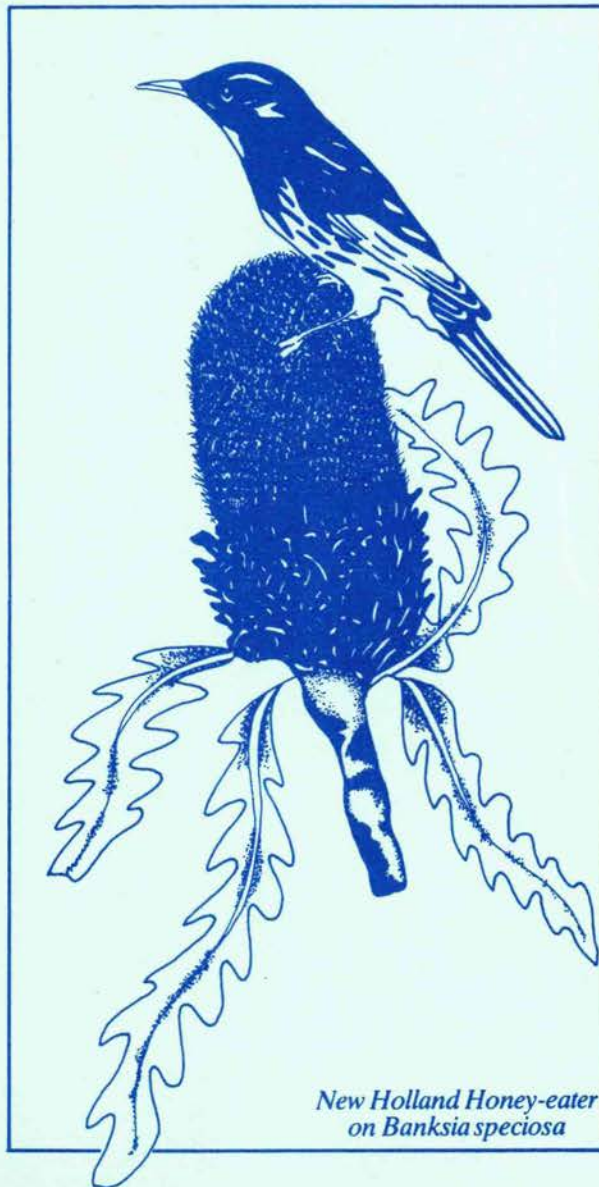




THE SOUTH COAST REGION



*New Holland Honey-eater
on Banksia speciosa*

DRAFT MANAGEMENT PLAN
APRIL 1989

SOUTH COAST REGION

DRAFT MANAGEMENT PLAN

APRIL 1989

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- staff of the South Coast Region in Albany and Esperance;
- various branches within the Department of Conservation and Land Management;
- the CALM Policy Directorate;
- the National Parks and Nature Conservation Authority and the Lands and Forest Commission.

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- Shire of Plantagenet (in particular Councillor Jack Adams);
- Shire of Cranbrook;
- Shire of Gnowangerup;
- Shire of Jerramungup (in particular Councillor Ken Thomas and Councillor Pam Forbes);
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John Watson
Regional Manager
Albany

NOMENCLATURE

Inclusion of a name in this publication does not imply its approval by the relevant nomenclature authority.

OBJECTIVES

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

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

This plan for the South Coast Region covers all land and water in the region vested under the CALM Act, together with wildlife responsibilities included in the Wildlife Conservation Act.

The objectives of the plan are:

- To describe the land and wildlife resources managed by CALM in the South Coast Region.

- To present a land use plan for land managed by CALM in the region.

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

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

- To recognise that recreational opportunities on land managed by CALM should where possible be integrated with the opportunities existing on nearby land which is not managed by CALM.

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

In addition to the regional plan, more detailed management plans will be prepared for certain high value or high conflict areas, e.g., all national parks - or for certain exploited or endangered species, e.g., kangaroos and the noisy scrub bird. These "area management plans" and "wildlife management programmes" 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.

CHAPTER 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 National Parks Authority, the Wildlife Section of the Department of Fisheries and Wildlife and the Forests Department were amalgamated to form the Department of Conservation and Land Management (CALM). The Act also established two controlling bodies: the National Parks and Nature Conservation Authority (NPNCA) in which national parks, nature reserves, conservation parks, marine parks, marine national parks and marine nature reserves are vested, and the Lands and Forest Commission (LFC) in which State forest and timber reserves are vested.

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

Regions

The State is divided into 11 CALM regions. They are Kimberley, Pilbara, Gascoyne, Goldfields, Greenough, Wheatbelt, South Coast, Southern Forest, Central Forest, Northern Forest and Metropolitan Regions, as shown in Figure 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 Western 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:

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.

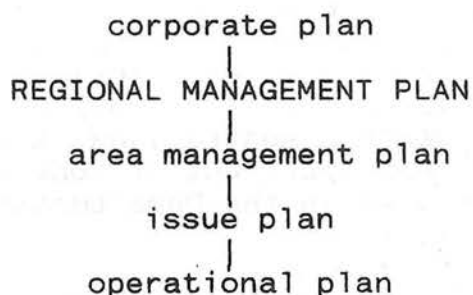
Knowledge:

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".

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



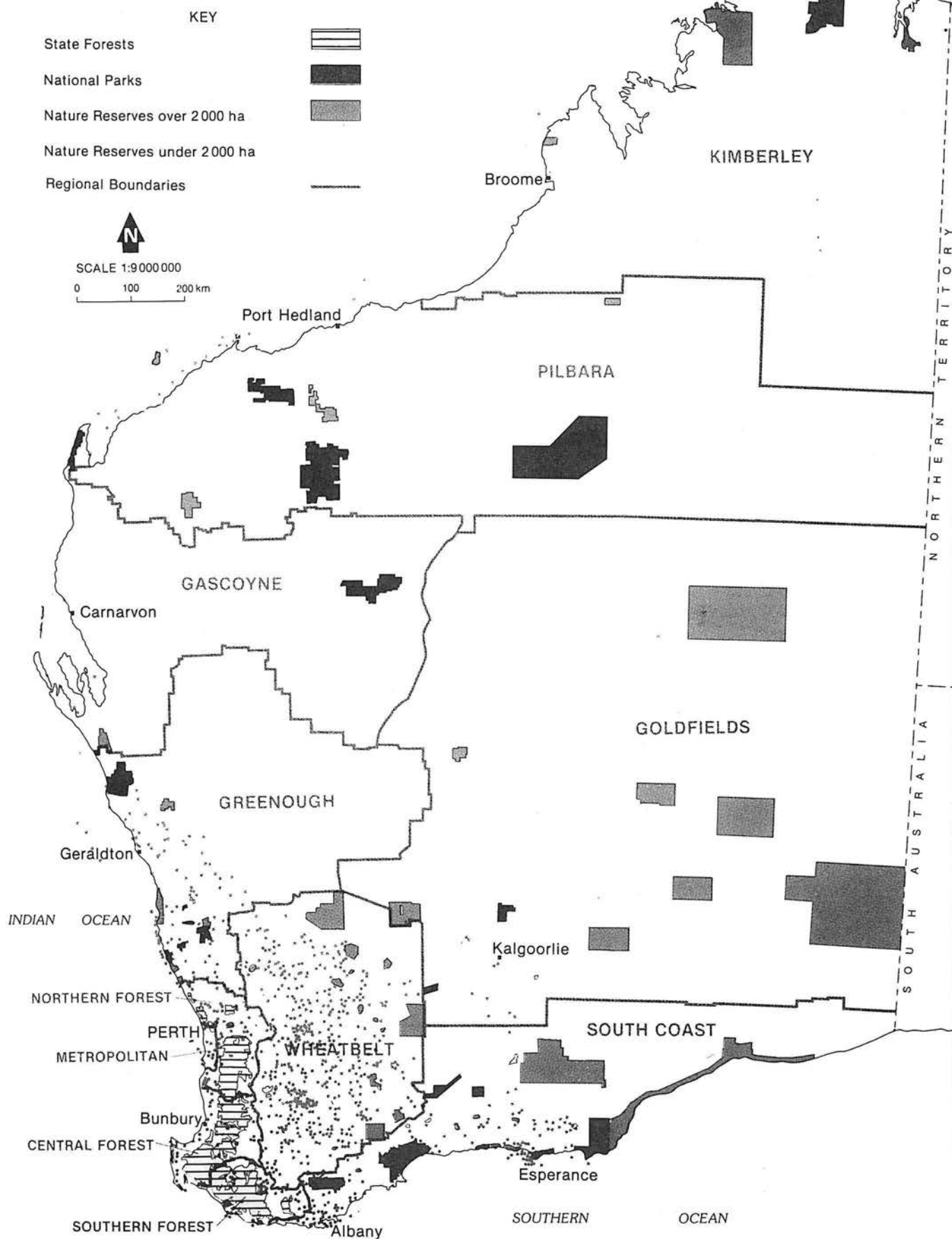
The Department's corporate plan establishes the link to land management plans.

It consists of broad policy statements for all major aspects of land use for all land and water vested in the NPNCA, the LFC and 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 region.

FIG 1

CALM REGIONS



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 sensibly 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, State forest, or other reserves. These are the most detailed management plans prepared by CALM. Once specific area management plans are prepared they will become the primary focus for management and use of the area in question. However, the overall strategies of this Regional Plan will continue to apply to the area unless specifically modified in the area management plan.

Regional and area management plans are subject to public review for a minimum period of 2 months in the draft form before submission to Government.

In addition, the Department prepares issue plans, wildlife management programmes, operational plans, manuals and prescriptions. These are used to implement regional and area management plans and are discussed in Chapter 6. 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.

CATEGORIES OF LAND CURRENTLY VESTED IN THE CONTROLLING BODIES AND MANAGED BY THE DEPARTMENT.

The CALM Act currently (February, 1989) lists seven categories of land to which the legislation applies. These are:

- State forest
- timber reserve
- national park
- nature reserve
- marine park
- marine nature reserve
- any other land vested in the Commission, the Authority or the Executive Director

In addition, the Department also manages land held freehold in the name of the Executive Director and sections of private land under pine and eucalypt share farming agreements.

VESTING AND MANAGEMENT

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

The Department is responsible for management of lands vested in the Authority, the Commission and the Executive Director. 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 AND SECURITY

"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.

In Western Australia, the security of tenure of Crown land reserve 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 many 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. Such status is currently under review using criteria for evaluation which are based on conservation and other values.

This review is being undertaken as part of the Government's recent (1988) review of mining in national parks. 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 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 conservation 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 eight categories of Crown land managed by CALM:

- nature reserve;
- national park;
- conservation park;
- marine nature reserve;
- marine national park;
- marine park;
- State forest;
- timber reserve;
- miscellaneous reserve.

In addition, the Department will continue to manage land held freehold in the name of the Executive Director and land under share farming agreements.

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 / Marine Nature Reserve

Vesting: National Parks and Nature Conservation Authority

Tenure: A Class (B and C class reserves are being 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 and Marine National Park

Vesting: National Parks and Nature Conservation Authority

Tenure: A Class (B or C Class parks are being 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. Commercial exploitation of flora and fauna is not permitted.

Only those recreational pursuits which do no 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 differences are that these areas do not have major national or international significance, are relatively small in size or 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 commercial use 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 Reserve

Vesting: Lands and Forest Commission or National Parks and Nature Conservation Authority (areas managed under Section 5g of the CALM ACT) or Executive Director (eg joint vesting).

Tenure: Normally B or C Class.

Purpose: These reserves have a wide variety of purposes, but normally are related to recreation, wildlife conservation and historical features. 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

The following criteria apply to categories of CALM land:

Nature Reserve / Marine 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 / Marine 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 1 000 ha in size and/or where wildlife conservation values have been affected by the past activities of land use decisions.

Marine Park

Marine areas managed for conservation, scientific 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.

LAND USE PLANNING AND MANAGEMENT IN CALM

GENERAL PRINCIPLES

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. Many 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. Second, it provides a basis for day-to-day management by CALM staff.

MULTIPLE USE PLANNING

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 (e.g., 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, power lines), and minerals, where mining on CALM land has been approved under the Mining Act or Special Agreements Acts.

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

Priorities for Land Use

All lands entrusted to CALM are managed for many uses. In many 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 minimal impact 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. Every area within a land use plan proposed by CALM is therefore 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;
- potential for appropriate public use;
- 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 in the same area at the same time.

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

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
COMPATIBILITY BETWEEN LAND USES AND RESERVE CATEGORIES

Land use	Reserve Category				
	Nature Reserve/ Marine Nature Reserve	National Park/ Marine National Park	Conservation Park	Marine Park	State Forest
Nature Conservation	/	/	/	/	/
Recreation	O	O	O	O	O
Catchment Protection	/	/	/	N/A	/
Timber or Fishery Production	X	X	X	/	/
Water Production	O	O	O	N/A	/
Public Utility	X	O	O	O	O
Mining (See Chapter 4, Page)	O	O	O	O	O

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

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

CALM follows two basic rules in the allocation of uses:

- 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.

Land Use Priorities and Compatibility

Six land use priorities are recognised in the preparation of land use plans for CALM lands:

- Nature conservation;
- Recreation;
- Protection (of water catchments or other forest 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.

CHAPTER 2. THE SOUTH COAST REGION ITS RESOURCES AND ADMINISTRATION

THE REGION

CALM's South Coast Region extends from Irwin Inlet (near Walpole) in the west to the South Australian border in the east and inland to include the Stirling Range, the Johnston Lakes area and the Southern Nullarbor.

The region includes all of the Shires of Jerramungup, Ravensthorpe, Esperance and Dundas, and the Town of Albany, and part of the Shires of Denmark, Plantagenet, Albany, Cranbrook and Gnowangerup. Albany and Esperance are the major towns.

The region is renowned for its outstanding flora, its spectacular landscapes including the southern coastline and most of the major mountain peaks of South Western Australia and its extensive cave systems on the Nullarbor, which are of international significance.

Tourism and primary production are the major industries in the region. Several of the State's oldest and largest national parks are located within the region in addition to an extensive system of nature reserves. Timber production is minimal when compared with the forested South West of the State, however, establishment of tree plantations on private land around Albany is expanding rapidly.

PHYSICAL AND BIOLOGICAL RESOURCES

Climate

The region experiences a mediterranean climate characterised by mild wet winters and hot dry summers.

Rainfall decreases northwards and eastwards across the region from 939 mm per annum in Albany to 274 mm at Norseman and 263 mm at Eucla. Over 50% of the yearly rainfall across the Region generally falls over the winter months, although there are occasional heavy falls in summer.

