on CALM land are shown in Map 13. In addition public utility agencies currently hold 45 forest leases and 38 gravel leases on CALM land within the region.

Public utilities provide essential community needs, but can have serious negative visual effects and cause permanent loss of natural land estate and resources. Existing public utilities will be maintained and new developments will take place during the period of this plan.

Regional Strategies

In addition to implementing Departmental policies and guidelines (see Appendices 1 and 2), during the period of this plan CALM staff in the region will:

- (i) meet with Regional officers in charge of key public utilities once a year to obtain information on any proposals likely to affect CALM land and negotiate relocation, timing of operations etc. to minimise impact on CALM land;
- (ii) seek involvement in public utility maintenance programs affecting CALM land to ensure that **harmful** effects are minimised;
- (iii) maintain an inventory of existing damage on areas of public utilities and implement rehabilitation programs. Ensure that where new damage occurs the utility involved is aware of its obligation to fund and undertake rehabilitation.

CENTRAL FOREST REGION PUBLIC UTILITIES

KEY

- C.A.L.M. ESTATE
- TRANSMISSION LINES 66kV, 132kV and 330kV
- CONVEYOR LINE
- RAILWAY
- MAJOR WATER SUPPLY PIPELINE
- NATURAL GAS PIPELINE
- MICROWAVE TRANSMISSION TOWER - S.E.C.
- MICROWAVE TRANSMISSION TOWER - TELECOM
- T.V. and RADIO TOWER
- LANDING GROUND - PUBLIC
- LANDING GROUND - C.A.L.M.
- LANDING GROUND - C.A.L.M. (agricultural standard only)



MAP 13

PART 4. RESEARCH

Organisation of the Division

The Division of Research is one of five divisions in the operations wing of the Department, under the overall control of the General Manager. The division is led by the divisional manager and a corporate team consisting of two senior principal research scientists and two principal research scientists. Internal organisation is on the basis of research programs, each led by a program leader. Staff are located at five research centres (Busselton, Como, Dwellingup, Manjimup, Woodvale), each under the administrative control of research centre manager and at two regional headquarters (Kalgoorlie, Karratha), which are administered by Woodvale. Some Como research centre staff are located at Narrogin and Wanneroo district offices.

The program structure for the division has only recently been adopted. It was designed to achieve the following objectives:

- to integrate the two research groups that came together with the formation of CALM;
- to foster better review and planning of research between workers in related subjects;
- to achieve better co-ordination with other CALM divisions and with external research organisations;
- to enable clearer definition of priorities and greater mobility of resources across the research spectrum.

Twelve programs have been established. Four are ecosystem based, six are process or goal based and two are service based. The programs are as follows:

Ecosystem based:	jarrah forest karri forest pine wetlands and waterbirds
Process/goal based:	biogeography fauna conservation flora conservation fire plant disease rehabilitation
Services:	computing executive and administrative support

Major Areas of Research

Each region is serviced primarily by centres located within the region concentrating on regional problems. However, research on such topics as utilisation, fire, fauna and dieback, service wider Departmental needs as well as the region in which the staff are located.

Apart from the general research listed above, the Central Forest Region is largely serviced by research done at Busselton and Como. Almost all this research is concerned with the establishment, management and utilisation of softwood, primarily *P. radiata*. Work has been done on problems of establishment in the Sunlands and hills plantations. The development of pruning and thinning regimes to optimise growth rates and the production of top regimes to optimise growth rates and the production of top quality sawn timber from plantation is also proceeding. Work on the development of agroforestry techniques is an integral part of the silvicultural work at Busselton.

In addition to basic pine silviculture, work is progressing on pine nutrition problems; more recently this research has concentrated on increasing the productivity of the older pine stands.

Genetic work, based at Como, is aimed at ensuring that the genotypes used in plantations provide the best possible growth rates, wood quality and disease resistance.

Research is also being undertaken to ensure that wood quality is sufficient to meet the needs of the timber industry. More recently research at Harvey, done from the Bunbury centre, has started to investigate aspects of wood utilisation with a view to maximising utilisation and upgrading wood quality.

Research into aspects of the effects of dieback disease (*Phytophthora cinnamomi*) on *P. radiata* in the Sunlands is being carried out from Como.

Some research has also been carried out on the second rotation establishment problem on coastal sands. Much of this work has been terminated and the results are being used by management.

Delineation and monitoring of rare flora is carried out by staff from Woodvale research centre.

Studies on the diet of waterbirds utilising mosquito breeding marshes around Leschenault Inlet, part of a larger multi-agency study looking at mosquito control options, is being conducted by staff from Woodvale research centre. Long term monitoring of waterbird population, particularly on the Wonnerup-Vasse wetlands, is being conducted in conjunction with the Royal Australasian Ornithologists Union.

PART 5. PLAN IMPLEMENTATION

The regional management plans provide a framework for more detailed area and operational plans and link these to the corporate, strategic and other plans. Regional plans do not present detailed management proposals on an area basis, but they provide a structure within which more detailed planning can take place.

LEGAL RESPONSIBILITIES

In both the preparation and implementation of management plans, Departmental staff must comply with the various Acts and legislation which impinge on operations. These are:

Acts Administered by this Department:

Conservation and Land Management Act, 1984 as amended
Timber Industries Regulation Act, 1926 as amended
Wildlife Conservation Act, 1950 as amended
Sandalwood Act, 1929 as amended

Acts under which the Department has specific responsibilities are:

Alumina Refinery Agreement Act, 1961 as amended
Alumina Refinery (Pinjarra) Agreement Act, 1969 as amended
Alumina Refinery (Wagerup) Agreement and Acts Amendment Act, 1978 as amended
Alumina Refinery (Worsley) Agreement Act Amendment Act, 1978 as amended
Bush Fires Act, 1954 as amended
Land Tax Assessment Act, 1976 as amended
Mining Act 1978 as amended
Wesply (Dardanup) Agreement Authorization Act, 1975 as amended
Wood Chipping Industry Agreement Act, 1969 as amended
Wundowie Charcoal Iron Industry Sale Agreement Acts, 1974 as amended

Other Acts which affect the Department's land management responsibilities include.:

Aboriginal Heritage Act, 1972 as amended
Aerial Spraying Control Act, 1966 as amended
Agriculture and Related Resources Protection Act, 1976 as amended
Agriculture Protection Board Act, 1950 as amended
Beekeepers Act, 1963 as amended
Control of Vehicles (Offroad Areas) Act, 1978 as amended

Country Areas Water Supply Act, 1947 as amended
Environmental Protection Act, 1986 as amended
Fisheries Act, 1905 as amended
Land Act, 1933 as amended
Local Government Act, 1960 as amended
Main Roads Act, 1930 as amended
Mining Act, 1978 as amended
Metropolitan Water Supply Sewerage and Drainage Act, 1909 as amended
Mineral Sands (Western Titanium) Agreement Act, 1975 as amended
Public Works Act, 1902 as amended
Rights in Water and Irrigation Act, 1914 as amended
Soil and Land Conservation Act, 1945 as amended
South West Development Authority Act, 1984 as amended
State Energy Commission Act, 1979 as amended
State Planning Commission Act, 1985 as amended
Water Authority Act, 1984 as amended

International treaties signed by the Commonwealth Government which may impinge on the Department's responsibilities are:

CITES - Convention on International Trade in Endangered Species

Ramsar Agreement - Convention on Wetlands of International Importance especially as Waterfowl Habitat

JAMBA - Japan Australia Migratory Birds Agreement

LIAISON REQUIRED

Effective liaison is required at appropriate levels between CALM and State and Commonwealth departments and authorities, local government, organisations and individuals affected by Departmental operations, particularly the following:

Associated Statutory Authorities - Commonwealth Government include the following:

CSIRO

Department of Defence

Telecom Australia

Associated Statutory Authorities - State Government include the following:

Agriculture Protection Board

Bush Fires Board

Department of Agriculture
Department of Industrial Development
Department of Land Administration
Department of Marine and Harbours
Department of Sport and Recreation
Education Department
Environmental Protection Authority
Fisheries Department
Main Roads Department
Police Department
South West Development Authority
State Energy Commission
State Government Insurance Office
State Planning Commission
Valuer Generals Office
Waterways Commission
Water Authority of Western Australia
W.A. Tourism Commission
Westrail

Local Government

All cities and shires which contain CALM land.

SUBSEQUENT PLANNING

The regional plan will be implemented by a series of area management plans, issue plans, operational plans, manuals and prescriptions prepared at district or branch level.

Issue plans

Issue plans are either a follow-up to an approved management plan, or are for necessary operations where there is not yet an approved management plan. Issue plans cover all relevant topics such as:

- bauxite rehabilitation
- dieback
- fire protection
- logging
- recreation

research
wildlife management

Many of these issue plans are prepared for a three-to four-year period, but revised annually.