Yearly maximum and minimum temperatures are strongly influenced by distance from the coast with inland parts of the region experiencing a far greater range in mean temperatures than the coastal areas. Frosts are relatively common inland during the winter months. In summer temperatures in excess of 38°C (100°F) are widespread but on the coast the cooling effects of strong sea breezes generally provide relief from the heat.

Winds are generally from the west and north-west in winter. Over summer they are predominantly south-easterly and generally increase in strength in the afternoon.

Geology

Four geologic regions can be identified in the South Coast Region - three of Precambrian origin (the Yilgarn Block,

Proterozoic rocks on or adjoining the Yilgarn Block, and the Albany-Fraser Province) and the fourth, the younger sedimentary Eucla Basin. (Figure 2)

The Archaean Yilgarn Block is composed of granites and gneisses dated at between 2600 and 3100 million years. This block also includes the minerally rich greenstone belts which have elongated north-west trending zones of metamorphosed sedimentary and volcanic rocks.

The Yilgarn Block and the Albany-Fraser Province are separated by a narrow band of metamorphic rocks. The most notable feature of this band is the Stirling Range, which rises abruptly to a height of 800 m above the surrounding country. The range is composed of metamorphosed sandstone (quartzite) and shale (phyllite) and is of a similar age to the adjacent Albany-Fraser Province which lies to the south and south-east.

The fourth region is the younger Eucla Basin, formed by downwarping of the margins of the ancient Precambrian Shield, and subsequent deposition of sediments in the Palaeozoic era. Marine deposition began in the early Cretaceous and continued until the mid-Tertiary, when an uplift of some 300 m produced the present continental outline. The limestones of the Nullarbor Plain are a product of the period of marine deposition.

By the late Tertiary the landscape of Western Australia had been reduced to one of low level and low relief, with some emergent ranges, such as the Stirling Range. Laterite had formed over many parts of the State, with extensive development of the laterite profile consisting of a surface sesquioxidic layer and underlying mottled and pallid zones.

Over the ensuing years, to the present, major landscape changes have been due to erosion. The main processes have been dissection, transport, sorting, deposition, cementation and fragmentation. The resulting landscape consists of laterite residuals with intervening valley elements. On the sandplains in particular there has been considerable movement of materials.

Landform and Soils

Geology has been a major factor in landform development, with different geologic formations producing different characteristic landforms. Weathering intensity, local relief and climate also influence landform and soil development.

Five landform regions can be identified in the South Coast Region (Figure 3). Moving from west to east these are the Avon, Stirling, Kalgoorlie and Nullarbor regions, with the Coastal Region following the southern coastline.

Avon Region

In the South Coast Region the Avon landscape is dominated by laterised plateaux with dissected edges. Inland the drainage lines become saline. There is substantial variation in soil

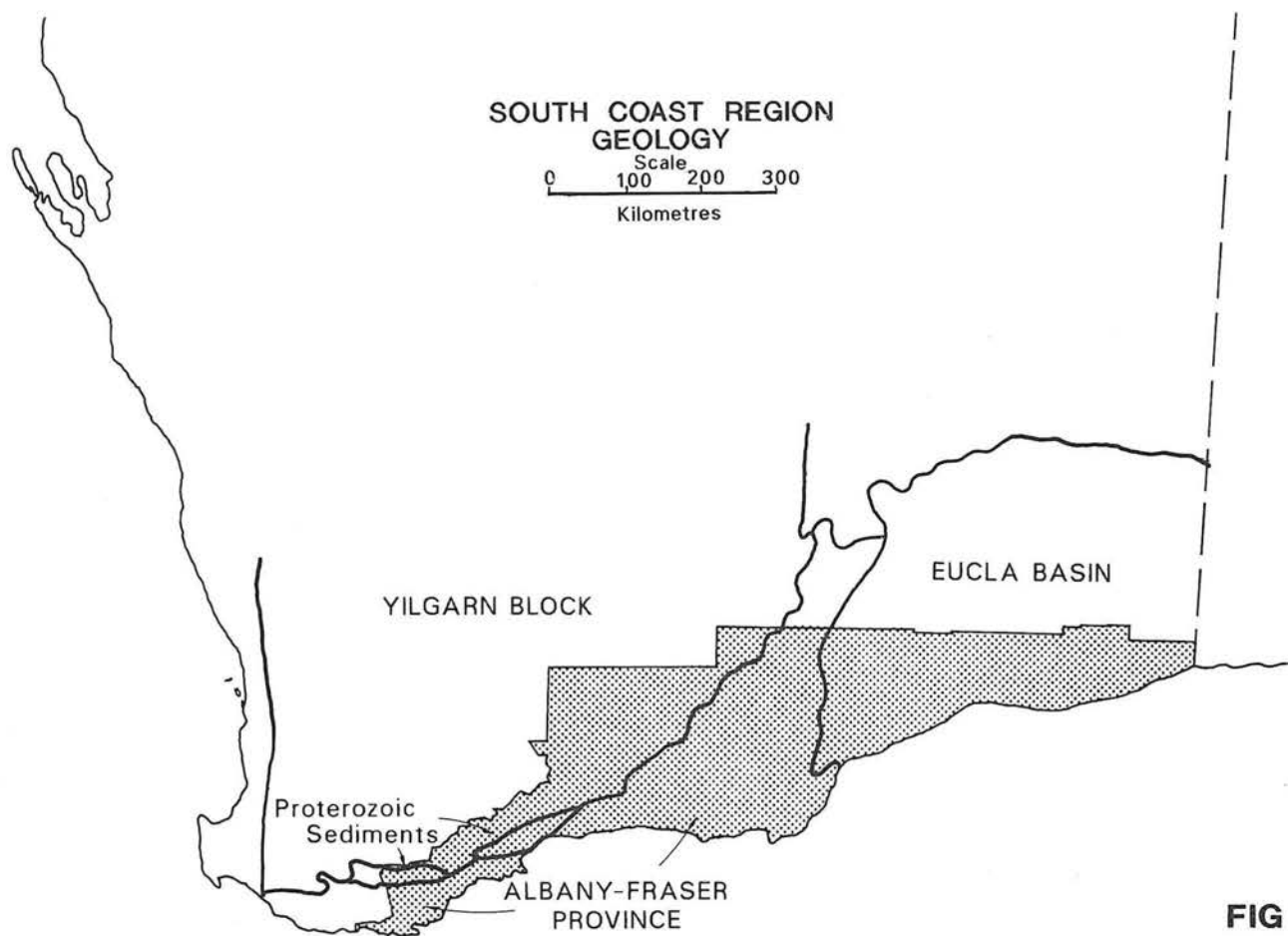


FIG 2
(BASED ON O'BRIEN, B. J. (ed) 1979, p24)

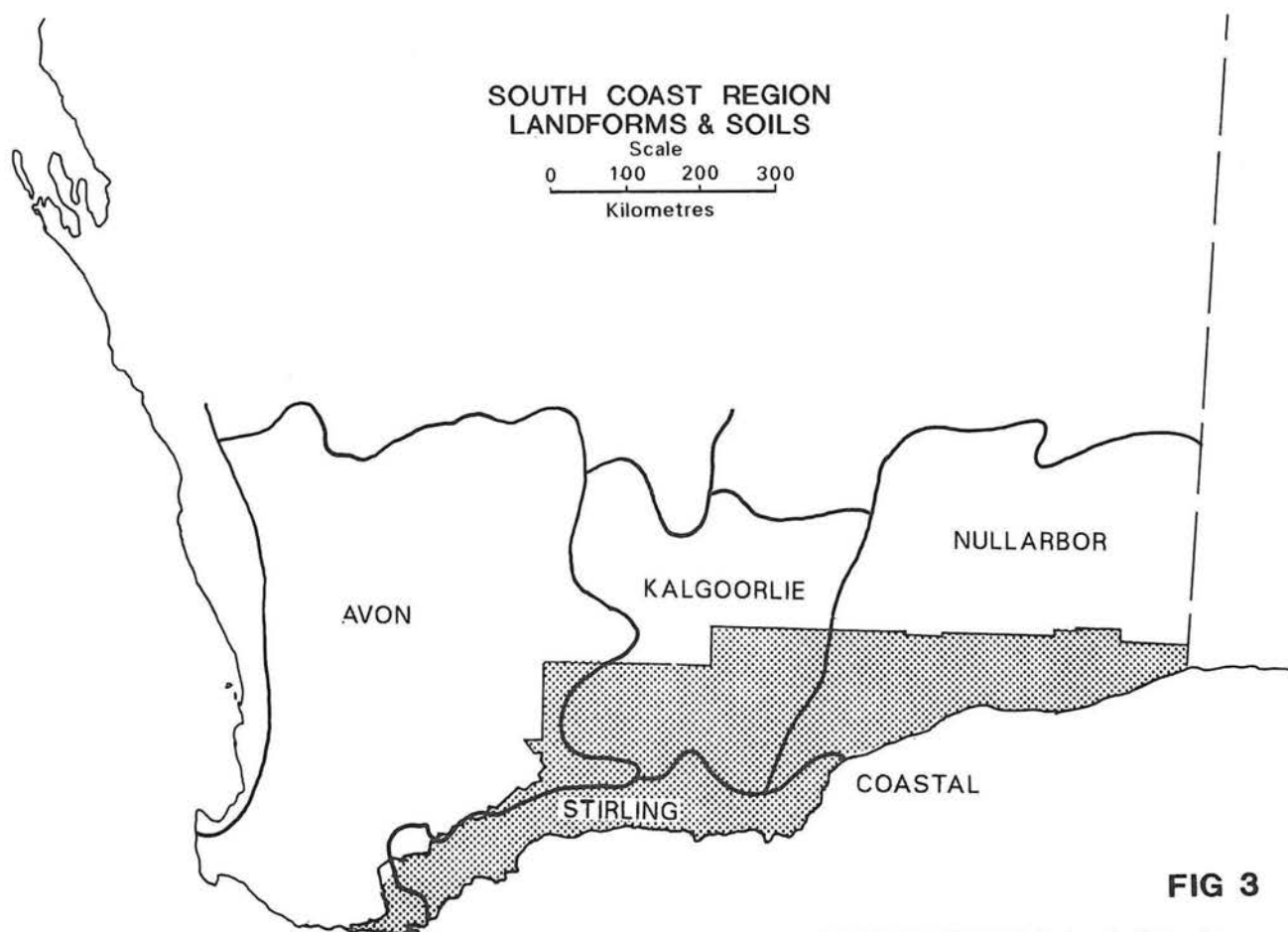


FIG 3
(BASED ON O'BRIEN, B. J. (ed) 1979, p27)

types including red earths, red duplex soils, yellow sands and red and yellow duplex soils.

Stirling Region

The Stirling region consists of a narrow belt along the south coast, from Denmark in the west to Israelite Bay in the east.

The Stirling landscape is characterised by laterised plateaux, with dissected edges and emergent quartzite ranges, specifically the Stirling Range, the Barren Ranges and Mount Ragged. The Stirling Range topography is controlled by the dip-slope of Quartzite units. Abrupt faces often form at the steep limbs of overturned folds. The Porongurup Range, of granitic origin, lies to the south of the Stirling Range. This region is dominated by yellow duplex soils on the plains and dissected areas, and by shallow sandy soils on the mountain ranges.

Kalgoorlie Region

The Kalgoorlie region is isolated from the coast and consists of vast plains interspersed by low rugged ranges and hills. The Kalgoorlie landscape has no integrated drainage system, instead there are elongated salt lake beds surrounded by loamy calcareous soils. East-west sand dunes with intervening salt lakes and clay pans are a notable feature. This region has three different soil types with yellow sands on laterite residuals, red earths in the broad valleys and calcareous loams around lakes.

Nullarbor Region

The Nullarbor is a vast plain, stretching some 800 km from Israelite Bay in the west, well into South Australia in the east, and some 300 km inland. It has no external drainage and no free water. The soils of this region are dominated by shallow calcareous loams.

The southern third of this region lies within the CALM South Coast Region.

Coastal Region

The Coastal region is dominated by maritime influences. Along the southern coastline three very different landscapes prevail. From Peaceful Bay to Israelite Bay the coastline is dominated by granitic and gneissic headlands and intervening curved sandy beaches. The form of the coastline here is controlled dominantly by either the orientation of gneissic layering or faults and joints, due to the younger deformation events described above. From Israelite Bay to Twilight Cove, high limestone cliffs limit access to the ocean, and beaches are narrow or absent. To the east of Twilight Cove the sandy beaches appear again, although here they are accompanied by extensive areas of unstable sand. The soils of this region are either unconsolidated sands or thin skeletal soils on granite and limestone headlands and cliffs.

Hydrology

Most of the rivers extend up to 60-70 km inland, the notable exception being the Pallinup River which extends over 150 km inland to the Katanning area. The rivers all discharge into inlets or "harbours" (most of which are semi-permanently or permanently closed to the ocean). Working from west to east the major rivers and inlets are:

- Kent River, draining into Owingup Swamp and then into the Irwin Inlet
- Denmark River and Hay River draining into Wilson Inlet
- Kalgan River, draining into Oyster Harbour (Albany)
- Pallinup River, draining into the Beaufort Inlet
- Bremer River draining into the Wellstead Estuary (Bremer Bay)
- Gairdner River, draining into the Gordon Inlet
- Fitzgerald River, draining into the Fitzgerald Inlet
- Hamersley River, draining into the Hamersley Inlet
- West River, Phillips River and Steere River draining into Culham Inlet (Hopetoun)
- Jerdacuttup River, draining into the Jerdacuttup Lakes
- Oldfield River and Munglinup River, draining into the Munglinup Estuary
- Young River and Lort River draining into Stokes Inlet
- Dalyup River draining into Lake Gore

There are only a few small rivers to the east of Esperance.

Around Albany and Esperance there are several freshwater lakes, often interconnected, with other more isolated lakes scattered elsewhere throughout the region. There are small groups of salt lakes along both the north west and south east boundaries of the Stirling Range. A broad zone of salt lakes extends from the Johnston Lakes area, through the Peak Charles area and to the north east of Esperance.

Beyond Israelite Bay there are occasional rock holes along the top of the Baxter Cliffs and onto the Hampton Tablelands.

Virtually all rivers in the region have high salinity and after heavy rainfall sediment loads are also high. There is evidence (Hodgkin, 1988b) that many of the inlets are silting up quite rapidly.

Public water supplies are based primarily on ground water near the coast and on artificial catchments for inland towns. There are no major water supply dams in the region.

Many of the caves on the Nullarbor extend to the ground water level and below providing the most extensive cave diving opportunities in Australia with water filled passages currently explored for several kilometres.

Vegetation

Parts of three of the four botanical provinces indentified in Western Australia fall within the South Coast Region - approximately a third of the South-west Province (includes part of the Darling, most of the Roe, and all of the Eyre

Districts), about half of the South-western Interzone (Coolgardie is the only district in this zone) and the southern tip of the Eremaean Province (includes the southern half of the Eucla District). These Provinces and associated districts are shown in Figure 4.

South-West Botanical Province

This province occupies the wetter south-west corner of Western Australia. Characteristic vegetation includes heath, thicket, mallee, woodland and forest.

Darling Botanical District

Warren Subdistrict - tall forests of karri, with forests of jarrah and marri on leached sands. Paperbarks and sedge swamps occur in the valleys.

Menzies Subdistrict - jarrah forest on ironstone gravels, and marri and wandoo woodlands on loamy soils.

Avon Botanical District

Only the southern tip of this district extends into the South Coast Region. Vegetation sequences include scrub-heath on sandplain, Acacia-Allocasuarina thickets on ironstone gravels, woodlands of york gum, salmon gum and wandoo on loams, and salt tolerant species on saline soils.

Eyre Botanical District

This district forms a narrow strip along the south coast from west of Albany east to Esperance. It overlies much of the Stirling landform - soil region. Scrub and mallee heath occur on the sandplains. Tallerack (Eucalyptus tetragona) is a characteristic species. Mallees particularly E. redunca and E. incrassata occupy valleys. Banksia scrub is also a feature.

Roe Botanical District

This district lies to the north of the Eyre Botanical District and includes Lake Grace in the west and Peak Charles to the east. Mallees, particularly E. eremophila, predominate. They generally occupy the valleys. Scrub-heath and Allocasuarina thickets occur on the plateaux.

South-Western Interzone

This province is an interzone between the South-west and Eremaean Provinces.

Coolgardie Botanical District

Norseman and Eyre lie within this district which is dominated by eucalypt woodlands. These woodlands become more open and a saltbush-bluebush understorey appears on more calcareous soils. Scrub-heath and

Allocasuarina thickets occur on the sandplains.

Eremaean Botanical Province

This is the arid central portion of the State characterised by hummock grassland, scrub and low woodland.

Eucla Botanical District

This district occupies the eastern quarter of the South Coast Region. Low trees of Acacia papyrocarpa, A. aneura and Allocasuarina cristata occur on the periphery of this district, with a bluebush steppe of perennial Maireana sedifolia, and annual grasses and forbs, grading to a treeless centre.

Native Fauna

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), yellow footed antechinus (Antechinus flavipes), bush rat (Rattus fuscipes), dugite (Pseudonaja affinis), tiger snake (Notechis scutatus), moaning frog (Heleioporus eyrei), western banjo frog (Limnodynastes dorsalis), emu (Dromaius novaehollandiae), silvereye (Zosterops lateralis), western rosella (Platycercus icterotis), New Holland honeyeater (Phylidonyris novaehollandiae), grey fantail (Rhipidura fuliginosa), red wattle bird (Anthochaera carunculata), tawny frogmouth (Podargus strigoides).

South Coast Communities (yate peppermint banksia swamps)

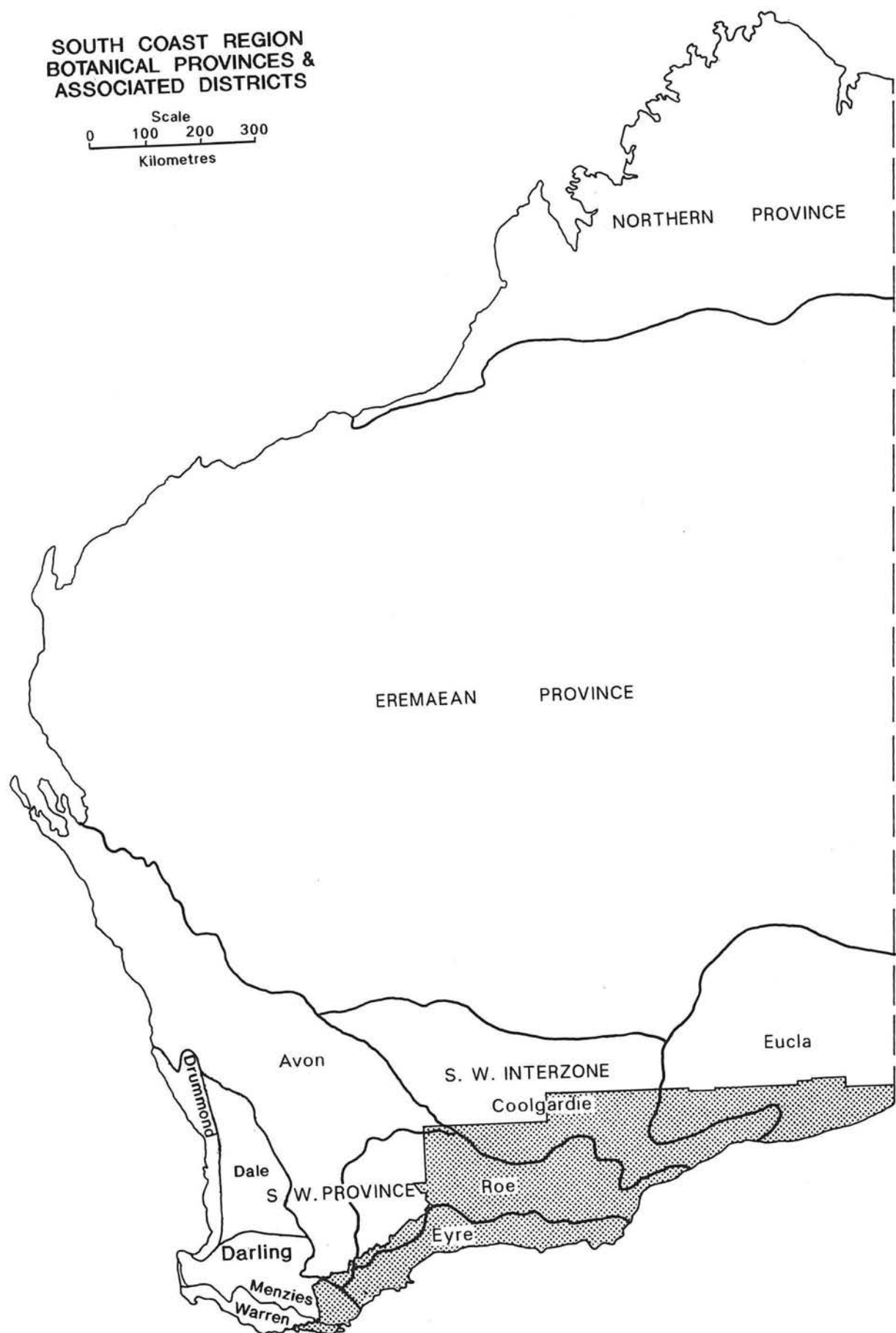
Western grey kangaroo, southern brown bandicoot, yellow footed antechinus, bush rat, honey possum (Tarsipes rostratus), dugite, tiger snake, bardick (Notechis curtus), whistling kite (Haliastur spheonurus), nankeen kestrel, Port Lincoln parrot, western rosella, elegant parrot (Neophema elegans), grey fantail, red wattle bird, New Holland honeyeater, kookaburra (Dacelo gigas), moaning frog, banjo frog.

Wetlands

White faced heron (Ardea novaehollandiae), Australian shelduck (Tadorna tadornoides), pacific black duck (Anas superciliosa), grey teal (Anas gibberifrons), maned duck (Chenonetta jubata), little pied cormorant (Phalacrocorax melanoleucos), black swan (Cygnus atratus), moaning frog, banjo frog.

Karri Forest

Yellow footed antechinus, grey bellied dunnart (Smithopsis griseoventer), bush rat, tiger snake, purple crowned lorikeet (Glossopsitta porphyrocephala), western rosella, New Holland honeyeater, moaning frog, western banjo frog.



(BASED ON GENTILLI, J. (ed) 1979, p106)

FIG 4

Wandoo Woodlands

Western grey kangaroo, western brush wallaby, short-beaked echidna (Tachyglossus aculeatus), dugite, emu, brown falcon (Falco berigora), nankeen kestrel (Falco cenchroides), western rosella, Port Lincoln parrot (Barnardius zonarius), grey fantail, red wattle bird, New Holland honeyeater.

Nullarbor/Southern Goldfields

Western grey kangaroo, red kangaroo (Macropus rufus), fat tailed dunnart (Smithopsis crassicaudata), dugite, gwardar (Pseudonaja nuchalis), wedge tail eagle (Aquila audax), brown falcon, nankeen kestrel, emu, New Holland honeyeater, Australian pipit (Anthus novaeseelandiae), bown songlark (Cinctorhamphus cruralis).

Islands

Australian sea lion (Neophoca cinerea), New Zealand fur seal (Arctocephalus forsteri), fleshy footed shearwater (Puffinus carneipes), great winged petrel (Pterodroma macroptera), little penguin (Eudyptula minor), pied oyster catcher (Haematopus ostralegus), sooty oyster catcher (Haematopus fuliginosus), death adder (Acanthopis antracticus).

SOCIAL AND ECONOMIC RESOURCES

History and Land Use

Aborigines

Aborigines occupied the south coast area for at least 50,000 years with a boundary between the Nyungar speaking people in the west and the Ngadjumaya and Mirning in the east occurring in the vicinity of Point Giegelup near Israelite Bay (Von Brandenstein, 1988).

The Aboriginal population of the South West is thought to have reached at least 6000 prior to white settlement (Berndt, 1979). Due to the cold winter climate along the South Coast. Aborigines constructed bark huts and also wore buka (cloaks) made of kangaroo skins, similar to those recorded from South East Australia.

Early journals (eg., Nind, 1832) suggest that Aborigines did not have permanent settlements all year round but instead tended to have a seasonal migration between coastal areas and the inland woods and forests.

Howard (1979) has claimed that within 50 years of white settlement, true blood Aborigines had virtually disappeared from the South West as a result of Aborigines from other areas moving in. In other words, as early as the 1880's few Aborigines in the South West of the State were directly descended from the original local Aboriginal people.

Exploration

European contact began in the 17th century when the Dutch began exploring the South Coast. In 1627 Thyssen in the "Guilden Zeepaerd" explored the coast from 116 to 133 degrees longitude and named it "Nuytsland".

There was little further official interest in the area for 150 years when rivalry between the French and the British led to several important expeditions including that of Vancouver who explored the coast from around Chatham Island (near Walpole) to King George Sound in 1791.

Following further visits to the King George Sound area by Flinders (1801) and D'Urville (1826) the British decided to establish a settlement under Major Lockyer at King George Sound. This occurred on December 1827 and was the first official white settlement (Frederickstown, now Albany) in Western Australia. Two years later (1829) the Swan River Colony was also established.

Exploration of the hinterland followed with important expeditions being:

1829	Captain Wakefield	Porongurup Range
1829	Dr Wilson	Mount Barker area
1832	Ensign Dale	Stirling and Porongurup Ranges

and Bannister in 1830-31 who travelled between the two settlements along a route which is now followed fairly closely by the Albany Highway.

Interest in the south east of the colony was generated by John Eyre's epic journey from Adelaide to Albany along the coast in 1841, searching for an overland stock route. Around 1848 Roe spent two years exploring the western part of the South Coast Region and he also visited the Hampton Tablelands on the Southern Nullarbor. In 1870 John Forrest travelled from Perth to Adelaide. It was on the basis of Forrest's report that an overland telegraph link was established between Albany and Adelaide in 1877.

Settlement

Even though the first settlement in the west was at Albany in 1827, subsequent development was slow due to the infertility of the surrounding land. There were numerous pastoral enterprises established, for example, the Moirs at Fanny Cove and the Dempsters at Esperance, but the majority of farming country was not opened up until the turn of the century.

The first major areas to be developed were north of the Stirling Range, around Bremer Bay and around Esperance,

Since the Second World War there has been a dramatic expansion in farming areas within the South Coast Region, with new releases being based on both war service settlement schemes and civilian settlement programmes. This rapid expansion occurred mainly in the Shires of Gnowangerup, Jerramungup, Ravensthorpe and Esperance, together with war service schemes in the Plantagenet and Albany Shires.

Timber Production

The first southern sawmills (Millars) operated at Torbay in 1884, and at Denmark from 1894, with export through the port of Albany. There is now little trace of the Torbay operation. However, sawmills are still in operation at Denmark and at Albany.

Mining

The major mining developments in the region have been around Ravensthorpe and Norseman. Interest has included copper, gold, manganese and, more recently, magnetite which has been found in the Wellstead area between Albany and Bremer Bay.

Transport

The main transport links in the region are by road. Highway 1 runs parallel to the coast from Albany to Esperance, then north to Norseman and east to Eucla. Other major highways link Albany with Perth and with the Lake Grace area. By 1890 Albany and Perth were connected by rail and by 1939 so too were Kalgoorlie and Esperance. These rail links continue but currently use is restricted to goods services with no passenger facilities. Daily air services connect Albany and Esperance with Perth. More limited services connect Esperance with Norseman and Kalgoorlie. Overseas, intrastate and interstate cargo is exported through the ports of Albany and Esperance.

Fishing

Coastal fishing is centred around Albany and Esperance and comprises estuarine, in-shore and off-shore industries. Commercial ocean fish farming has recently commenced at Albany. Management of the commercial fishing industry is undertaken by the Fisheries Department. The fishing industry impacts upon many lands managed by CALM which lie adjacent to estuaries and the coastline.

Tourism

Tourism is a major growth industry throughout the region and the South Coast is actively promoted as part of the State's "Leeuwin Way". As many tourists seek out spectacular scenery and wildflowers there is heavy reliance by the tourism industry on lands managed by CALM.

Local Government and Population

The region includes all or part of ten local government areas with populations estimated at June 30, 1987, as follows.

	<u>Area (km²)</u>	<u>Population</u>
Denmark (Pt)	960	2 878
Albany (Pt)	4 422	8 730
Town of Albany	37 000	14 741
Plantagenet (Pt)	4 792	4 149
Cranbrook (Pt)	3 390	1 025
Gnowangerup (Pt)	5 000	2 173
Jerramungup	6 000	1 341
Ravensthorpe	12 872	1 396
Esperance	28 477	9 902
Dundas	107 508	2 298
	<u>173 458</u>	<u>48 613</u>

(Australian Bureau of Statistics)

As the CALM regional boundaries do not follow shire boundaries the population of the region cannot be determined accurately, but is estimated to be around 46,000.