Operational plans

The operational plan for a region is the sum of the annual works programs for the districts within the region. An operational plan shows where operations are to be carried out in a financial or calendar year. Intended works over a three-to four-year period may also be indicated. An operational plan has identifiable targets and criteria for measuring performance. It is prepared annually to incorporate any change in priorities.

The following works programs, covering the topics listed, will continue to be prepared during the period of this regional management plan:

fire control
hardwood regeneration
hardwood silviculture
hardwood logging
noxious weed eradication
prescribed burning
pine silviculture
pine planting
pine logging regional and district recreation
road construction and maintenance

Wildlife Management Programs

These present historical and scientific data and details of strategies and management options for particular fauna or flora species. Examples include:

The Noisy Scrub Bird Management Program (Burbidge, Folley and Smith 1986);
Kangaroo management in Western Australia (McNamara and Prince 1986).

Wildlife management programs are prepared by specialist staff to guide management of specific species.

Departmental Manuals and Prescriptions

Manuals provide guidelines on how operations are to be carried out, whereas prescriptions are job specific. Prescriptions may include details such as a map of the work area, personnel required, cost estimate, safety rules, environmental protection specifications and liaison requirements.

Written job prescriptions are used for most jobs carried out by Departmental gangs and for some jobs carried out by staff and contractors.

The following manuals will continue to be used and others will be drawn up as necessary:

- Foresters Manual (to be progressively incorporated into a CALM Operations Manual);
- Pine management guide;
- Working arrangements;
- Code of hardwood logging practice;
- (Hardwood) industry control manual;
- (Hardwood) operations manual;
- Dieback hygiene manual (1986);
- Rare flora register for forest regions (1986);
- District managers guide (1986);
- Code of softwood logging practice (1986);
- Recreation operations manual;
- Signs manual;
- Chemicals manual.

Guidelines for Necessary Operations

The CALM Act (Section 33) provides that certain operations can be carried out when there is no management plan. For national parks and nature reserves, these are defined as those actions necessary for the preservation or protection of persons, property, land, flora or fauna, or for the preparation of a management plan. For indigenous State forest they are defined as those actions that ensure multiple use and sustained yield of that resource for the satisfaction of long term social and economic needs.

Guidelines for 'necessary operations' are prepared by district and specialist staff for approval by the directors.

Regional, District, Branch Strategic Plans

Each year, or as required, Regional Managers draw up a strategic plan detailing such matters as:

- responsibilities;
- objectives and key strategies;
- priorities for the period, including reference to work deferred because of insufficient resources;
- liaison requirements;
- administrative structure and arrangements;
- update of resources (personnel, etc);
- targets and/or performance indicators and control systems to measure success or failure;
- reports required, such as annual reports by districts.

Planning by other Departments, Authorities and Organisations

Many other departments, authorities and organisations produce management plans. It is the intention of this Department to conform to the appropriate Acts, Regulations, By-laws and plans of other organisations providing that these do not conflict with our Acts, Regulations and responsibilities. This Department also intends that other departments should conform with our Acts and Regulations.

Our plans are discussed with organisations and individuals likely to be affected by them and we seek input into other organisations plans that are likely to affect us.

Examples of the types of plans which may affect this Department are:

Commonwealth Government

Telecom: microwave link proposals, telephone cable developments.

State Government

Environmental Protection Authority: Coastal management plans, conservation reserve proposals for Systems;

Main Roads Department: Proposals for major roadworks etc.;

State Energy Commission: Proposals for new electricity or gas lines;

State Planning Commission: Regional or area plans;

Water Authority: Proposals for major new developments, catchment recreation plans-;

Waterways Commission: Inlet/estuary management programs.

Local Government

Town (shire) plans, proposals for major new developments.

Private Enterprise

Mining Companies: Proposals including ERMP for major new developments.

WORKS PROGRAMS AND FINANCE

The Departmental objective for financial management is to prepare budgets which reflect Departmental goals and priorities and to manage works programs according to approved budgets.

PERSONNEL

Increase in personnel numbers is justified in a number of areas. In the current economic situation, however, personnel numbers are likely to decrease in line with Government policy.

CALM aims to develop and maintain a system of management that will give full scope to individual capacity and ability, and encourage teamwork. High priority is given to the safety of CALM personnel and other people who recreate or work on land managed by CALM.

Training

In accordance with the Departmental training policy (See Policy Statement No. 6 'Staff Training and Career Development') training needs for staff and employees will be evaluated each year, included in annual works programs and budget submissions, and implemented on a priority basis as resources permit.

RESEARCH, INVENTORY AND MONITORING

Research, inventory and monitoring requirements are continually reviewed by regional and research staff, Inventory Branch and other Departmental branches. Depending on factors such as urgency, likely cost and priority the required work is either carried out, programmed or deferred, depending on existing resources and workloads.

REPORTS AND RECORDS REQUIRED

Management records will continue to be kept in the manual Hardwood Operations Control System (HOCS) and Pine Operations Control System (POCS) and the computerised Conservation and Land Management Information System (CALMIS). Specified area and volume data will be provided for inclusion in the Departmental annual report and continuously for management requirements.

Standard reports will be produced by the computerised hardwood and pine logging systems and financial reports by the general ledger system.

Comments on progress in implementing the regional management plans will be incorporated in the Departmental Annual Report as appropriate.

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GLOSSARY

Aquifer: A zone of soil or subsoil material that allows the passage of water faster than adjoining zones.

Basic raw materials: Gravel, sand, rocks, limestone, clay used for fill and for roads and buildings.

Bedrock: Barren formation underlying the exploitable part of a mining deposit.

Buffer: An area of land managed in such a way as to protect another area from outside influences.

Catchment: The surface area from which water runs off to a river or any other collecting reservoir, e.g. swamps, groundwater.

Catena: A gradual succession of soil types over an area, usually due to variation in relief (topography).

Cave: A natural underground cavity formed in rock, usually with an opening to the surface. Significant caves are large enough to be entered by humans.

Clearfelling: The felling and removal of the standing crop. The subsequent crop is even-aged.

Compatible uses: Uses that do not conflict with the priority use.

Conditional uses: Uses that conflict to an extent with the priority use and are only permitted so long as there is no significant harm to the priority use.

Conservation: Management of human use of the environment so that it may yield the greatest sustainable benefit to present generations while maintaining the potential to meet the needs and aspirations of future generations.

Corporate plan: A document expressing an organisation's direction and commitments, e.g. in terms of its mission, charter, objectives and strategies.

Cretaceous: Period of geological time from about 65 million to 135 million years ago.

Crystalline rocks: Igneous rocks (formed by the cooling of hot fluid material - magma) or metamorphic rocks (originally igneous or sedimentary but altered by heat and/or pressure).

Day use recreation: Recreational use of an area for a period of one day or less.

Disease: A disorder which results in a morbid (sickly) condition of a plant or animal.

Ecosystem: A specific environment, e.g. lake including all its biological, chemical and physical components.

Endangered: Flora or fauna in danger of extinction and whose survival is unlikely if the causal factors continue operating.

Endemic: Flora or fauna that is confined in its natural occurrence to a particular region.

Environment: The physical surroundings in which an organism or group of organisms live.

Erosion: Wearing away of the land surface by natural forces.

Estuary: A partially enclosed coastal body of water either permanently or periodically open to the sea.

Exotic: A plant introduced from another locality. Not indigenous.

Fauna: Animal life.

Feral: An introduced or domestic animal now living in the wild.

Flora: Plant life.

Forest: An ecosystem characterised by a more or less dense and extensive tree cover.

Geology: The science which investigates the history of the earth's crust, from the earliest times to the commencement of the historical period.

Geomorphology: The description and interpretation of landforms.

Group Selection: A silvicultural system in which the crop is felled in small groups either to permit regeneration to develop or to release advance growth.

Hardwood: The timber of broadleaved trees, and the trees themselves, belonging to the botanical group Angiosperms, e.g. Eucalypts.

Hydrology: The study of water movements, quality, distribution and utilisation, above, on and below the ground.

Interpretation: The process of communicating the significance (bringing out the meaning) of an area by describing and explaining its characteristics.

Jurassic: Period of geological time, from about 135 million to 195 million years ago.

Landform: All the physical, recognizable, naturally formed features of land, having a characteristic shape; includes major forms such as a plain, mountain, or plateau, and minor forms such as a hill, valley or alluvial fan.

Landing: A site at which logs have been accumulated for the purpose of loading on to a hauling vehicle.

Laterite: The weathering of rock/soil which leads to the removal of silica and alkalies, resulting in a soil or rock with high concentrations of iron and aluminium oxides (laterite).

Mature forest: The stage at which a stand best fulfils the (main) purpose for which it was maintained e.g. produces the best possible supply of specified products.

Mesozoic: Era of geological time from about 65 million to about 245 million years ago.

Monadnock: An isolated hill or mass of rock which stands above the surrounding country because its rock has been more resistant to erosion than the rock of the area.

Multiple use management: The use of land, especially forest land, for several different purposes. Some types of use are compatible with each other, but others may not be compatible, in which case it is necessary to set a priority or even exclusive use for a particular area.

Objective: A specific statement of measurable results to be achieved within a specific time period.

Permian: Period of geological time from about 240 million to about 280 million years ago.

Pests: Troublesome or destructive animals, including insects, either introduced or native.

Plain: An extensive area of level or gently undulating land, usually of low altitude.

Plateau: An extensive, level or mainly level area of elevated land.

Podzolic: A soil with a very thin organic-mineral layer (horizon) above a bleached layer which rests upon a clay enriched dark coloured horizon. Podzols are acid soils with clearly defined boundaries between horizons.

Policy: The courses of action to be followed to achieve an organisation's objectives.

Pollution: Any direct or indirect alteration of the environment by discharging, emitting or depositing wastes or substances which are harmful or potentially harmful.

Precambrian: The oldest period of geological time, from about 550 million years ago to the time of consolidation of the earth's crust about 4 500 million year years ago.

Prescribed burning: The application of fire to land under such conditions of weather, soil moisture, time of day and other factors that will result in the controlled spread and intensity of heat required to accomplish specific silvicultural, environmental or fire hazard reduction objectives.

Priority use: The use which will prevail in any situation of conflict between various uses.

Quaternary: The most recent period of geological time, from the present to about 1.8 million years ago.

Rare species: Less than a few thousand reproductively mature specimens are known to exist in the wild.

Rehabilitation: Process necessary to return disturbed land to a predetermined surface, land use or productivity.

Restricted: Flora or fauna that occurs only in a confined area.

Rutile: A reddish-brown tetragonal mineral common in acid igneous rocks, in metamorphic rocks, and as residual grain in beach sand.

Salinity: The measure of total soluble (dissolved) salt, i.e. mineral constituents, in water. Water containing more than 500 parts per million (mg/L) is not considered desirable for domestic use.

Scarp: An inland cliff or steep slope, often formed as a direct result of a geological fault.

Sedgeland: Areas of coarse, grassy, rush-like or flag-like plants growing in wet places.

Sedimentary rocks: Formed from pre-existing rocks by the action of erosion (e.g. sandstone), chemical precipitation (e.g. rock salt) or the activity of organisms (e.g. limestone).

Silviculture: The art and science of establishment and tending of forest.

Snig Track: Track on which a log is hauled from tree stump to a loading point (or landing).

Softwood: The timber of trees, and the trees themselves, belonging to the botanical group Gymnosperms, e.g. Pines.

Strategy: Explains how policy is intended to be achieved.

Sustained yield: As applied to forest policy, a method or plan of management (sustained yield management) that implies continuous production with the aim of achieving, at the earliest practicable time and at the highest possible level, an approximate balance between net growth and yield.

Tertiary: Period of geological time, from about 1.8 million to 65 million years ago.

Thinning: A felling made in an immature stand for the purpose of improving the growth of trees that remain without permanently breaking the canopy.

Topography: The delineation of the natural and artificial features of an area.

Turbidity: Discolouration of water due to suspended silt or organic matter.

Underground water: Water which occupies the pores and crevices of rock and soil.

Virgin forest: Forest which has not been cut-over (logged).

Weeds: Plants (often self-sown exotics) growing where they are not wanted.

Wetland: Any lowland covered by shallow and sometimes temporary or intermittent waters, e.g. swamps, creeks, rivers, lakes, estuaries.

Woodland: A plant community in which trees form only an open canopy, the intervening area being occupied by lower vegetation, usually grass or scrub.

GLOSSARY OF ABBREVIATIONS

A.	Acacia
B.	Banksia
CALM	(Department of) Conservation and Land Management
CSIRO	Commonwealth Scientific and Industrial Research Organization
CTRC	Conservation Through Reserves Committee
DRA	Disease Risk Area
E.	Eucalyptus
EPA	Environmental Protection Authority
ERMP	Environmental Review and Management Program
<i>et al.</i>	and others
ha	hectares
ID no.	Identity number
IUCN	International Union for the Conservation of Nature and Natural Resources
km	kilometre
L.	Lake
LFC	Lands and Forests Commission (a controlling body established under Section 20 of the CALM Act, 1984).
M.	Melaleuca
MPA	Management Priority Area
P.	Pinus
m	metre
m ²	square metres
m ³	cubic metres
mg/L	milligrams per litre
n.d.	No date
NPNC	National Parks and Nature Conservation Authority (a controlling body established under Section 21 of the CALM Act, 1984)
SEC	State Energy Commission
TDS	Total dissolved solids
VCL	vacant Crown land
WAWA	Water Authority of Western Australia
10 ³	1 000
10 ⁶	1000000

APPENDIX 1. DEPARTMENTAL POLICY STATEMENTS

CALM inherited policies from the three agencies amalgamated to form the Department, and is currently developing new policies covering the complete range of Departmental management responsibilities.

Policies are published and distributed throughout the Department as Policy Statements. They can be made available to any member of the public who wishes to read them.

Policy statements issued or in final stages of drafting (at 1 July 1987) are as follows:

No.	Title	Date of issue or amendment
1	Planning	Jan 1986
2	Basic Raw Materials	Nov 1985
3	Dieback and Logging	Sep 1986
4	Departmental Advisory Committees	Dec 1985
5	Research and Technical Publications	Jan 1986
6	Staff Training & Career Development	Jan 1986
7	Recreation in Nature Reserves	Jan 1986
8	Financial Management	May 1986
9	Conservation of Endangered Flora in the Wild	-
10	Rehabilitation of Disturbed Land	Nov 1986
11	Protection of Aboriginal Sites	-
12	Arbor Day	Aug 1986
13	Taking of Protected Flora in the Kimberley Region	Dec 1986
14	Weeds on CALM land	Nov 1986
15	Public Participation	Apr 1987
16	Computer Purchase and Use	Dec 1986
17	Housing	Feb 1987
18	Recreation	Apr 1987
19	Fire Management	May 1987
-	Reporting, Monitoring and Re-evaluation of Ecosystems	-
-	Management of Conservation Lands	-
-	Communications	-
-	Marine and Estuarine Reserve System (W.A.)	-

Policies are being developed for a further 20 issues relevant to CALM activities and responsibilities.

Until the full range of policies is available, Departmental management guidelines (see Appendix 2) are used as a basis for operations. These provide managers with day-to-day guidelines for planning and management. They are based upon new CALM policies, or policies inherited by CALM from the former agencies.

THE TIMBER STRATEGY FOR WESTERN AUSTRALIA

A comprehensive statement on the timber strategy for W.A. has been released i.e. 'Timber production in Western Australia. A strategy to take W.A.'s south-west forests into the 21st century' (CALM, 1987).

The timber strategy is a component of the land management plans, and is consequently a statutory document.

The timber strategy covers:

- the demand for wood;
- W.A.'s forest resources;
- the forest-based industries in W.A.;
- forest management;
- setting the allowable cut;
- allocation of the cut;
- log pricing;
- timber utilisation;
- timber marketing.

THE CONSERVATION AND RECREATION STRATEGY

A statement on the policies and management guidelines used by CALM in areas of conservation and recreation has been released i.e. 'Strategies for Conservation and Recreation on CALM lands in Western Australia. The conservation, environmental protection and recreation strategies of W.A.'s Department of Conservation and Land Management.' It covers:

- wildlife conservation;
- recreation;
- landscape management;
- environmental protection;
- fire;
- mining;
- wildflower picking.
- dedication of land;
- cultural areas;
- community education and interpretation;
- apiculture;
- public utilities.

APPENDIX 2 DEPARTMENTAL MANAGEMENT GUIDELINES

Note:

Management guidelines are continually under review and may change during the period of this plan, particularly as new CALM policies are developed.

Each Management guideline comprises:

A broad objective - a broad statement of what the Department expects to achieve.

Specific objectives - the courses of action to be taken to achieve the broad objective.

Strategy - which explains how the objectives are intended to be achieved.

DEDICATION OF LAND

Objective

To reserve natural ecosystems and other significant land areas of the State within appropriate definition of purpose and security of tenure to meet conservation needs and public demands for use.

Specifically the aim is to:

assess the potential of land within the State to meet the requirements of the Conservation and Land Management Act;

advise Government on the value of vacant Crown land for forestry, national parks and nature reserves;

pursue dedication of vacant Crown land suitable for Departmental management;

purchase suitable areas of private property as they become available and ensure suitable vesting, or make agreements for joint management, as appropriate;

oppose alienation of State forests, national parks, nature reserves and marine reserves;

consolidate existing reserves by negotiation to ensure that boundaries are manageable with respect to adjacent land uses.