From the figures above it is apparent that the shires become larger and much more sparsely populated working from west to east. Overall the population density of the western section of the region from Denmark to Jerramungup is about ten times greater than that of the remainder of the region to the east.

LAND TENURE

Area Statement

Table 3 summarises land managed by the Department in the region as at 1 February 1989. Approximately 15% of the region by area is managed by the department.

Figures 5 and 6 show the current extent of land managed by CALM within the region.

TABLE 3
LAND MANAGED BY CALM IN THE SOUTH COAST REGION
AS AT 1 FEBRUARY 1989

	Area (ha)	%
State forest and Forest Act reserves	7 944	0.3
National parks	890 325	37.5
Nature reserves	1 475 083	62.2
Miscellaneous reserves	68	0.0
	<hr/> 2 373 420 <hr/>	<hr/> 100.0 <hr/>

REFERENCE NUMBER	TENURE REFERENCE	RESERVE NAME	SHIRE
ALBANY DISTRICT			
1	33842	QUARRAM NATURE RESERVE	DENMARK
2	F 175/25	MEHINUP (FOREST BLOCK)	"
3	20361	MEHINUP NATURE RESERVE	"
4	A24482	WILLIAM BAY NATIONAL PARK (Pt.)	"
5	12046	"	"
6	23120	RUDYARD BEACH NATURE RESERVE	"
7	26177	WEST CAPE HOWE NATIONAL PARK	ALBANY
8	16136	TENNESSEE NORTH NATURE RESERVE	"
9	F 217/25	TENNESSEE NORTH (FOREST BLOCK)	"
10	31908	SHELTER ISLAND NATURE RESERVE	"
11	24891	MARBELLUP NATURE RESERVE	"
12	25809	LAKE POWELL NATURE RESERVE	"
13	A619	PHILLIPS BROOK NATURE RESERVE	"
14	A18739	MILLBROOK NATURE RESERVE	"
15	A24258	TORNDIRUP NATIONAL PARK	"
16	5225	"	"
17	22058	LAKE SEPPINGS NATURE RESERVE	"
18	30463	BAKERS JUNCTION NATURE RESERVE	"
19	30469	BON ACCORD ROAD NATURE RESERVE	"
20	18772	NAPIER NATURE RESERVE	"
21	A25705	BENNET ROAD NATURE RESERVE	"
22	26564	WOODIARUP RESERVE	"
23	28689	TAKENUP ROAD NATURE RESERVE	"
24	40101	MT MASON NATURE RESERVE	"
25	A27956	GRANITE HILL NATURE RESERVE	"
26	27139	TWO PEOPLES BAY NATURE RESERVE	"
27	26385	SOUTH SISTER NATURE RESERVE	"
28	36550	NORTH SISTER NATURE RESERVE	"
29	A15107	WHITE LAKE NATURE RESERVE	"
30	26688	LAKE PLEASANT VIEW NATURE RESERVE	"
31	36028	(Pt.) SOUTH STIRLING NATURE RESERVE	"
32	A26650	MT MANYPEAKS NATURE RESERVE	"
33	27157	HASSELL NATIONAL PARK	"
34	36719	CHEYNE ROAD NATURE RESERVE	"
35	26234	ARPENTEUR NATURE RESERVE	"
36	144	"	"
37	32199	"	"
38	30049	"	"
39	27614	"	"
40	A25869	"	"
41	188/25	"	"
42	26894	"	"
43	29128	"	"
44	14792	"	"
45	18987	"	"
46	25503	"	"
47	A25386	"	"
48	26688	"	"
49	18468	"	"
50	A25812	"	"
51	A26160	"	"
52	A26161	"	"
53	9159	"	"
54	39971	"	"
55	26264	"	"
56	17298	"	"
57	26792	"	"
58	26793	"	"
59	28687	"	"
60	14039	"	"
61	A31737	"	"
62	31909	"	"
63	A31738	"	"
64	A31738	"	"
65	23516	"	"
66	31881	"	"
67	31425	"	"
68	27525	"	"
68A	39566	"	"
69	29184	"	"
70	31128	"	"
71	A40156	"	"

**LAND MANAGED BY CALM
AS AT 1st/FEB/1989
ALBANY DISTRICT**

0 20 40 60 80 100 Km

- ▲ National Park
- Nature Reserve
- State Forest / F Act Reserve
- 5g Reserve
- Region boundary
- Shire boundary

39

REFERENCE NUMBER	TENURE REFERENCE	RESERVE NAME	SHIRE
ESPERANCE DISTRICT			
72	27023	(Pt) FRANK HANN NATIONAL PARK	.
73	32339	(Pt) LAKE SHASTER NATURE RESERVE	.
74	A31754	CHEADANUP NATURE RESERVE	.
74A	31755	EAST NAMUP NATURE RESERVE	.
73	32339	(Pt) LAKE SHASTER NATURE RESERVE	ESPERANCE
75	26410	FUSS ROAD NATURE RESERVE	.
75A	30583	GRIFFITHS ROAD NATURE RESERVE (WEST BLOCK)	.
76	A32590	STOKES NATIONAL PARK	.
77	31744	CASCADE GROUP NATURE RESERVE	.
78	31743	.	.
79	31742	FIELDS ROAD NATURE RESERVE	.
80	32601	MOIR HOMESTEAD RESERVE	.
81	30583	GRIFFITHS ROAD NATURE RESERVE (EAST BLOCK)	.
82	36183	SPEEDINGUP NATURE RESERVE	.
83	A32419	LAKE GORE NATURE RESERVE	.
84	29012	BISHOPS ROAD NATURE RESERVE	.
85	8019	SWAN LAGOON NATURE RESERVE	.
86	19628	DALYUP NATURE RESERVE	.
87	35257	LAKE MORTIJINUP NATURE RESERVE	.
88	3042	.	.
89	29680	RED LAKE NATURE RESERVE	.
90	16801	TRUSLOVE NORTH NATURE RESERVE	.
91	27985	TRUSLOVE NATURE RESERVE	.
91A	28846	KENDALL ROAD NATURE RESERVE	.
92	23527	ESPERANCE FORESTRY BLOCK	.
93	27768	STEDDYS ROAD (SOUTH) NATURE RESERVE	.
94	28300	STEDDYS ROAD (NORTH) NATURE RESERVE	.
95	A31197	SHARK LAKE NATURE RESERVE	.
96	A32257	LAKE WARDEN NATURE RESERVE	ESPERANCE
97	A15231	WOODY LAKE NATURE RESERVE	.
98	A23825	MILLET LAKE NATURE RESERVE	.
99	27386	MT RIDLEY GROUP NATURE RESERVE	.
100	27384	MITTENOOM HILLS NATURE RESERVE	.
101	A22795	CAPE LE GRAND NATIONAL PARK	.
102	27387	BURDETT ROAD NATURE RESERVE (NORTH)	.
103	27388	BURDETT ROAD NATURE RESERVE (SOUTH)	.
104	27385	BURDETT ROAD NATURE RESERVE (EAST)	.
105	27354	COOLINUP NATURE RESERVE	.
106	32776	KAU ROCK GROUP NATURE RESERVE	.
107	32777	.	.
108	32780	.	.
109	32779	.	.
110	32782	MT NEY NATURE RESERVE	.
111	32783	BEAUMONT GROUP NATURE RESERVE	.
112	32130	.	.
113	32129	.	.
114	32128	.	.
115	27086	ALEXANDER NATURE RESERVE	.
116	12131	.	.
117	31799	MUNTZ ROAD NATURE RESERVE	.
118	32784	NEREDUP SWAMP NATURE RESERVE	ESPERANCE
119	38334	.	.
120	32800	BEBENORIN ROAD NATURE RESERVE	.
121	38545	CLYDE HILL NATURE RESERVE	.
122	38544	NIBLICK NATURE RESERVE	.
123	A24047	CAPE ARID NATIONAL PARK (Pt)	.
124	14234	CAPE ARID NATIONAL PARK (Pt)	.
125	A27632	(Pt) NUYTSLAND NATURE RESERVE	.
126	36002	ISRAELITE BAY RESERVE	.
127	36056	ROCKY ISLETS NATURE RESERVE	.
128	39435	WOODY ISLAND NATURE RESERVE	.
129	A22796	RECHERCHE ARCHIPELAGO NATURE RESERVE	.
130	28168	SPRINGDALE ROAD NATURE RESERVE	.
72	27023	(Pt) FRANK HANN NATIONAL PARK	DUNDAS
131	36004	PEAK CHARLES NATIONAL PARK	.
132	36608	DONAK NATURE RESERVE	.
133	F 197/24	PROCKWAY TIMBER RESERVE	.
134	33113	.	.
135	33501	.	.
136	36957	DUNDAS NATURE RESERVE	.
125	A27632	(Pt) NUYTSLAND NATURE RESERVE	.
137	A36205	EUCLA NATIONAL PARK	.

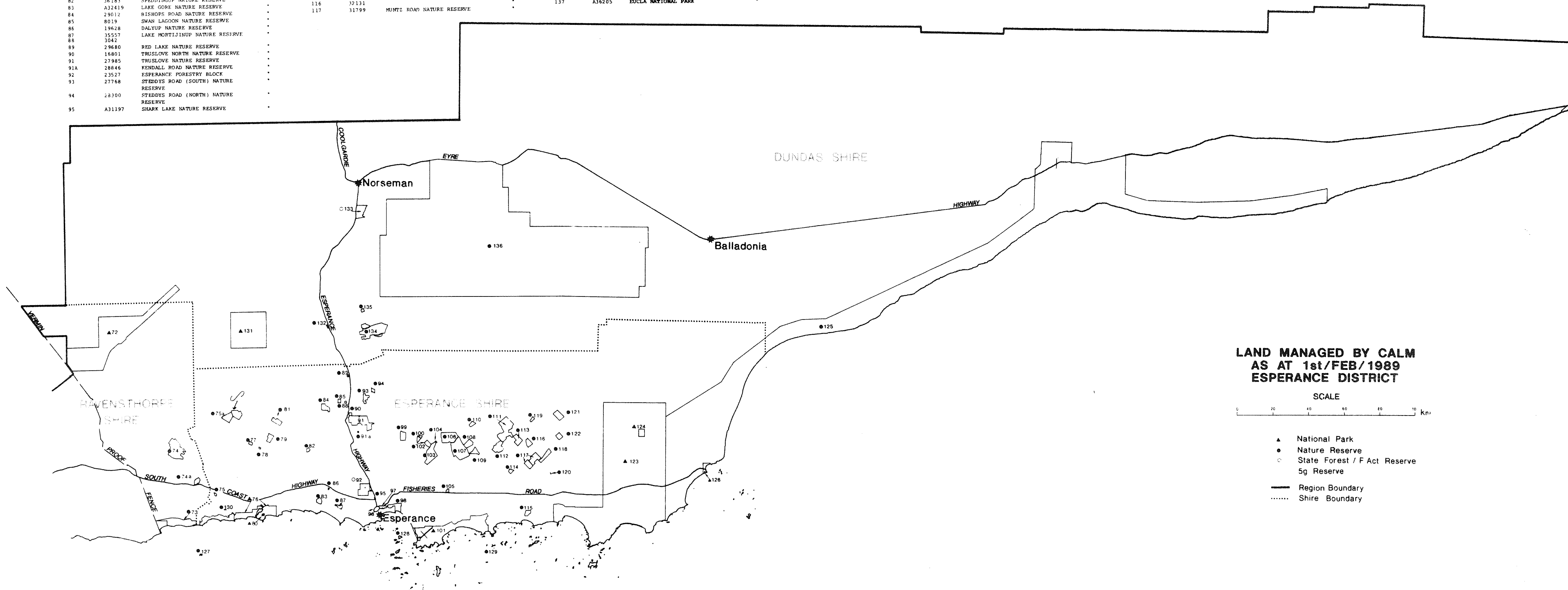


FIG 6

SURROUNDING LANDS

The South Coast Region is bordered by three other CALM regions viz the Southern Forest Region based at Manjimup, the Wheatbelt Region based at Narrogin, and the Goldfields Region based at Kalgoorlie (Figure 1). It is bordered in the east by the Far West District of the South Australian National Parks and Wildlife Service based at Ceduna.

To the west of the region land use is largely based on forest production with major timber production centres located at Manjimup and Pemberton and conservation and recreation in forest parks and reserves. To the north west lies the major section of the Western Australian Wheatbelt. To the north east i.e. from the Rabbit Proof Fence east the region is bordered by uncleared land mainly mallee heaths and woodlands which extend into the Southern Goldfields, and the treeless plains of the Nullarbor which extend into desert country north of the Trans Australian Railway and into South Australia.

Significant conservation reserves bordering the South Coast Region are the Lake Magenta Nature Reserve north east of Jerramungup and extensions to the Nullarbor National Park (currently being gazetted) along the boundary with South Australia.

CALM ADMINISTRATION IN THE SOUTH COAST REGION

Regional Objectives

The administrative objective of the South Coast Region is to:

1. Provide an effective administrative framework for the conservation of wildlife throughout the Region and the management of lands, waters and natural resources entrusted to the Department.

This involves:-

- 1.1 The establishment of a system of regional and district management, where staff convert plans and policies into work programmes, carry out the work, provide feedback on progress and policy of planning needs, and maintain close, constructive relationships with local communities.
- 1.2 The development and maintenance of corporate information systems to facilitate the sharing of data, efficient communication and decision making.
- 1.3 The maintenance of a well motivated and competent staff.
- 1.4 The provision of programmes for staff development and training.
- 1.5 Ensuring liaison, co-operation and co-ordination with branches of the

Department and with other agencies or people which have a function or interest in conservation and land management.

1.6 Maintenance of a safe working environment.

Additional objectives are to:

2. Establish and maintain a system of secure reserves which protect viable representative samples of the State's natural ecosystems and species, both terrestrial and aquatic, as well as areas suitable for recreation and the production of renewable natural resources.
3. Ensure that conservation and land management is carried out according to sound, well-researched scientific principles.
4. Provide public education and information programmes designed to increase community enjoyment, understanding of and support for nature conservation, and park and reserve management.
5. Encourage and assist the public to participate in the development of conservation and land management policies and the implementation of management and research programmes.
6. Prepare and implement management plans for land and waters entrusted to the Department.
7. Prepare and implement wildlife management programmes.
8. Prepare and implement timber production strategies which help to meet the objectives of the State.
9. Develop opportunities for appropriate recreational use of lands and waters entrusted to the Department.