Strategies

- (i) Continue survey of all non-dedicated land (and waters) which could be of value to the public estate.
- (ii) Exchange land where the Department's assets will benefit from the transaction.
- (iii) Issue leases for activities not opposed to the purpose of the land, where this will assist management objectives.
- (iv) Continue biogeographical studies and research to identify further areas or ecosystems for inclusion in the reserve system.

WILDLIFE CONSERVATION

Objectives

To manage forest, parks and reserves for conservation of native wildlife (flora and fauna); to ensure long-term maintenance of species' diversity and genetic resources; and provide for the persistence of those habitats, species and ecological processes which comprise natural ecosystems.

To protect and manage wildlife populations throughout the State, and provide special protection for species declared to be rare and endangered.

Specifically, the Department will aim to:

Develop a Reserve system

Establish and manage a system of parks and reserves dedicated to a primary purpose of wildlife conservation which:

is broadly representative of the region's natural habitats and contains viable populations of plants and animals representative of the indigenous flora and fauna; and is sufficiently and appropriately spaced to provide refuge for migratory and nomadic species as well as habitat for sedentary species.

Manage parks and reserves whose primary function is wildlife conservation to:

maximise diversity and species- richness, or provide habitat for particular species or communities.

Manage those State forests and reserves whose primary function is not wildlife conservation to meet wildlife conservation objectives to the maximum extent possible without compromising the area's primary purposes.

Maintain habitat for those species of indigenous plants and animals which are rare or endangered.

Undertake ecological research and monitor change in reserve environments and species populations to develop a knowledge-base appropriate to reserve management objectives.

Strategies

Protect Wildlife

- (i) Ensure that wildlife protection regulations are adhered to throughout the State.
- (ii) Ensure that protected flora and fauna are taken for private or commercial purposes only in accordance with regulations and permits, and that the numbers taken do not endanger the long term sustainability of populations in the wild.
- (iii) Ensure that any native species taken for private or commercial purposes are treated as humanely as possible.
- (iv) Provide assistance to other land-holders for protection of populations of rare and endangered species, where appropriate.
- (v) Maintain an information system pertaining to the location, condition and management needs of populations of rare and endangered plants and animals.
- (vi) Maintain an effective enforcement unit and inspectorial programs.
- (vii) Monitor the status of wild populations, habitat and seasonal conditions and ensure that permits to take are consistent with the long-term maintenance of population numbers.
- (viii) Monitor the take of wildlife subject to permit and ensure that conditions are adhered to.

Establish a representative reserve system

- (ix) Assess and characterise the qualities of existing conservation reserves to determine conservation values and particular management problems in each one.

- (x) Evaluate the extent to which conservation reserves act as a system, both internally and in the extent to which they need to be integrated with other land whose primary function is not wildlife conservation.
- (xi) Assess the extent to which the existing conservation reserves are representative of the biota of Western Australia and develop a strategy for acquisition of additional land for reservation where the existing reserve system is shown to be deficient.
- (xii) Develop a set of priorities for each region for the allocation of resources to research, planning, and management of conservation reserves.

Management of conservation reserves

- (xiii) Develop and maintain an inventory of conservation reserves containing information on vesting and management history, location, size and shape, landscape, biotic diversity, environmental condition, and the presence of species in need of special protection.
- (xiv) Prepare management plans for individual conservation reserves or groups of similar reserves with clearly defined objectives for protection and, where necessary, restoration of identified conservation values, and with special emphasis as appropriate on:
 - maintenance of species- richness and continuance of natural ecological processes;
 - protection of rare or endangered species;
 - protection of unique habitats or communities;
 - maintenance of habitat for migratory species.
- (xv) Exclude from conservation reserves, as far as possible, species of plant and animal not native to the area. Where exotic organisms have been introduced, take measures to eradicate them from the reserve or, where that is not possible, to control their populations to levels where they do not damage the conservation values of the reserves.
- (xvi) Provide facilities to service those recreational or educational activities in the reserve which are prescribed in an approved management plan.

LANDSCAPE MANAGEMENT

Objective

To ensure that all land uses and activities on CALM land are planned and carried out in ways that

complement the inherent visual qualities of the natural environment.

Specifically, the aim is to:

employ staff trained in landscape architecture and related design disciplines to promote sound landscape management practices within CALM planning and operations;

develop a landscape classification system which will assist in the identification, evaluation and amelioration of visual impacts, and which is applicable to and compatible with both broad scale and detailed project planning;

prepare a comprehensive manual and set of landscape management guidelines covering all operations that have an effect on the landscape;

conduct training courses covering visual resource and landscape management and planning concepts for Departmental staff and other interested groups who work on CALM lands.

Strategies

- (i) Harvest State forest areas designated for timber production in ways that are sympathetic to existing landscape patterns and within the limits imposed by sound silvicultural and management techniques.
- (ii) Establish pine forests in accordance with accepted landscape design principles so that possible intrusive effects on the landscape are minimised.
- (iii) Plan and design facilities for recreation that are in harmony with the natural environment.
- (iv) Locate and design roads and utility corridors to minimise both environmental and social impacts on the areas they traverse.
- (v) Ensure that major disturbances imposed on CALM lands (dams, mines) are planned and implemented to minimise the impact on existing landscape values.
- (vi) Locate and design all new buildings and structures using materials and colours compatible with the surrounding landscape.
- (vii) Develop and implement a standard system of signs to cater for the various sign requirements of the Department.

- (viii) Evaluate land use proposals on adjacent lands in terms of their potential impact on landscape and recommend how these can be mitigated.

CULTURAL AREAS

Objective

To ensure the preservation and enhancement of significant cultural areas (modified landscape, historic sites, Aboriginal sites, caves) on land controlled by the Department.

Specifically the aim is to:

locate and record the presence of significant sites;

liaise with the Museum, universities, historic societies, National Trust and other relevant bodies to ensure suitable classification, registration, protection and management of sites;

manage the sites as appropriate;

encourage further research where required;

liaise with industry, local government and public utilities to ensure the protection of these sites.

Strategies

- (i) Where necessary, ensure protection by suitable tenure and provision within management plans for the area or region concerned.
- (ii) Employ regional committees to assist in site location and evaluation.
- (iii) Facilitate site location and classification by concentrating on areas in which potentially damaging operations are to be carried out.
- (iv) Maintain the necessary degree of confidentiality where required to protect values.
- (v) Record as required in Departmental information systems to prevent inadvertent damage by Departmental operations.

ENVIRONMENTAL PROTECTION

Objective

To protect CALM lands from environmental degradation caused by natural agencies (e.g. insects, fungi, dieback), exotic agencies (e.g. weeds, feral animals) and human activities (e.g. mining, pollution, litter, roading),

Specifically, the aim is to:

- manage land, wherever possible, to avoid disturbance that degrades natural ecosystems;
- develop appropriate environmental controls for all CALM activities;
- monitor the extent and severity of physical disturbances and infestations on CALM lands;
- classify CALM land on the basis of sensitivity to disturbances and pollution;
- develop appropriate environmental and legal controls to minimise environmental damage by other agencies and private individuals;
- encourage research into harmful natural and exotic agencies.

Strategies

- (i) Include environmental guidelines and controls in all management proposals and prescriptions.
- (ii) Ensure that landscape management and rehabilitation procedures are considered in planning all operations that can cause disturbance.
- (iii) Ensure that all staff are adequately informed and trained in aspects of environmental management.
- (iv) Disseminate information about environmental factors to other agencies and members of the public.
- (v) Allocate appropriate resources (staff, money, training) to ensure that the policies can be implemented.

FIRE

Objectives

To protect community and environmental values on lands managed by the Department from damage or destruction by wildfire.

To use fire as a management tool to achieve land management objectives, in accordance with designated land use priorities.

Specifically, the aim is:

Fire Suppression

The Department will:

Respond to fires occurring on or near CALM land to a degree that is appropriate to the values at risk.

Assess its response to a fire in the light of potential damage to the following values in order of priority:

- (i) Human life;
- (ii) Community assets, property and environmental values;
- (iii) Cost of suppression in relation to values threatened.

Where values dictate:

(i) provide a detection system which will give timely warning of the presence of a fire threatening community or environmental values;

(ii) provide a well-trained and equipped suppression organisation capable of containing several simultaneous unplanned fires under extreme weather conditions in conjunction with other firefighting organisations.

Use of Fire

The Department will:

Use planned fire only where this use is in accordance with an approved management plan, or, where such a plan does not exist, to protect and maintain the designated priority land use.

Prepare written prescriptions in advance, for approval by senior designated officers, before any planned fires are undertaken.

Use fire conservatively in areas where information about the impacts of fire is limited, and in areas where the primary land use is conservation of flora and fauna.

In such areas, the use of fire will be restricted to:

- (i) protection of neighbouring community assets; and

(ii) providing a diversity of fuel and vegetation ages, but ensuring as much as possible of each major vegetation association is maintained in the mature condition.

Use prescribed fire or other methods to reduce fuels on CALM lands, where it can be demonstrated that this is the most effective means of wildfire control, and where undesirable ecological effects do not result.

The frequency of fuel reduction measures will be governed by the rate of build-up of fuels, the value of the assets to be protected, and the resources available to carry out the work.

Liaison

The Department will:

Ensure effective liaison with neighbours, bush fire brigades, shires, Bush Fires Board and other fire control organisations.

Support the concept of shire district fire plans and promote mutual aid interagency agreements for fire control of lands of mixed tenure with common fire problems.

Public Awareness

The Department will provide for public education in relation to the prevention of fire, and the role and use of fire in ecosystem management, and hazard and risk reduction.

Research

The Department will undertake research into fire prevention and control, and fire effects and fire behaviour on CALM lands to improve the scientific basis for, and effectiveness of, fire management programs.

DISEASES

Objective

To minimise the damage caused by plant and animal diseases on Departmental lands.

Specifically, the aim is to:

maintain a record of all plant and animal diseases of significance to management of CALM lands;

classify land and populations according to disease presence, susceptibility of habitats and resistance to disease;

investigate the cause and effect of diseases and prescribe effective control measures, where warranted;

ensure that all management practices for an area are in accord with effective disease control;

inform the public of the nature and significance of disease on CALM land and request their co-operation in prevention and control;

rehabilitate infected areas or populations where appropriate.

Strategies

- (i) Maintain effective expertise on pathogens within the Department.
- (ii) Ensure that disease effects are considered in all ecological studies.
- (iii) Use quarantine and hygiene methods for control, as necessary.
- (iv) Provide for staff training in disease detection and control.

WEEDS AND PESTS

Objective

To achieve a safe and systematic management of weeds and pests of ecological significance, on CALM lands.

Specifically, the aim is to:

direct management to eradication, control or containment depending on land management objectives, and the nature of the weed or pest;

monitor the extent or severity of infestations on Departmental lands;

control declared weeds and animal pests on Departmental land where it is economically feasible to do so;

ensure conservation values are not prejudiced in control work;

carry out research to determine the most effective method of control to meet priority use objectives;

liaise with other departments, authorities, shires, industry and neighbours involved in weed and pest control and related matters.

Strategies

- (i) Ensure that all artificial control programs are carried out with safety of the operator and public a priority.
- (ii) All chemical controls must conform with prescribed techniques and have the approval of the district or regional manager.
- (iii) Wherever possible expert control teams will be employed for hazardous control procedures.
- (iv) Biological control of exotic weeds or pests must be approved by the Director of Nature Conservation.

REHABILITATION

Objective

To regenerate degraded land with self-regulating ecosystems consistent with the purpose of the land and, where possible, to restore indigenous biological communities.

Specifically, the aim is to:

rehabilitate land managed by the Department which has been degraded by disturbance so that it will best meet the needs of the designated land use for the area;

apply restoration techniques which favour natural values, wherever possible;

ensure that the cost of rehabilitation is borne by the agency responsible for site degradation, wherever possible;

ensure that rehabilitation provides for as many secondary land uses as possible;

monitor regeneration programs and encourage research to ensure that the aims are being achieved and that techniques are continually being improved;

liaise with other Government departments, miners, industry and other land users to continue the exchange of ideas, techniques and standards for rehabilitation.

Strategies

- (i) Ensure that agreements and planning for disturbances on CALM land make provision for rehabilitation.
- (ii) Employ species and genotypes native to the original site in restoration, whenever possible.
- (iii) Encourage natural regeneration of indigenous vegetation.
- (iv) In the absence of natural regeneration, planting or seeding procedures should be planned to simulate the original vegetation with respect to species diversity, composition and spacing.
- (v) For areas where nature conservation is not the priority use, if naturalness cannot be achieved, rehabilitation should enhance priority uses or maintain them at an acceptable level as determined by landscape architects.

RECREATION

Objective

To cater for the widest range of recreational activities giving the most satisfying experience for users, through the planning and managing of activities and facilities on land controlled by the Department.

This is to be done having regard to the preservation of natural land values, consistency of recreational activity with purpose of vesting, equity, and the capacity of the Department to manage the proposed activity.

Specifically, the aim is to:

Provide and allow for the widest range of recreational opportunities consistent with:
the purpose and vesting of the land;
the ability of the natural system to sustain the activity without impairment;
the ability of the Department to supervise the activity where land values may be impaired.

Provide facilities and information to enhance use and enjoyment of recreation sites.

Plan facilities to involve users (both individuals and groups) to the fullest possible extent.

Where appropriate, obtain assistance in the provision of services from non-public sources. This may be by way of commercial concessions or voluntary help.

Recoup costs through charges to users where recreational opportunities create a management cost, and where it is practical to do so.

Ensure safety, through planning, maintenance, information and signs.

Strategies

- (i) Identify opportunities for recreation when regional and area management plans are being prepared.
- (ii) Monitor existing activities and facilities and collect data on use to ensure that the quality of opportunities is maintained; the current use is appropriate to the primary objectives of land reservation; and resources are allocated based on need.
- (iii) Consult with individuals and organisations about management of recreational opportunities and further requirements.
- (iv) Plan the most appropriate recreational use of areas, based on preservation of natural values and anticipated recreation demands. Anticipate the need to minimise maintenance and management costs and reduce conflicts between users.

(v) Regularly review fees to ensure that they are equitable, and reflect management costs incurred.

(vi) Continually and effectively inform the public of:

recreational opportunities available to them and the positive efforts made by the Department to provide them;

the reasons for management decisions regarding restrictions on use; behaviours which maximise the retention of natural values;

requirements for safety of all users.

COMMUNITY EDUCATION AND INTERPRETATION

Objective

To promote community awareness and understanding of the natural environment and encourage public attitudes and behaviour compatible with, and supportive of, conservation of flora and fauna and the management of forests, parks and reserves.

Specifically, the aim is to:

encourage people to learn about State forests, parks, reserves and wildlife; foster the desire in people to experience the natural environment and its management; interpret the environment in forests, parks and reserves for visitors;

co-ordinate and assist public participation in management planning and implementation through advisory committees and 'friends' groups;

research and evaluate methods and techniques available for achieving effective community education and interpretation;

liaise with associated agencies, organisations and interest groups to integrate education and interpretation programs.

Strategies

- (i) Provide an education/interpretation section within the Information Branch.
- (ii) Provide facilities such as self-guided walk trails, visitor centres, displays and brochures.
- (iii) Train regional and district staff in interpretation and effective communication with the public.
- (iv) Provide the Education Department and private school system with appropriate advice and assistance in curriculum development, and assist with in-service training of teachers, teachertrainers and relevant community group leaders.
- (v) Produce and market appropriate educational films, videos, slides, sound tapes, pamphlets, brochures and other audio visual material and publications.
- (vi) Promote the use of planned tours, seminars, workshops, field days and lectures to explain conservation and land management, at the regional level.
- (vii) Ensure public inquiry into CALM's activities is satisfied.

SUPPORT SERVICES

Objective

To assist in achieving the goals of resource management under the responsibility of CALM in an effective manner.

Specifically, the aim is to:

provide information, advice, trained personnel and equipment necessary to achieve resource management objectives;

acquire knowledge and skills so that management decisions are based on the most up-to-date information and expertise;

review management techniques, information, staff finance and equipment needs at regular intervals;

promote public understanding of natural ecosystems, conservation and CALM policy.

Strategies

- (i) Maintain sufficient support staff to provide information, advice and equipment to allow resource management goals to be achieved.
- (ii) Ensure management systems and controls are effective.
- (iii) Maintain training and recruiting programs to ensure that the expertise necessary to achieve resource management goals is always available.
- (iv) Prepare statements indicating the technical value of projects in a way that allows a financial priority to be allocated.
- (v) Provide information on conservation matters for the public, using appropriate means such as publications, talks and field visits.
- (vi) Maintain contact with Government departments and other organisations with interest in areas managed by CALM.

CATCHMENT MANAGEMENT

Objective

To manage catchments needed for water supply so as to maintain or enhance water quantity and quality in accordance with the requirements of the Water Authority of Western Australia (WAWA).

Specifically, the aim is to:

protect existing healthy vegetation from agents that might lead to deterioration of water quality;

rehabilitate degraded areas to ensure water quality is maintained or restored;

regulate other uses of gazetted catchments when they compete with water supply objectives;

monitor the quality of streams where changes in land uses are involved;

investigate techniques of land management with the aim of maximising water supply without detrimentally affecting quality;

liaise with water supply authorities (WAWA) concerning all aspects of water supply and any new management practices proposed;

ensure that CALM plans allow for new dams and major supply facilities proposed by WAWA.