The above objectives will be discussed in more detail elsewhere in this plan.

Districts within the Region

The region is divided into two districts as shown on Figure 7.

The Albany District extends east up to the Rabbit Proof Fence. Its operations are concerned with the management of national parks, nature reserves and softwood (pine) and eucalypt sharefarming schemes. District administration is located within the Regional Headquarters in Albany.

The Esperance District extends from the Rabbit Proof Fence east to the South Australian border. Prime responsibilities

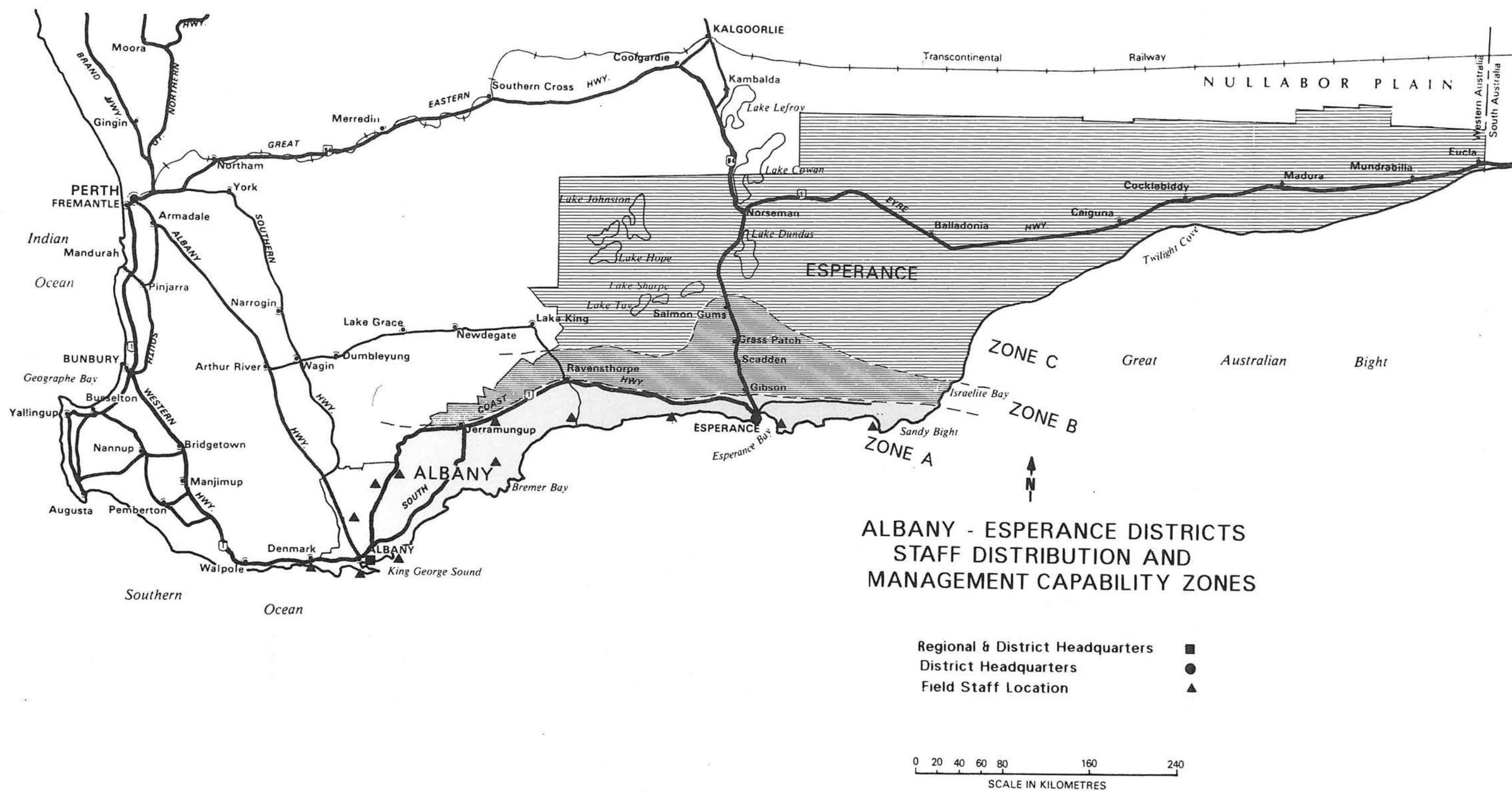


FIG 7

of the district include management of national parks and nature reserves and, in conjunction with other organisations, advisory services regarding the planting of trees on farms for amenity, shelter and small scale production. Administration is located within a separate District Office in Esperance.

Personnel

At 1 February 1989 Departmental personnel were based in the region, as follows:

DEPARTMENT OF CALM PERSONNEL EMPLOYED IN SOUTH COAST REGION AS AT 1 FEBRUARY 1989

Professional Staff	4
Field Staff	7
Administration and Clerical Staff	6
Wildlife Officers	4
National Park Rangers	17
Wages Employees	6
Casual Employees	1
Total	<u>45</u>

The location of personnel throughout the region is illustrated in Figure 7.
Most national parks and one nature reserve in the region are permanently staffed.

Management Capability Zones

Due to the size of the region, the small number of staff and the location of staff in the field, the on site management capability of CALM varies markedly across the region. Therefore three broad zones of management capability have been recognised (Figure 7):

- Zone A Management capability good. Ability to plan operation programmes such as fire protection and to respond to emergencies such as wild fires.
Generally high public use.
- Zone B No immediate staff presence, but generally accessible within 2 hours.
Limited ability to plan operation programmes and to respond to emergencies.
Generally medium public use.
- Zone C Occasional staff presence only. More than 2 hours drive from nearest CALM office or outstation. Can only plan operational programmes in exceptional circumstances and at high financial and manpower cost - no ability to respond to emergencies.
Generally low public use except in vicinity major highways.

These zones of management capability are incorporated in the Fire Control Plan for the region and the South Coast Region Dieback Protection Plan 1989-1993 (CALM, in preparation).

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.

Local people and other agencies frequently assist CALM with fire fighting and in emergencies. Excellent liaison is maintained with many local organisations and government agencies, particularly bushfire brigades.

From 1981 - 1985 a highly successful "Volunteer Conservation Programme" provided opportunity for members of the public including local groups and schools to assist State and Local government agencies in projects which would enhance the environment (Watson, 1985). This programme was the first of its kind in Australia. It was co-ordinated in a voluntary capacity by the former National Parks Authority and subsequently by CALM.

Other assistance is provided through the activities of bona fide external research workers and through groups such as the Albany Branch of the W.A. Wildflower Society, the Fitzgerald River National Park Association and the Friends of Esperance National Parks.

PRESENT USE OF LAND MANAGED BY CALM IN THE REGION.

The present distribution and purpose of land managed by CALM in the South Coast Region comprises national parks, nature reserves and some small State forest and timber reserves. Over the past ten years management plans were prepared for several individual national parks and other reserves, but no planning review of the type being addressed in this regional plan has been done previously.

This plan involves not only the first regional overview of each type of reserve managed by CALM in the South Coast Region, but also the first assessment of the total area managed by CALM. A number of changes of purpose and additions to the reserve system are proposed. The objective is to allow the introduction of proposed new categories of reserve, improve the security of purpose for many areas and change the name and vesting of other areas to better reflect the purpose for which they are managed.

PROPOSED CHANGES IN TENURE, VESTING AND PURPOSE

In accordance with the changes to the system of land vesting, tenure and purpose described in Chapter 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 4, Figures 8 and 9, and Appendix 1.

The changes derive from the following sources:

- (1) Conservation reserve proposals. Relates to recommendations by the Conservation Through Reserves Committee (CTRC, 1974) as reviewed by the EPA ("Red Book" reports: 1975, 1976).
- (2) South Coast Reserve Working Group proposals. Relates to recommendations by a series of EPA working group established during 1980 to 1984 to assess coastal reserves in the shires of Esperance, Ravensthorpe, Jerramungup, Albany and Denmark as reviewed by the EPA and subsequently endorsed by Cabinet in 1985.
- (3) Recommendations made in coastal management plans for the following areas:
 - Shire of Denmark (Dept Conservation and Environment and Denmark Shire Council, 1987).
 - Pallinup/Beaufort Inlet Area (Newbey, 1987).
 - Ravensthorpe (Craig *et al*, 1984).
 - Starvation Boat Harbour (Van Steveninck and Burkin, 1984).
 - Esperance District (Chape and Sansom, 1983).
 - Esperance Eastern Coast (Craig and Oma, 1984).
 - Munglinup Inlet (Chalmers, 1983).
 - Israelite Bay (Esperance Shire Council, 1984).
- (4) Unvested national parks and nature reserves being considered for vesting in the NPNCA.

TABLE 4

PROPOSED CHANGES IN TENURE, VESTING AND PURPOSE IN
THE SOUTH COAST REGION

Id NO	AREA NAME OR LOCALITY	CURRENT CLASSIFICATION	PROPOSED CLASSIFICATION	RESERVE NO
		U = NOT VESTED IN NPNCA OR LFC	<u>NB</u> for detailed explanation see APPENDIX 1	
		* = VESTED IN ANOTHER AUTHORITY		
<u>DENMARK SHIRE</u>				
D1	Mehinup	Forest Act Reserve	NR vested in NPNCA	175/25
D2	Owingup Swamp	VCL	" " "	VCL
D3	Stanley Island	VCL	" " "	VCL
D4	(Part) William Bay NP	National Park	Other Reserve	A24482
<u>ALBANY TOWN AND SHIRE</u>				
50 A1	Youngs Siding	Forest Act Reserve	NR vested in NPNCA	217/25
A3	Migo, Richards, Seagull Is	VCL	" " "	VCL
A6	Marbellup	Other Reserve*	" " "	801
A7	Down Road	" " "	" " "	20948
A8	West of Albany	Timber Reserve (U)	State Forest	24000
A10	Salmon Holes Road	Other Reserve*	National Park	28503
A11	Jones Road	Nature Reserve (U)	NR vested in NPNCA	23923
A14	Mount Martin	Other Reserve*	National Park	33308
A15	Gull Rock Area	National Park (U)	" "	A27107
A16	Mount Mason	Nature Reserve (U)	NR vested in NPNCA	A28690
A17	Lake Seppings	Nature Reserve	Other Reserve	22058
A17a	Dempster Road	National Park (U)	NR vested in NPNCA	A24991
A18	Moodiarup Road	National Park	" " "	A25705
A19	Lake Corimup	Other Reserve	" " "	A23850
A20	Normans Beach	Other Reserve	National Park	25865
A21	Waychinicup River	Other Reserve	" "	27502
A22	Waychinicup River	Other Reserve	" "	31888
A23	Waychinicup River	Other Reserve	" "	29883
A23a	Arpenteur Nature Reserve	NR vested in NPNCA	National Park	36719
A23b	Manypeaks Nature Reserve	" "	" "	36028

Id No	AREA NAME OR LOCALITY	CURRENT CLASSIFICATION	PROPOSED CLASSIFICATION	RESERVE NO
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U = NOT VESTED IN NPNCA
OR LFC

NB for detailed explanation see APPENDIX 1

* = VESTED IN ANOTHER AUTHORITY

A23c	Cheyne Road Nature Reserve	NR vested in NPNCA	National Park	27157
A23d	Waychinicup-Cheyne Beach	VCL	National Park	VCL
A24	Hassell National Park	National Park	"5g" Reserve	A26650
A25	Cheyne Island	Other Reserve	NR vested in NPNCA	14944
A26	Cheyne Bay	" "	Conservation Park	31240
A27	Cape Riche area	" "	" " "	A14943
A28	Cheyne Bay	VCL	" " "	VCL
A29	Hunwick Road North	Nature Reserve (U)*	NR vested in NPNCA	1998
A30	Gledhow Nature Reserve	Nature Reserve (U)	" " "	5205
A31	Mt Boyle Road	" "	" " "	30791

PLANTAGENET SHIRE

P2	Narrikup	Nature Reserve (U)	NR vested in NPNCA	25965
P3	Yellakup Road	" "	" " "	15775
P4	Golf Links Road	" "	" " "	A10003
P5	Porongurup	Other Reserve	National Park	17644
P6	Kamballup	" "	NR vested in NPNCA	800
P7	Kamballup	" "	" " "	27605
P8	Kamballup	" " * (pt) only	" " "	27607
P9	Kojaneerup Springs	" " *	National Park	1090

GNOWANGERUP SHIRE

G1	Toompup Road South	Nature Reserve (U)	NR vested in NPNCA	15756
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JERRAMUNGUP SHIRE

J1	East of Ongerup	Other Reserve	NR vested in NPNCA	22343
J2	Marra Bridge, Pallinup	" "	" " "	33257
J3	Peniup Creek	" "	" " "	29500
J3a	VCL Peniup Creek	VCL	" " "	VCL
J4	Pallinup Estuary	Other Reserve	Conservation Park	14986
J5	Pallinup Estuary	" " *	" " "	14987
J5a	Pallinup Estuary	" " *	" " "	14988
J6	Pallinup Estuary	" " *	" " "	22353
J7	Pallinup Estuary	" "	" " "	(PT) 27102
J8	Pallinup Estuary	" "	" " "	(PT) 31240
J8a	Gairdner South Road	" "	NR vested in NPNCA	28283

Id NO	AREA NAME OR LOCALITY	CURRENT CLASSIFICATION	PROPOSED CLASSIFICATION	RESERVE NO
		U = NOT VESTED IN NPNCA OR LFC	NB for detailed explanation see APPENDIX 1	
		* = VESTED IN ANOTHER AUTHORITY		
<u>Fitzgerald Area</u>				
J9	Fitzgerald River	Other Reserve	NR vested in NPNCA	26172
J10	" "	" "	" " "	36207
J11	" "	" "	" " "	1028
J12	" "	VCL	" " "	VCL
J13	" "	Other Reserve	" " "	35398
J14	Gordon Inlet Area	" "	National Park	(PT) 32666
J15	Old Ongerup Road	" "	" "	1029
J17	Fitzgerald River	" "	" "	20393
J18	Jacup Loc 2014 VCL	VCL	" "	VCL
J19	Calyerup	Other Reserve	" 5g" Reserve	10132
J20	VCL Calyerup	VCL	" "	VCL
J21	West Fitzgerald	Other Reserve	National Park	5051
J22	VCL West Fitzgerald	VCL	" "	VCL
J23	Gairdner River	Other Reserve	" "	(PT) 33258
J24	Bremer River	" "	" "	(PT) 33258
J25	Dillon Bay	National Park	Other Reserve	(PT) A31737
J26	Fitzgerald River	Other Reserve	National Park	1406
J27	Rabbit Proof Fence	" "	" "	10133
J28	" " "	" "	" "	12121
J29	" " "	" "	" "	12122
J30	" " "	" "	" "	12123
J31	" " "	" "	" "	10135
J32	Quallup	" "	" "	5055
J33	South Gordon Inlet	" "	" "	2507
J34	North of Hunter River	" "	" "	3251
J35	Hunter River	" " *	" "	2524
J36	Wellstead Estuary	" "	" "	23060
J37	Lizzie Creek Area	National Park	Other Reserve	(PT) A31737
J38	(PT) Bremer River Foreshore	Other Reserve*	National Park	(PT) 22355