Strategies

- (i) Direct management of salt-sensitive areas to establish and maintain a deep-rooted perennial crop, and restore vegetation cover as quickly as possible where it is removed.
- (ii) Design harvesting and silvicultural practices to increase water quantity while protecting water quality.
- (iii) Protect and maintain stream reserves.
- (iv) Keep road construction and maintenance to a standard necessary for catchment protection.
- (v) Minimise the spread of dieback disease, particularly in salt-sensitive areas.
- (vi) Continue prescribed burning on catchments in such a way as to minimise turbidity and ash pollution and to regulate run-off.
- (vii) Manage existing land uses on catchments to minimise the risks of siltation, turbidity, salinity and biological pollution.
- (viii) Avoid land use changes where they prejudice water values or potential storage sites.
- (ix) Plan recreational activities on catchments according to guidelines prepared by the Western Australian Water Resources Council.

WOOD PRODUCTION

Objective

To produce the maximum range and type of wood products, so as to provide long term economic and social benefits to the people and to sustain the forests of W.A.

Specifically, the aim is to:

adjust the cut from the native forest progressively to a level consistent with the growth of the forest, having due regard for associated regional economic stability;

ensure wood production areas are dedicated and protected, to permit long term forecasting and effective silvicultural management;

ensure that the wood products from the forest are used conservatively in conversion and in marketing to favour the highest value product;

provide softwood plantations to supplement the hardwood cut, to meet demand, wherever it is economically and socially desirable to do so, and in accord with effective land use management;

continue research to ensure the best possible inventory, protection, silvicultural, utilisation and harvesting techniques are employed in management;

expand the hardwood sawlog resource base by encouraging use of lower quality logs, smaller logs and residues;

monitor wood production operations to ensure they are environmentally sound and favour multiple use management of the forest;

liaise with local government and the timber industry concerning environmental protection, future availability of the resource, and utilisation standards.

Strategies

- (i) Regulate log sale agreements and royalties to favour conservative use of timber and stability of the timber industry.
- (ii) Integrate harvesting operations to favour the best extraction and use of all log and round wood materials.
- (iii) Provide direction to industry through research into the use and marketing of timber resources.

- (iv) Control and direct wood use from the forest through regional management and operational plans.
- (v) Encourage private involvement in hardwood and softwood production.

MINING

Objective

To ensure that approved exploration and mining operations proceed according to conditions specified to minimise environmental damage and to rehabilitate in conformance with the purpose of vesting.

Specifically, the aim is to:

abide by the Mining Act which allows for proposals to be rejected or approved subject to conditions by the Hon Minister for Conservation and Land Management on national parks, State forest and A class reserves;

ensure that when any proposal for exploration or mining is submitted involving land and waters under CALM management that the land values affected by the proposal are fully considered;

where conditions applying to exploration and mining are being considered by Government, ensure the development of the most appropriate conditions to preserve the values for which the land was reserved;

liaise with Mines Department, the Department of Resources Development and the Environmental Protection Authority to ensure that the most appropriate conditions for exploration and/or mining on parks, reserves and forests, are developed;

ensure that conditions applied to exploration and mining are complied with;

continue research into techniques aimed at minimising environmental damage and land use conflict;

liaise with exploration companies to ensure they are aware of the effects of mining on the environment and other land uses, and of rehabilitation techniques;

liaise with authorities responsible for administering mining agreements and with other organisations authorised to study mining effects and rehabilitation techniques;

rehabilitate areas affected by mining to suit the designated land use, and in accordance with conditions imposed by State Government under the various special agreement Acts and Mining Act.

Strategies

- (i) Seek the inclusion of appropriate conditions governing environmental protection into the mineral leases issued under the Mining Act.
- (ii) Ensure that exploration on CALM land is conducted in strict adherence to conditions stipulated by the relevant departments.
- (iii) Seek to direct mining operations into areas where there will be least conflict with other land uses.
- (iv) Where possible obtain realistic compensation from companies mining on CALM land to cover loss of conservation values, land purchase and the continuing cost of rehabilitation and management of areas affected by mining.

BASIC RAW MATERIALS

Objective

To minimise the effect of the extraction of gravel, stone and sand on conservation values on Departmental land.

Specifically, the aim is to:

lease sites to Government and semi-government bodies for gravel, stone and sand for use on roads on or within 5 km of land controlled by this Department, where economic sources are unavailable outside CALM land;

prohibit gravel, stone and sand extraction by the Department or its authorised agents from Departmental land over which a mining tenement (for gravel) has been granted;

control supplies for other purposes (for commercial use, for other Departments) under the Mining Act on approved Mining Act tenements/or extractive industry licences under the Local Government Act;

ensure appropriate environmental measures are taken with all operations.

Strategies

- (i) Locate borrow pits, wherever possible, outside stream and road reserves, and where they are not in view from the public roads.
- (ii) Rehabilitate borrow pits according to the designated land use.
- (iii) Minimise pits in national parks, conservation parks and nature reserves.
- (iv) Review extractive industry plans prepared by local authorities where these affect CALM land.

WILDFLOWER PICKING

Objective

To control the commercial harvesting of flora on Crown land and private property within sustainable levels, to minimise detrimental effects on conservation values on Crown land, and to maintain a supply of seed from native flora.

Specifically, the aim is to:

permit picking and seed collection on State forest and Crown land other than nature reserves, conservation parks and national parks, subject to land use priorities and management conditions;

ensure royalties or collection fees are paid to reimburse service charges and control collection, wherever it is practicable to collect them; license picking on private property;

collect data on the range of occurrence of species in commercial demand and investigate their management requirements;

identify, protect and manage species of rare flora that occur on both Crown land and private land;

encourage commercial interests to meet the demand for blossom and plants from private nurseries and orchards;

provide suitable seedlings and seed from Departmental nurseries and seed stores for rural conservation projects where these materials are not satisfactorily available from private sources.

Strategies

- (i) Monitor distribution and management of protected flora and those species declared as rare flora.
- (ii) Ensure pickers are licensed in accordance with the provision of the Wildlife Conservation Act, and are familiar with the conditions and endorsements applicable to their licences.
- (iii) Establish and maintain seed orchards for species that are of limited supply or are difficult to collect.

APICULTURE

Objective

To facilitate beekeeping subject to the need to minimise conflict with other land use objectives.

Specifically, the aim is to:

ensure apiary sites are sited to optimise the use of available areas, consistent with the primary land use requirements;

control apiculture on the Department's land, other reserves and Crown land by the issuing of permits and allocation of apiary sites;

advise registered beekeepers of proposed CALM activity that could conflict with the location of their hives or honey production from a site;

investigate the allocation and use of apiary sites with respect to nectar and honey production.

Strategies

- (i) Locate apiary sites at acceptable intervals, taking account of constraints such as:
 - existence of suitable vehicular access to the apiary site;
 - need to avoid transference of disease, including dieback;
 - effects of European honey bees on high conservation value ecosystems and rare flora/fauna which are strongly dependent on nectar and pollen;
 - proximity of current or proposed activity by CALM and other authorised users;
 - risk of water pollution caused by beekeepers' activities;
 - requirements of other Authorities controlling Crown land or Government reserves;
 - location in relation to private property;
 - relevant Acts and Regulations.
- (ii) Notify the Government Apiculturist of the Department's prescribed burning program each year.
- (iii) Continue liaison with other authorities that control Crown land on which apiary sites are located.
- (iv) Gather data on resource use and honey production by a system of annual returns.
- (v) Support research into the affect of European bees on native flora and fauna.

FISHING

Objective

To provide for fishing, permitted under the Fisheries Act and Regulations, in locations where access is consistent with land management objectives.

The aim is to:

permit fishing in non-reserved tidal waters in inlets and off the coast as regulated by the Department of Fisheries;

permit recreational freshwater fishing on CALM land under conditions established through the Fisheries Act;

prohibit fishing on CALM land under any conditions where it can be shown that it could be a threat to sustenance of the species or populations concerned;

liaise with Local Government, special interest groups and the public to improve planning for fishing on CALM lands and waters;

encourage monitoring and research to determine acceptable limits to resource use on CALM lands.

Strategies

- (i) Control fishing operations through the operations of the Department of Fisheries and within the provisions of the Fisheries Act.
- (ii) Regulate use of favourable sites on CALM land through control of access.
- (iii) Plan for fishing within recreational programs, wherever applicable.

PUBLIC UTILITIES

Objective

To limit development of public utilities that result in loss of reserve area and conservation values on CALM land to those considered essential by Government and for which there is no reasonable alternative location.

The aim is to:

retain as much as possible of the land managed by the Department free of public utilities.

guide the location of public utilities on CALM land into areas where land use conflict and environmental damage are minimised;

rehabilitate redundant sites to suit the designated land use;

liaise with, and advise, service authorities to ensure their operations are in sympathy with the environment and other land uses.