Id NO	AREA NAME OR LOCALITY	CURRENT CLASSIFICATION	PROPOSED CLASSIFICATION	RESERVE NO
		U = NOT VESTED IN NPNCA OR LFC	NB for detailed explanation see APPENDIX 1	
		* = VESTED IN ANOTHER AUTHORITY		
RAVENSTHORPE SHIRE				
R1a	Aerodrome Road	Nature Reserve (U)	NR vested in NPNCA	31424
R2	North of Ravenshtorpe	Timber Reserve	Other Reserve	39566
R3	Hopetoun	Other Reserve	NR vested in NPNCA	7853
R4	"	" "	" " "	28438
R5a	Jerdacuttup Road	" "	" " "	8457
R6	Kundip Area	" " *	" " "	11577
R6a	Hopetoun-Ravensthorpe Road	Road Reserve/VCL	"5g"Reserve	VCL
R8	Hatfield Road	Nature Reserve (U)		27177
R9	Hatter Hill	VCL	" " "	VCL
R9a	Hatter Hill Area	Other Reserve	" " "	19866
R9b	" " "	" " "	" " "	9926
R9c	" " "	" " "	" " "	(PT) 13527
R9d	" " "	" " "	" " "	13526
R9e	" " "	" " *	" " "	21168
R10	Frank Hann National Park	National Park	" " "	A27023
R11	Starvation Boat Harbour	Other Reserve	" " "	(PT) 7580
R12	" " "	" " "	" " "	9393
Fitzgerald Area				
R13	NW of Ravensthorpe	Nature Reserve (U)	" " "	(PT) 34410
R14	VCL S of 34410	VCL	" " "	VCL
R15	Pt 30795 Cocanarup	Timber Reserve	State Forest	(PT) 30795
R16	VCL SW of 30795	VCL	" "	VCL
R17	Pt 30795 Cocanarup	Timber Reserve	"5g"Reserve	(PT) 30795
R20	Rabbit Proof Fence	Other Reserve	National Park	12124
R21	Dempster Inlet	" "	" "	512
R22	Kybulup Pool	" "	" "	10865
R23	VCL South of Cocanarup	VCL	"5g"Reserve	VCL
R24	Near No Tree Hill	Other Reserve	" "	20510
R25	John Forrest Road	" "	" "	20509
R26	Hopetoun-Ravensthorpe Road	" "	" "	26662
R27	Near Kundip	" "	" "	9559
R28	Near Gordon Inlet	" "	National Park	(PT) 32666

Id NO	AREA NAME OR LOCALITY	CURRENT CLASSIFICATION	PROPOSED CLASSIFICATION	RESERVE NO
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U = NOT VESTED IN NPNCA
OR LFC
* = VESTED IN ANOTHER AUTHORITY

NB for detailed explanation see APPENDIX 1

Ravensthorpe Range

R29	Moolyall	Other Reserve	NR vested in NPNCA	32047
R30	"	" "	" " "	18460
R31	Mount Short	" " *	" 5g" Reserve	17880
R32	VCL North of Highway 1	VCL	" "	VCL
R33	Moolyall	Other Reserve	" "	17384
R34	Mount Desmond	" "	" "	(PT) 16119
R35	Near Highway 1	" "	" "	10021
R36	Mount Desmond	" "	" "	12201
R37	VCL South of Highway 1	VCL	" "	VCL
R38	E of Jerdacuttup	Other Reserve	" "	31979
R39	Cheadanup North	VCL	NR vested in NPNCA	VCL

ESPERANCE SHIRE

E1	pt Lake Shaster NR (East)	Nature Reserve	Other Reserve	pt 32339
E1a	pt Lake Shaster NR (East)	" "	National Park	pt 32339
E2	Springvale Road	Timber Reserve (U)	NR vested in NPNCA	25376
E3	Rollond Road	Nature Reserve (U)	" " "	35659
E4	Cascades	" " (U)	" " "	31745
E5	Young River System	Other Reserve	" " "	A31762
E6	" " "	" "	" " "	A31751
E7	" " "	" "	" " "	A31750
E8	" " "	" "	" " "	A31749
E9	Lort River System	" "	" " "	A31739
E10	" " "	" "	" " "	26913
E11	" " "	" "	" " "	A31761
E12	Baker/Quallilup Area	Nature Reserve (U)	National Park	27888
E13	" " "	" " (U)	" "	26885
E14	Lake Quallilup (Part)	Other Reserve	" "	pt 30672
E15	Lake Mortijinup (Part)	Nature Reserve (U)	NR vested in NPNCA	Pt 24486
E16	Dalyup	Nature Reserve	Other Reserve	19628
E18	Helms Arboretum	Other Reserve	State Forest	14543
E19	" "	" "	" "	34788
E19a	" "	Timber Reserve	" "	23527
E20	Pink Lake	Nature Reserve (U)	NR vested in NPNCA	24511
E21	" "	Other Reserve *	" " "	4182
E25	E of Esperance (Part)	Other Reserve	" " "	pt 28170
E25a	" " "	Other Reserve/VCL	National Park	Pt 28170

Id NO	AREA NAME OR LOCALITY	CURRENT CLASSIFICATION	PROPOSED CLASSIFICATION	RESERVE NO
		U = NOT VESTED IN NPNCA OR LFC	NB For detailed explanation see APPENDIX 1	
		* = VESTED IN ANOTHER AUTHORITY		
E28	Alexander-Kennedy area	Nature Reserve (U)	NR vested in NPNCA	27087
E28a	Alexander-Kennedy area	VCL	NR vested in NPNCA	VCL
E31	Israelite Bay	Joint Executive Director	National Park	36002
E32	Nuytsland NR	Nature Reserve	National Park	27632
E33	Peak Charles Extension	VCL	" "	VCL
E33a	The Pups	Other Reserve	" "	2786
E34	North of Red Lake	Other Reserve*	NR vested in NPNCA	21362
<u>DUNDAS</u>				
DS1	Mount Day	VCL	NR vested in NPNCA	VCL
DS2	Knapp Rock	VCL	" " "	VCL
DS3	Bremer Range	VCL	" " "	VCL
DS4	Peak Charles area	VCL	National Park	VCL
DS5	25 Mile Rocks	Nature Reserve (U)*	NR vested in NPNCA	8029
DS5a	NW of Norseman	VCL	State Forest	VCL
DS6	Jimberlana Hill	Other Reserve	NR vested in NPNCA	6043
DS7	" "	" "	" " "	17154
DS8	E of Madoonia Downs	VCL	" " "	VCL
DS9	Nuytsland Additions	VCL	National Park	VCL
DS10	N of Madura Caves	VCL (2 areas)	NR vested in NPNCA	VCL
DS11	Madura Caves	Pastoral Lease	"5g"reserves	VCL
DS12	Eucla-Abrakurrie	VCL	National Park	VCL
DS13	Weebubbie Cave	Other Reserve	" "	19713
DS 14	Nuytsland Nature Reserve	Nature Reserve	" "	27632

(5) Changes proposed by CALM in this management plan

All proposals to change land tenure or to reserve vacant Crown Land will be referred to the NPNCA or to the Lands and Forest Commission, 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 changes involving A class reserves or State forest.

The boundaries of the proposed parks and reserves and additional State forest areas shown on Maps 9 and 10 are not final and may be adjusted during the consultation and legislative processes described above. In addition, boundary modifications may be recommended in future area management plans.

DETAILS OF PROPOSED MAJOR CHANGES

About 170 proposed changes in tenure, vesting or purpose are listed in Table 4 and briefly summarised in Appendix I.

Some of the more significant proposals are:

New or Expanded Nature Reserves

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

Vacant Crown land around the Owingup Swamp should be added to Quarram Nature Reserve.

Rationale: EPA Red Book recommendations 2.12 (2)

Crown land in the vicinity of the Beaufort Estuary (Pallinup River) should be established as a conservation park.

Rationale: Such a proposal was developed by the Jerramungup South Coast Reserves Working Group but was not included in the groups final report to the EPA. The high conservation values of this areas have subsequently been addressed by Newbey (1987).

Crown lands should be amalgamated to form a nature reserve in the Ravensthorpe Range.

Rationale: Red Book recommendation 3.8 refers: The area has outstanding conservation values including several species of rare flora and fauna.

Frank Hann National Park should be converted to Frank Hann Nature Reserve.

Rationale: Public use of the Frank Hann National Park is virtually restricted to through traffic on the Lake King-Norseman Road and occasional visits by local residents to the Lilian Stokes Rock area near the western boundary. The area falls more strictly within the criteria for a nature reserve.

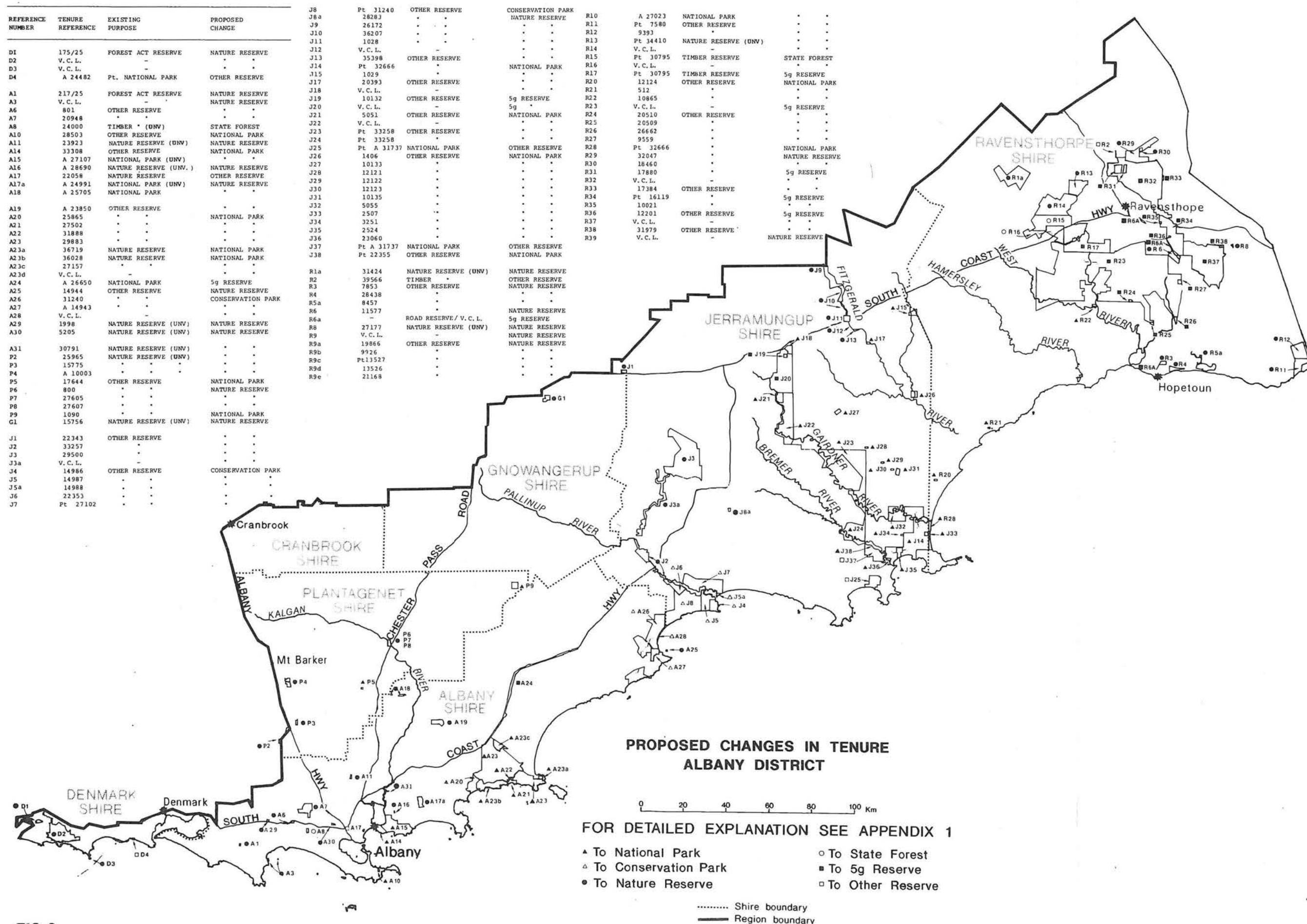


FIG 8

REFERENCE NUMBER	TENURE REFERENCE	EXISTING PURPOSE	PROPOSED CHANGE
E1	Pt 32339	NATURE RESERVE	OTHER RESERVE
E1a	Pt 32339	NATURE RESERVE	NATIONAL PARK
E2	25376	TIMBER RESERVE (UNV)	NATURE RESERVE
E3	35659	NATURE RESERVE (UNV)	"
E4	31745	"	"
E5	A 31762	OTHER RESERVE	"
E6	31751	"	"
E7	A 31750	"	"
E8	A 31749	"	"
E9	A 31739	"	"
E10	26913	"	"
E11	A 31761	"	"
E12	27888	NATURE RESERVE (UNV)	NATIONAL PARK
E13	26885	"	"
E14	Pt 30672	OTHER RESERVE	"
E15	Pt 24486	NATURE RESERVE (UNV)	NATURE RESERVE
E16	19628	"	"
E18	14543	OTHER RESERVE	STATE FOREST
E19	34788	"	"
E19a	23527	TIMBER RESERVE	"
E20	24511	NATURE RESERVE (UNV)	NATURE RESERVE
E21	4182	OTHER RESERVE	"
E25	Pt 28170	"	"
E25a	Pt 28170	" / V.C.L.	NATIONAL PARK
E28	27087	NATURE RESERVE (UNV)	NATURE RESERVE
E28a	V.C.L.	"	"
E31	36002	MISCELLANEOUS RESERVE	NATIONAL PARK
E32	27632	NATURE RESERVE	NATIONAL PARK
E33	V.C.L.	"	"
E33a	2786	OTHER RESERVE	"
E34	21362	"	NATURE RESERVE