Strategies

- (i) Liaise with shires to avoid the use of CALM land for access to new subdivisions.
- (ii) Obtain compensation, where appropriate, to offset loss of Departmental land and associated values.
- (iii) Guide public utilities into areas where risk of dieback disease spread, salinity, and aesthetic impact are minimised. Encourage the use of landscaping.
- (iv) Encourage the use of the same sites for more than one utility.
- (v) Ensure management practices do not endanger public utilities.
- (vi) Develop procedures for rehabilitation of redundant sites in conjunction with and, where appropriate, at the expense of, the agency responsible.
- (vii) Ensure that proposals for public utilities are provided for in management plans for CALM lands.

APPENDIX 3. COMPARISON BETWEEN EPA, FORESTS DEPARTMENT AND CALM REGIONAL PLAN PROPOSALS FOR EPA SYSTEMS 1,2,4 AND 6

These tables indicate the way individual areas have been dealt with by the EPA in its Systems reports, the Forests Department in its last General Working Plan and CALM in the draft and final regional plans.

Note:

1. All proposals by CALM to change land tenure will be subject to the normal review processes by the Controlling Bodies, Department of Land Administration and affected government and local government authorities. Both Houses of Parliament must agree to any changes of tenure of State forest or A Class Reserves.
2. No boundaries are final. Final boundaries will only be established after all consultative processes have been completed.

APPENDIX 3. COMPARISON BETWEEN EPA, FORESTS DEPARTMENT AND CALM REGIONAL PLAN PROPOSALS FOR EPA SYSTEMS 1,2,4 AND 6

EPA no.	Locality	EPA proposal	Forests Department GWP 87 (1982) App.3,4,5	Draft Regional Plan (Apr '87)	Final Regional Plan
System 1					
1.1.2	Ludlow	SF	FFL	NP/SF	NP/SF
1.3	Whicher-Bovell	FP	FFL	NR	NR
1.4	Leeuwin-Naturaliste	NP	-	NP	NP
1.4	Boranup	FP	FFL	FP	NP
1.5	Milyeannup	FP	FFL	NR	NR
1.5	Rapids	FP	R	FP	CP
1.5	Chester	FP	FFL	NR	NR
-	Mowen	-	FFL	FP/SF	NR/SF
-	Blackwood	-	R	FP	CP/SF
-	Witchcliffe	-	SF	SF	SF
System 2					
2.1	Scott NP	NP	-	NP	NP
2.2	Pemberton NP	NP	-	NP	NP
2.3	D'Entrecasteaux	NP	-	NP	NP
2.4	Shannon basin	SF/FP	FFL/SF	NP	NP
2.4	Dickson	FP	FFL	NR	NR
2.4	Iffley	FP	S	SF	SF
2.4	One Tree Bridge	FP	R	FP	CP
2.4	Brockman	FP	R	NP	NP
2.4	Dombakup	FP	FFL		CP
2.4	Lindsay	FP	S	SF	SF
2.4	Johnston O'Donnell	FP	FFL	NP	NP
2.4	Soho	FP	FFL	NP	NP
2.4	Beavis-Giblett	FP(a)	SF	SF	SF
2.4	Strickland	FP(a)	FFL	NR	NR
2.4	Hawke-Treen	FP	FFL	NP	NP
2.4	Boorara	FP	FFL	FP	CP
2.4	Curtin	FP	FFL	NP	NP

EPA no.	Locality	EPA proposal	Forests Department GWP 87 (1982) App.3,4,5	Draft Regional Plan (Apr '87)	Final Regional Plan
2.4	Wattle	FP	FFL	NP	NP
2.4	Lower Shannon	FP	FFL	NP	NP
2.4	Mitchell Crossing	FP	FFL	NP	NP
2.4	Muirillup Rock	FP	R	FP	CP
2.5	Perup	FP	FFL	FP	NR
2.6	Lake Muir	NR	-	NR	NR
2.12	Gingilup Swamp	CFF	-	NR	NR
2.13	Islands	CFF	-	NR	NR
2.15	Kent-Denmark	SF	SF	SF/SP	SF/NP
-	Mt Frankland MPA	-	R	NP	NP
-	Keystone-Swarbrick	-	S	FP	SF
-	Giants	-	SF	FP	NP
-	Paget MPA	-	FFL	NR	NR
-	One Tree Bridge NR	-	-	FP	NR
-	Jardee NP	-	-	5g	CP
-	Jervik Park NP	-	-	5g	CP
-	Sheepwash	-	SF	NP	NP
-	Mt Lindesay	-	SF	SP	NP
-	Sir James Mitchell NP	-	-	NP/SF	NP/SF
System 4					
-	Chowerup VCL	-	-	SF	SF
-	Wournbelup VCL	-	SF	NR	SF
-	Bolbelup	-	SF	NR/SF	NR/SF
System 6					
C 2	Moore River NP	NP/CFF/RP	-	NR	NR
C 6	Yurine Swamp	CFF	-	NR	NR
C 9	Gingin-Boonanarring	CFF	-	NR	NR
C 10	L. Wannamal	CFF	-	NR	NR
C 12	Caraban MPA	FFL	FFL	NR	NR
C 13	Wabling MPA	FFL	FFL	NR	NR

EPA no.	Locality	EPA proposal	Forests Department GWP 87 (1982) App.3,4,5	Draft Regional Plan (Apr '87)	Final Regional Plan
C 14	L. Muckenburra	CFF	-	NR	NR
C 15	Gin Gin	CFF	-	NR	NR
C 17	L. Chandala	CFF	-	NR	NR
C 18	Burroloo Well	CFF	-	NR	NR
C 19	Needonga-Chittering	CFF/RP	-	NR	NR
C 20	Mt Byroomanning	CFF/RP	-	NR	NR
C 21	J ulimar M PA	RP	FFL	FP	CP
C 23	Culham	CFF	-	NR	NR
C 26	Bullsbrook	CFF	-	NR	NR
C 27	Beelaring-Goonaring	CFF	-	NR	NR
C 28	Wundowie	CFF	-	NR	NR
C 29	Clackline	CFF	-	NR	NR
C 30	Inkpen Rd	CFF	-	NR	NR
C 32	Dale MPA	FFL	FFL	FP	CP
C 33	Russell MPA	RP	FFL	FP	CP
C 34	Gunapin MPA	FFL	FFL	FP	CP
C 35	Sullivan MPA	FFL	FFL	FP	CP
C 36	Eagle Hill MPA	FFL	FFL	FP	CP
C 37	Brookton and Albany Hwy	RP	SF/FFL	SF/FP	SF/CP
C 38	Cooke MPA	RP	FFL	FP	CP
C 39	Windsor MPA	RP	FFL	FP	CP
C 40	Boyagarring MPA	FFL	FFL	FP	CP
C 41	Lupton MPA(<i>b</i>)	FFL	FFL	FP	FC
C 42	Duncan MPA	FFL	FFL	FP	CP
C 43	Gyngoorda MPA	FFL	FFL	FP	CP
C 44	Wandering MPA(<i>b</i>)	FFL	FFL	FP	CP
C 47	North Dandalup	CFF/RP	-	NR	NR
C 48	North Dandalup	CFF/RP	-	NR	NR
C 49	North Dandalup	CFF/RP	-	NR	NR
C 50	Peel Inlet	CFF/AR/RP	-	NR	NR
C 51	Harvey Estuary	CFF/AR/RP	-	NR	NR
C 52	McLarty-Mealup	CFF/RP	-	NR	NR

EPA no.	Locality	EPA proposal	Forests Department GWP 87 (1982) App.3,4,5	Draft Regional Plan (Apr '87)	Final Regional Plan
C 54	Yalgorup NP	RP	-	NP	NP
C 55	Clifton MPA	RP	FFL	NP	NP
C56	McLarty MPA	RP	FFL	NP	NP
C 57	Myalup MPA	FFL	FFL	NP	NP
C 59	Wagerup	CFF	-	NR	NR
C 60	Harvey	CFF/W	-	NR	NR
C 61	L.Preston	CFF	-	NR	NR
C 62	Harvey	CFF	-	N R	NR
C63	Myalup-Mialla	protect	-	FP	CP
C 65	Benger Swamp	CFF	-	NR	NR
C 72	Teesdale MPA	RP	FFL	FP	CP
C 73	Murray Valley MPA	RP	R	FP	5g
C 74	Plavins MPA	RP	FFL	FP	CP
C 75	Samson MPA	RP	FFL	FP	CP
C 76	Federal MPA	RP	FFL	FP	CP
C 77	Bell MPA	RP	FFL	FP	CP
C 80	Reserves, Harvey	CFF	-	NR	NR
C 82	Surface MPA	RP	FFL	FP	CP
C 83	Nalyerin MPA	RP	FFL	FP	CP
C 84	Trees MPA	RP	FFL	FP	CP
C 85	Stene MPA	RP	FFL	FP	CP
C 86	Dardanup MPA	RP	FFL	FP	CP/SF
C 87	Lennard MPA	RP	FFL	FP	CP/SF
C 88	Westralia MPA	RP	FFL	FP	CP
C 90	Preston MPA	FFIL	FFL	FP	CP/SF
C 91	Noggerup MPA	FFL	FFL	FP	CP/SF
C 92	Goonac MPA	FFL	FFL	FP	CP
C 93	Muja MPA(<i>b</i>)	FFL	FFL	FP	CP
C 94	Bennelaking MPA(<i>b</i>)	FFL	FFL	FP	CP
C 95	Mullalyup MPA	RP	FFL	FP	CP/SF
C 96	Wilga	CFF	-	NR	NR
C 97	St John Brook MPA	RP	FFL	FP	CP