DS1	V.C.L.	-	NATURE RESERVE
DS2	V.C.L.	-	"
DS3	V.C.L.	-	"
DS4	V.C.L.	-	"
DS5	8029	NATURE RESERVE (UNV)	NATIONAL PARK
DS5a	VCL	-	NATURE RESERVE
DS6	6043	OTHER RESERVE	STATE FOREST
DS7	17154	"	NATURE RESERVE
DS8	V.C.L.	-	"
DS9	V.C.L.	-	"
DS10	V.C.L. (2 PORTIONS)	-	NATIONAL PARK
DS11	PASTORAL LEASE	-	NATURE RESERVES
			5g RESERVE
			(MULTIPLE)
DS12	V.C.L.	-	NATIONAL PARK
DS13	19713	OTHER RESERVE	"
DS14	27632	NATURE RESERVE	"

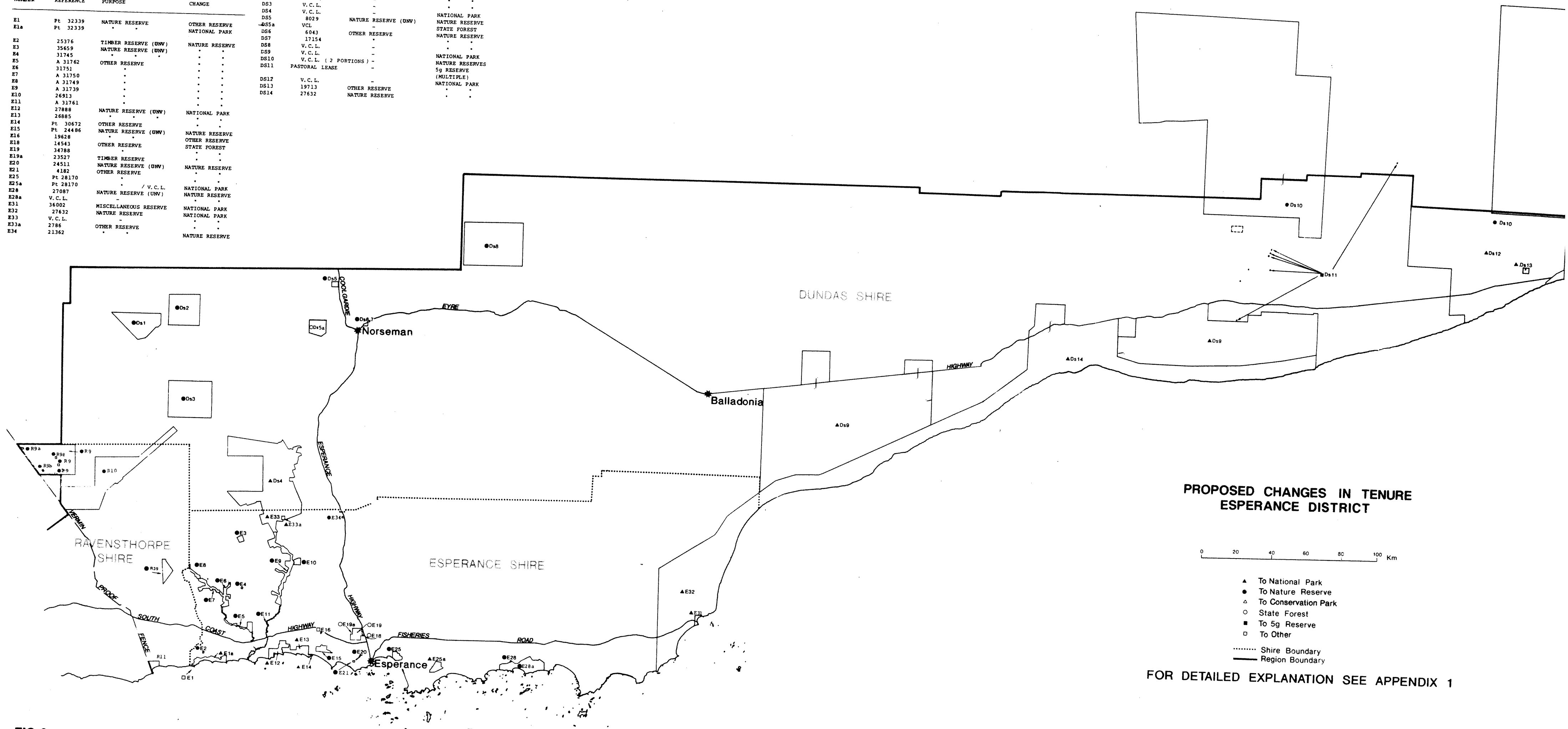


FIG 9

59

Crown land along the Lort River should be established as a nature reserve linking the Peak Charles area of the Southern Goldfields with Stokes National Park and the coast.

Rationale: there is potential for a relatively wide corridor of bush to link the area south of Peak Charles with the coastal reserves system by amalgamation of several existing reserves and V.C.L. along the Lort River. Most other river systems between Ravensthorpe and Esperance have narrower foreshore reserves and some have incompatible land uses including mining.

Vacant Crown land and other Crown land in the Nullarbor should be established as new nature reserves, primarily to protect the flora and fauna associated with caves and surface karst features.

Rationale: recommendations as per Australian Speleological Federation (Davey, 1978) and McKenzie and Robinson (1987).

New or Expanded National Parks

A national park should be established from existing Crown land in the Gull Rock area near Albany.

Rationale: this area is currently unvested A class "national park" it forms a scenic backdrop to the eastern side of King George Sound and Middleton Bay near Albany. Several species of rare flora occur.

The Waychinicup National Park should be established by amalgamating existing nature reserves vested in the NPNCA, vacant Crown land and other Crown land.

Rationale: a Cabinet endorsed recommendation arising from the Albany South Coast Reserves Working Group. Implementation is nearing completion. The area contains rare flora and fauna including a new colony of noisy scrub birds (Burbidge *et al*, 1986).

Additional areas of Crown land, including part of Lake Shaster Nature Reserve should be added to Stokes National Park on the coast to the west of Esperance.

Rationale: This area is existing or proposed nature reserve. However, whilst having high conservation value it is used for various forms of public recreation which are not appropriate in a nature reserve.

A new national park should be established on the Nullarbor to include the existing Eucla National Park, vacant Crown land and other Crown land.

Rationale: recommendations as per Davey (1978) and McKenzie and Robinson (1987). This area will lie adjacent to a major South Australian National Park once Koonalda Station is vested with the South Australian National Parks and Wildlife Service.

Nuytsland Nature Reserve together with additions proposed by Davey (1978) and McKenzie and Robinson (1987) should be converted to national park.

Rationale: the area experiences a high level of public recreational use including camping, cave exploration,

nature study, sight seeing, and adventure tours, all of which are more appropriate in a national park.

Additional State Forest

Most of Cocanarup Timber Reserve (unvested Crown land) near Ravensthorpe plus nearby vacant Crown land should be established as Cocanarup State Forest.

Rationale: EPA Red Book recommendations 3.2. and 3.3. refer: Although some of the area has been previously recommended for addition to Fitzgerald River National Park there are substantial difficulties posed by conflicting land uses including mining, beekeeping, water production and timber cutting. It is felt that for the interim at least the area would be better managed as State forest primarily for conservation but with limited timber production.

Miscellaneous Reserves

Two areas of vacant Crown land and other Crown land adjacent to the Fitzgerald River National Park, located at Calyerup in the north west corner of the park and between Kybulup (in the north east section of the park) and Cocanarup Timber Reserve, should be established as multiple purpose reserves.

Rationale: EPA Red Book recommendations 3.2 and 3.3 refer. Although the areas have been previously recommended for addition to Fitzgerald River National Park, a position which is still favoured by the NPNCA, there are difficulties posed by conflicting land uses including mining and to a lesser degree, beekeeping, and water production. It is felt that for the interim the areas may have to be managed for multiple use.

Vacant Crown land and other Crown land in much of the Ravensthorpe Range should be established as a multiple purpose reserve.

Rationale: as for previous proposal. Red Book recommendations 3.8, proposing that the area become nature reserve refers. This position is still favoured by the NPNCA.

FUTURE LAND DEDICATION

The system of national parks, nature reserves, conservation parks and State forest proposed for the South Coast Region in this plan is based upon existing lands managed by CALM and proposals for incorporation of various areas of vacant Crown land or other Crown land. There are, throughout the region, numerous instances where private land or leasehold land has potential either for addition to existing CALM estate or for establishment of a new reserve in its own right. As a general rule the Government should not actively seek the purchase of such lands unless extremely high conservation or other values are involved (e.g. rare flora and fauna habitat). Rather, the department should monitor the availability for purchase of such lands, and subject to funds being available, should negotiate with the owners in the usual manner.

Staff should continue to assess outstanding EPA (CTRC) recommendations and any other proposals for addition to the lands managed by CALM in the region.

Land exchange may on occasions be used to rationalise and improve the management boundary of land managed by CALM, provided a balance of reserve values is maintained.

CHAPTER 4. MANAGEMENT ISSUES AND PROPOSED STRATEGIES

Key management issues affecting CALM managed land in the South Coast Region may be grouped under one of eight major headings viz:

Landform and Landscape features
Conservation of Flora and Fauna
Cultural Areas
Protection
Recreation
Public Participation and Liaison
Production and other Commercial Use
Public Utilities, Subdivisions and Enclave Reserves

Each of these issues will be dealt with as follows:

- Background information on resources and issues;
- Regional strategies, which add specific detail to existing Departmental policy guidelines, for example, on conservation and recreation (CALM, 1987a) and on timber production (CALM, 1987b). Although policy guidelines are prepared primarily for internal Departmental use they are available for consultation at CALM offices throughout the State.

The issues presented and strategies proposed are not ranked in order of priority. While it is intended that all strategies listed will be eventually implemented the priority for addressing outstanding strategies will need to change as circumstances change. Regional staff should review all strategies annually to ensure that the priorities are achievable within the resources available. Furthermore, the implementation of regional strategies will often be dependent upon the outcome of an area or issue management plan.

LANDSCAPE AND LANDFORM

LANDSCAPE

The South Coast Region has high scenic beauty much of which occurs within or near to land managed by CALM. Major features of the region include:

Coastline and offshore islands;
Mountain peaks and ranges e.g. Stirling Range, Peak Charles, Mount Ragged;
Inlets and estuaries;
Karri forest e.g. West Cape Howe, Porongurup National Parks;
River valleys e.g. Fitzgerald and Hamersley Rivers;
Southern Nullarbor.

The vistas offered of mountains, and particularly from them, mean that any scars upon the landscape are widely visible. Such scars may result from roads, recreation sites, firebreaks, gravel pits etc.

Other agencies which may have a deleterious effect on landscape include:

mining;
insect and fungal diseases;
fires;
public utilities;
some private developments.

Regional Strategies

In addition to implementing Departmental policies and guidelines the Department should:

- (i) classify landscape features on lands managed by CALM according to the Departmental system;
- (ii) identify and protect important landscapes in the region;
- (iii) ensure that any developments on lands managed by CALM, such as road construction, recreation sites and establishment of plantations are undertaken with due regard to their potential impact upon visual qualities of the environment;
- (iv) provide advice to private landholders and other agencies to minimise the visual impact of operations, especially on lands adjacent to or within the viewshed from lands managed by CALM;
- (v) carry out a research program into landscape perceptions and preferences;
- (vii) conduct training courses in landscape management for Departmental staff and other organisations who operate on land managed by CALM.

COASTLINE

Much of the region's coastline is managed by CALM as national parks and nature reserves. The fragile nature of much of Western Australia's coastline has long been recognised. There is now general community awareness of the care which is required in the provision of facilities and their subsequent maintenance within the coastal zone.

Many areas of coastal land managed by CALM within the region were developed with facilities such as roads, car parks, and "ad hoc" footpaths prior to gazettal as national park or nature reserve, and prior to the recognition of coastal management principles. The result is a legacy of coastal management problems including dune blowouts, incorrectly sited facilities and landscape scars.

Whilst major rehabilitation measures have been undertaken a number of serious coastal management problems remain especially around Albany (West Cape Howe National Park, Torndirrup National Park and Two People's Bay Nature Reserve), in the Fitzgerald River National Park and to the east of Esperance (Cape Le Grand National Park).

Regional Strategies

In addition to implementing Departmental policies and guidelines the Department should:

- (i) establish and maintain an inventory of the condition of the coastal zone within land managed by CALM;
- (ii) indentify and rank the main problem areas and prepare works programmes to arrest erosion and provide safe accessways for visitors;
- (iii) ontinue to provide advice to neighbours or other agencies such as local authorities regarding coastal zone management;
- (iv) maintain liaison with other agencies who have particular expertise in coastal management including the Environmental Protection Authority, the State Planning Commission and the Department of Marine and Harbours.

UPLAND AREAS

Although small by international standards, there are numerous hills, peaks and mountains distributed throughout the region. Such areas, have traditionally attracted visitors (for example, Bluff Knoll in the Stirling Range National Park has an estimated annual visitation of around 20 000 persons) and many have footpaths to their summits. Subsequent erosion is a major management problem.

Furthermore, where dieback disease occurs on upland areas it has potential to infect all lands downslope. In the case of mountain peaks the extent of downslope areas under threat is generally considerable. It is therefore essential to minimise the spread of dieback disease in these areas and to ensure that footpaths, like roads, are well drained and if possible do not cross in and out of areas which are infected by dieback disease.

Whereas the problems of coastal zone management have long been formally recognised by other agencies (as described in the preceeding section), this is generally not the case with footpath erosion in upland areas.

Experience in national parks overseas indicates that the maintenance of upland footpaths is a demanding task. Nevertheless well planned and properly constructed footpaths can provide safe and enjoyable experiences for park visitors.