EPA no.	Locality	EPA proposal	Forests Department GWP 87 (1982) App.3,4,5	Draft Regional Plan (Apr '87)	Final Regional Plan
C 98	Blackwood R.	RP	-	NR	NR
C 99	Greenbushes MPA	RP	FFL	FP	NR
C100	Dalgarup MPA	RP	FFL	NR/SF	NR/SF
C101	Nollajup MPA	FFL	FFL	FP	NR
M 3	Yanchep NP	RP	-	NP	NP
M 4	Ridges	RP	FFL	NP	NP
M 5	Yeal NR	CFF	-	NR	NR
M 6	Neerabup NP	RP	-	SP	CP
M 8	Wanneroo	RP	-	NR	NR
M 9	Melaleuca MPA	FFL	FFL	NR	NR
M 14	Bullsbrook	CFF	-	NR	NR
M 16	Avon Valley NP	NP/CFF	-	NP	NP
M 18	Walyunga NP	RP	-	NP	NP
M 21	John Forrest NP	RP	-	NP	NP
M 25	L. Leschenaultia	RP	R	FP	CP
M 27	L. Manaring	CFF	-	NR	NR
M 28	Woorooloo	CFF	-	NR	NR
M 29	Greenmount NP	RP	-	SP	CP
M 34	Gooseberry Hill NP	RP	-	SP	CP
M 34	Kalamunda NP	RP	-	SP	CP
M 34	Kalamunda SF	FFL[W	SF	FP	CP
M 34	Burkinshaw Rd NP	RP	-	SP	CP
M 80	Lesmurdie Falls NP	RP	-	SP	CP
M 84	Gooralong MPA	RP	FFL	SP	NP
M 85	Serpentine NP	RP	-	SP	NP
M 86	Karnet MPA	RP	FFIL	SP	NP
M 87	Serpentine MPA	RP	FFL	SP	NP
M108	Goegrup Lakes	CFF	-	NR	NR
-	Marradong	-	R	FP	CP
-	Araluen-Canning	-	-	SP	CP
-	Yanchep SF	-	SF	NR	NR
-	Kemerton	-	-	FP	CP/5g

EPA no.	Locality	EPA proposal	Forests Department GWP 87 (1982) App.3,4,5	Draft Regional Plan (Apr '87)	Final Regional Plan
-	Camballan	-	SF	SF	SF
-	Wagerup NP	-	-	SP	CP
-	Gwindinup NP	-	-	SP	CP
-	Bridgetown NP	-	-	SP	CP

Note

Some areas considered in the EPA Systems reports are vested in authorities other than CALM, or are outside the boundaries of the Northern, Central and Southern Forest Regions and are therefore not listed above.

Legend

- AR aquatic reserve
- CFF conservation of flora and fauna reserve
- CP conservation park
- FFL flora, fauna and landscape MPA
- FP forest park
- MPA management priority area
- NP national park
- NR nature reserve
- R recreation MPA
- RP regional park
- S scientific study, education MPA
- SF State forest
- SP State park
- VCL vacant Crown land
- W water reserve
- 5g reserve under Section 5g of CALM Act.
- (a) The EPAs 1982 report on Karri forest conservation amended the EPAs earlier recommendation for these areas to FFL MPAs.
- (b) These areas are located within System 4.

APPENDIX 4. CONSERVATION RESERVES PROPOSED BY THIS PLAN CENTRAL FOREST REGION

Name (or locality)	Area (ha) (a)	Vegetation type and/or Special features
NATURE RESERVES		
Busselton District		
(Stockdill Rd)	60	jarrah, marri
Capel	90	banksia, paperbark
(Walburra)	20	jarrah, marri
Seal Is.	10	Seal Island
St Alouarn Is.	10	St Alouarn Islets
Broadwater	90	The Broadwater
Sabina	60	wetland
Sugarloaf Rock	(b)	Sugarloaf Rock
Flinders Is.	10	Flinders Islet
Haag	10	jarrah, marri
(Ruabon)	30	peppermint, banksia, marri, jarrah
Whicher	6370	jarrah, marri, mountain gum
Chester	330	karri, jarrah, marri
Paget	1400	jarrah, marri, paperbark
Mowen	820	wetland, jarrah, marri
	<u>9310</u>	
Collie District		
L. Towerrinning	160	Lake Towerrinning
Boolading	170	jarrah, marri, wandoo
Haddleton	720	jarrah, marri, wandoo
(Egret colony)	(b)	egret colony
(Collie River)	40	jarrah, marri, flooded gum
Wild Horse Swamp	280	wetland, wandoo, jarrah
(Coalfields Rd)	(b)	jarrah, marri
(Wyvern Rd)	10	jarrah, marri
(Capercup North Rd)	140	wandoo, marri, jarrah
(North Boyanup Rd)	10	jarrah, marri, banksia
	<u>1530</u>	
Harvey District		
(Byrd Swamp)	40	heath, paperbark
(Wellard Rd)	10	paperbark peppermint flooded gum
Harvey Flats	80	jarrah, banksia, paperbark
Buller	300	jarrah, marri, banksia, sheoak
Kooljerrennup (part)	70	jarrah, marri, banksia, paperbark
Crampton	40	jarrah, banksia, christmas tree

Name (or locality)	Area (ha) (a)	Vegetation type and/or Special features
Benger Swamp	540	freckled duck, waterbirds
Rive dale	50	banksia, paperbark, marri, jarrah
Falls Brook	340	jarrah, marri
	<u>1470</u>	
Kirup District		
(Wahkinup)	80	wandoo, marri, jarrah
Kulikup	70	wandoo, marri, jarrah
Powalup	40	jarrah, marri
(Six Mile Rd)	10	jarrah, marri
(Wilga)	30	jarrah, marri
Red Hill	240	wandoo, marri, jarrah
(Boyup Brook Rd)	(b)	jarrah, marri
Greenbushes	1400	jarrah, marri, yarri, flooded gum
Nollaiup	660	jarrah, marri, virgin wandoo
	<u>2530</u>	
Nannup District		
(East Nannup Rd)	10	jarrah, marri
Gingilup Swamp	2800	sedges, paperbark, jarrah, marri
Dalgarup	920	karri
Milyeannup	5560	virgin jarrah, marri, yarri
	<u>9290</u>	
NATIONAL PARKS		
Leeuwin-Naturaliste	19700	coastline heath, karri, caves
Ludlow	2200	tuart, peppermint
Scott	3300	jarrah, marri, karri
Yalgorup (part)	10700	tuart, jarrah, marri, lakes
	<u>35900</u>	
CONSERVATION PARKS		
Bennelaking	5600	jarrah, marri, wandoo
Blackwood	3230	Blackwood River, jarrah, marri
(Bridgetown)	50	jarrah, marri
Dardanup	600	jarrah, marri, yarri, bullich
(Ellis Creek)	130	jarrah, marri, (big jarrah trees)
Goonac	5400	jarrah, marri, wandoo, tamar
(Gwindinup)	10	jarrah, marri, banksia
Kemerton (part)	1500	jarrah, tuart, banksia
Lane Poole (part)	32100	virgin jarrah, marri, wandoo
Lermard	2400	jarrah, marri, yarri
Muja	6400	jarrah, marri, wandoo
Mullalyup	2200	jarrah, marri, yarri

Name (or locality)	Area (ha) (a)	Vegetation type and/or Special features
Noggerup	2400	jarrah, marri, yarri, flooded gum
Preston	570	jarrah, marri, yarri, peppermint
Rapids	2500	jarrah, marri
St John Brook	3400	jarrah, marri, flooded gum
Stene (c)	4400	wandoo, jarrah, rock sheoak
(Wagerup)	10	jarrah, marri, banksia
Westralia	2000	jarrah, marri, yarri
	<u>74900</u>	
CALM ACT SECTION 5G RESERVE		
Golden Valley	70	exotic trees
Lane Poole Reserve (part)	800	jarrah, marri
	<u>870</u>	

Note

- (a) Areas under 1000 ha are to nearest 10 ha
Areas over 1000 ha are generally to nearest 100 ha
- (b) Under 5 ha
- (c) Stene is to be added to Lane Poole