Regional Strategies

In addition to implementing Departmental policies and guidelines the Department should:

- (i) establish and maintain an inventory of the condition of all footpaths in upland areas of the Region;

- (ii) identify and rank problem areas and prepare works programmes to arrest erosion, provide safe access for visitors and minimise the risk of dieback spread;
- (iii) close footpaths which are beyond the scope of known rehabilitation techniques, or which impose an unacceptable risk of dieback spread;
- (iv) obtain records of techniques and maintain direct liaison with agencies interstate and overseas who are involved in footpath construction and maintenance work;
- (v) establish research to evaluate ways of reducing path erosion and to investigate the most cost effective and environmentally acceptable methods of stabilising damaged footpaths, and to clarify the extent to which use of footpaths may exacerbate spread of dieback disease;
- (vi) develop footpaths to high standards to provide safe and enjoyable walking for park visitors.

CAVES

A few shallow caves are found in the limestone, quartzites and granites along the coast as far east as Hopetoun. They are small and undeveloped for visitors.

By contrast the vast Nullarbor Plain which spans from Western Australia into South Australia contains many thousands of blowholes, caves, collapse dolines and other karst features. Many of the caves are among the most outstanding in Australia and some, such as Mullamallang Cave, are accredited with international recognition by speleologists. (See for example, Waltham 1974).

Caves have special scientific, aesthetic and recreational values (Watson, 1978) and the speleothems (decorations) they contain are effectively non-renewable resources. Once broken or damaged they may take thousands of years to reform.

Recognised speleological societies operate within a strict code of conservation and safety ethics developed by the Australian Speleological Federation. However, damage continues to occur at the hands of vandals, casual visitors and the occasional "clumsy" caver.

The sport of diving within the long water filled passages of Nullarbor caves has recently developed, mainly due to activity by cave divers with experience derived from the Mt Gambier area of South Australia. This specialised use of caves is addressed as a separate issue later in this chapter in the section on recreation.

Regional Strategies

In addition to implementing Departmental policies and guidelines the Department should:

- (i) maintain an inventory of all caves and major karst features within the region;
- (ii) classify each cave on land managed by CALM according to the State cave classification developed by the WA Working Group on Cave Protection and Management (Watson, 1978);
- (iii) prepare cave management plans to provide the basis for improved protection of caves on the Nullarbor;
- (iv) permit entry to caves on land managed by CALM where an understanding and formal commitment to observe the A.S.F. code of ethics is provided and where there is no likelihood of unavoidable damage to the cave or cave fauna occurring;
- (v) promote research into the scientific aspects of caves, karst topography and associated flora and fauna;
- (vi) maintain contact with recognised speleological groups and seek their assistance when necessary.

WETLANDS AND ESTUARIES

Wetlands occur as lakes, swamps, rivers, inlets and estuaries. Many of the wetlands in the region occur on or near the coast. They have a high conservation value.

Major wetlands are threatened by pollution from farm runoff water, increasing salinity, spread of weeds and inappropriate types of recreational use.

Regional Strategies

In addition to implementing Departmental policies and guidelines the Department should:

- (i) list wetland resources in the region and identify key values for each wetland;
- (ii) attempt to secure important wetland areas within lands managed by CALM;
- (iii) as far as possible seek to prevent actions within the catchments of wetlands on lands managed by CALM, which will have an adverse effect on nature conservation values;
- (iv) where appropriate attempt to rehabilitate degraded wetlands on lands managed by CALM;
- (v) monitor the condition of wetlands and the management of wetland catchments.

CONSERVATION OF FLORA AND FAUNA

FLORA AND FAUNA

The Department is responsible for flora and fauna on land managed by CALM for the protection of native flora and fauna throughout the State under the Wildlife Conservation Act. This Act gives the Department responsibilities on private property as well as 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 maintain diversity and species richness. In some reserves, management is directed to providing habitat for particular species or communities. Such reserves in the South Coast Region should be progressively defined by CALM staff.

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

Knowledge of the existence and distribution of the many species of native plants and animals in the region is considerable, but not complete. High priority is given to investigating and protecting rare and endangered species and their habitat.

Currently (February 1989) 75 plant species known to occur within the region are gazetted as rare threatened or in need of special protection (Table 5). This represents 33% of all rare flora species in the State. During the life of the plan the list will be amended from time to time. There are 21 species of rare vertebrates (Table 6). The noisy scrub bird (Atrichornis clamosus) occurs naturally at Two Peoples Bay Nature Reserve and has been translocated to Mount Manypeaks Nature Reserve and to the Walpole-Nornalup National Park located in the CALM Southern Forest Region under CALM Wildlife Management Programme No 2 (Burbidge et al, 1986).

Regional Strategies

In addition to implementing Departmental policies and guidelines the Department should:

- (i) continue research to test hypotheses leading to an understanding of patterns and processes in ecosystems;
- (ii) develop management plans for conservation reserves which aim to maintain wildlife (flora and fauna) diversity and to maintain representative habitats;
- (iii) maintain close liaison with landholders, other agencies and the public regarding their responsibilities under the Wildlife Conservation Act and regulations;
- (iv) review the adequacy of conservation lands in the region in the light of research findings;

TABLE 5

GAZETTED RARE FLORA OF THE SOUTH COAST REGION (AS AT
1/2/89)

SPECIES	DISTRICT
<u>Acacia argutifolia</u>	Albany
<u>Acacia simulans</u>	Albany
<u>Adenanthos cunninghamii</u>	Albany
<u>Adenanthos dobagii</u>	Albany
<u>Adenanthos ellipticus</u>	Albany
<u>Adenanthos eyrei</u>	Esperance
<u>Adenanthos ileticos</u>	Esperance
<u>Adenanthos pungens</u>	Albany
<u>Adenanthos velutinus</u>	Albany
<u>Anigozanthos bicolor subsp. minor</u>	Esperance
<u>Asplenium obtusatum</u>	Albany/Esperance
<u>Baeckea arbuscula</u>	Albany
<u>Banksia brownii</u>	Albany
<u>Banksia goodii</u>	Albany
<u>Banksia verticillata</u>	Albany
<u>Billardiera mollis</u>	Albany/Esperance
<u>Caladenia integra</u>	Albany/Esperance
<u>Caladenia plicata</u>	Albany
<u>Caladenia sp. (Esperance) D.R.Voigt 36.</u>	Esperance
<u>Caladenia sp. (jarrah forest) S.D.Hopper 3990</u>	Albany/Esperance
<u>Caladenia sp. (southern forest) S.D.Hopper 3553</u>	Albany
<u>Conostylis lepidospermoides</u>	Esperance
<u>Conostylis misera</u>	Albany
<u>Cooperhooia georgei</u>	Albany
<u>Corybas sp. (Albany) L.Byrne 10</u>	Albany
<u>Darwinia collina</u>	Albany
<u>Darwinia macrostegia</u>	Albany
<u>Darwinia meeboldii</u>	Albany
<u>Darwinia oxylepis</u>	Albany
<u>Darwinia squarrosa</u>	Albany
<u>Darwinia wittwerorum</u>	Albany
<u>Darwinia sp. (Stirling Range) G.J.Keighery 5732</u>	Albany
<u>Daviesia sp. (Ravensthorpe) M.D.Crisp 6065</u>	Albany
<u>Daviesia sp. (Norseman) M.D.Crisp 5943</u>	Esperance
<u>Daviesia sp. (Stirling Range) K.R.Newbey 5113</u>	Albany
<u>Drakaea sp. (south west) S.D.Hopper 3566</u>	Albany
<u>Drakaea sp. (Great Southern) S.D.Hopper 3461</u>	Albany
<u>Drosera fimbriata</u>	Albany
<u>Drummondita hassellii var. longifolia</u>	Esperance
<u>Dryandra sp. (Stirling Range) F.Lullfitz 3379</u>	Albany
<u>Eremophila denticulata</u>	Albany
<u>Eremophila serpens</u>	Albany
<u>Eucalyptus bennettiae</u>	Albany
<u>Eucalyptus burdettiana</u>	Albany
<u>Eucalyptus cerasiformis</u>	Esperance
<u>Eucalyptus coronata</u>	Albany
<u>Eucalyptus erectifolia</u>	Albany
<u>Eucalyptus goniantha (subsp goniantha)</u>	Albany
<u>Eucalyptus insularis</u>	Esperance
<u>Eucalyptus merrickiae</u>	Esperance
<u>Eucalyptus sp. (Norseman) S.D.Hopper 2736</u>	Esperance
<u>Grevillea baxteri</u>	Esperance
<u>Grevillea infundibularis</u>	Albany
<u>Hibbertia bracteosa</u>	Albany
<u>Kennedia becxiana</u>	Esperance

continued

<u>Lambertia echinata</u>	Esperance
<u>Lambertia fairallii</u>	Albany
<u>Lambertia orbifolia</u>	Albany
<u>Laxmannis jamesii</u>	Albany
<u>Lechenaultia pulvinaris</u>	Albany
<u>Myoporum salsoioides</u>	Albany
<u>Myoporum turbinatum</u>	Esperance
<u>Prasophyllum triangulare</u>	Albany
<u>Prostanthera carrickiana</u>	Esperance
<u>Pterostylis pusilla</u>	Albany/Esperance
<u>Rhizanthella gardneri</u>	Albany
<u>Ricinocarpus trichophorus</u>	Albany
<u>Stylidium galioides</u>	Albany
<u>Stylidium plantagineum</u>	Albany
<u>Thelymitra psammophila</u>	Albany
<u>Verticordia fimbriilepis</u>	Albany
<u>Verticordia helichrysantha</u>	Albany
<u>Verticordia sp.(Fitzgerald) C.A.Gardner</u>	
9148	Albany
<u>Villarsia calthifolia</u>	Albany
<u>Xyris sp.(Stirling Range) G.J.Keighery</u>	
7951	Albany

TABLE 6

GAZETTED RARE FAUNA OF THE SOUTH COAST REGION AS AT
(1/2/89)

MAMMALS

SCIENTIFIC NAME	COMMON NAME
<u>Bettongia penicillata</u>	Woylie (Brush tailed bettong)
<u>Macropus eugenii</u>	Tammar
<u>Pseudocheirus peregrinus occidentalis</u>	Western ringtail
<u>Phascogale calura</u>	Red-tailed wambenger
<u>Antechinus apicalis</u>	Dibbler
<u>Pseudomys shortridgei</u>	Shortridge's native mouse
<u>Balaenoptera musculus</u>	Blue whale
<u>Megaptera noaeangliae</u>	Humpback whale
<u>Eubalaena australis</u>	Southern right whale
<u>Dasyurus geoffroii</u>	Chuditch

BIRDS

<u>Stictonetta naevosa</u>	Freckled duck
<u>Cereopsis noaeohollandiae grisea</u>	Cape barren goose
<u>Falco peregrinus</u>	Peregrine falcon
<u>Platycercus haematogaster narethae</u>	Naretha bluebonnet
<u>Pezoporus wallicus</u>	Ground parrot
<u>Cacatua leadbeateri</u>	Major Mitchell's cockatoo
<u>Atrichornis clamosus</u>	Noisy scrub-bird
<u>Falcunculus frontatus</u>	Crested shrike-tit
<u>Psophodes nigrogularis</u>	Western whip-bird
<u>Dasyornis brachypterus</u>	Brown bristle-bird
<u>Emblema oculatum</u>	Red-eared firetail

REPTILES

<u>Python spilotes</u>	Carpet snake
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- (v) continue surveys to record the distribution, abundance and other details of flora and fauna including gazetted rare species;
- (vi) seek to control feral predators and weeds;
- (vii) where appropriate manage habitat to favour threatened fauna;
- (viii) assist research staff to develop and implement strategies for each rare species to ensure continued survival and expansion of populations and to develop wildlife management programmes when desirable;
- (ix) protect and monitor populations of rare species;
- (x) continue to implement the Department's kangaroo and noisy scrub bird management programmes.

VEGETATION AND RESERVE "CORRIDORS"

In the western section of the region and on the Esperance sandplains there has been considerable clearing of native bushland for agriculture. Recently the rate of clearing new land has declined due to the moratorium on new land releases imposed in 1983 and to implementation of the Soil and Land Conservation Act (1985) which restricts clearing where deleterious effects on soil stability or water salinity might subsequently occur.

The system of nature reserves and national parks in these areas comprises a series of vegetation "islands" within a largely cleared landscape. However, in some cases well defined "corridors" of uncleared vegetation and/or natural features such as salt lakes remain linking major reserve systems. Important examples are the Fitzgerald River system linking the Fitzgerald River National Park with Lake Magenta Nature Reserve, the Ravensthorpe Range linking the Ravensthorpe coastline with the Southern Goldfields, and the Lort and Young River systems which link the west Esperance coastline with the Peak Charles area and Southern Goldfields (Figure 10). Smaller corridors occur along the lower reaches of the Pallinup River and the Beaufort Estuary. Corridors also occur along some roadside verges, notably Hassell National Park.

Regional Strategies

In addition to implementing Departmental policies and guidelines the Department should:

- (i) in consultation with neighbours and local authorities seek to establish and ensure protection of vegetation corridors between major reserves;
- (ii) maintain contact with the Roadside Conservation Committee and with Soil Conservation District Committees.

MARINE CONSERVATION

There are currently no formal marine reserves in the region but there are marine parts of most coastal national parks and nature reserves between high and low water marks. Most offshore and inshore islands (including some islands within inlets or estuaries) are vested as nature reserves. In the Recherche Archipelago, there are around 1500 separate islands, rocks and other "obstacles to shipping" (Goodsell et al, 1976).

The conservation of marine mammals and seabirds is a CALM responsibility under the Wildlife Conservation Act. Many Western Australian whale strandings involving both single animals and large pods, have occurred in the South Coast Region.

In many cases islands represent important fauna refuges because they are largely undisturbed by the activities of man. They therefore warrant the preparation of management plans.

Regional Strategies

In addition to implementing Departmental policies and guidelines the Department should:

- (i) evaluate marine areas adjoining the region as possible marine reserve;
- (ii) prepare emergency plans for protection and assisting marine fauna, e.g., stranded whales, seals. These plans should include the training of staff;
- (iii) prepare management plans for islands within the region.

CULTURAL AREAS

Areas of Aboriginal and European cultural importance occur on many lands managed by CALM. Sites are scattered throughout the region. Issues and strategies for these areas are discussed below.

ABORIGINAL SITES

Aboriginal people occupied the region for at least 40 000 years, and many sites have been identified. These are most plentiful on the Esperance coastal plain. All Aboriginal sites are protected by the Aboriginal Heritage Act.

Detailed 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 region. Smith (1982) reports a number of Aboriginal sites in the Esperance area. Aboriginal sites can be threatened by a variety of activities. CALM operations need to be carefully planned to avoid disturbance to Aboriginal sites.

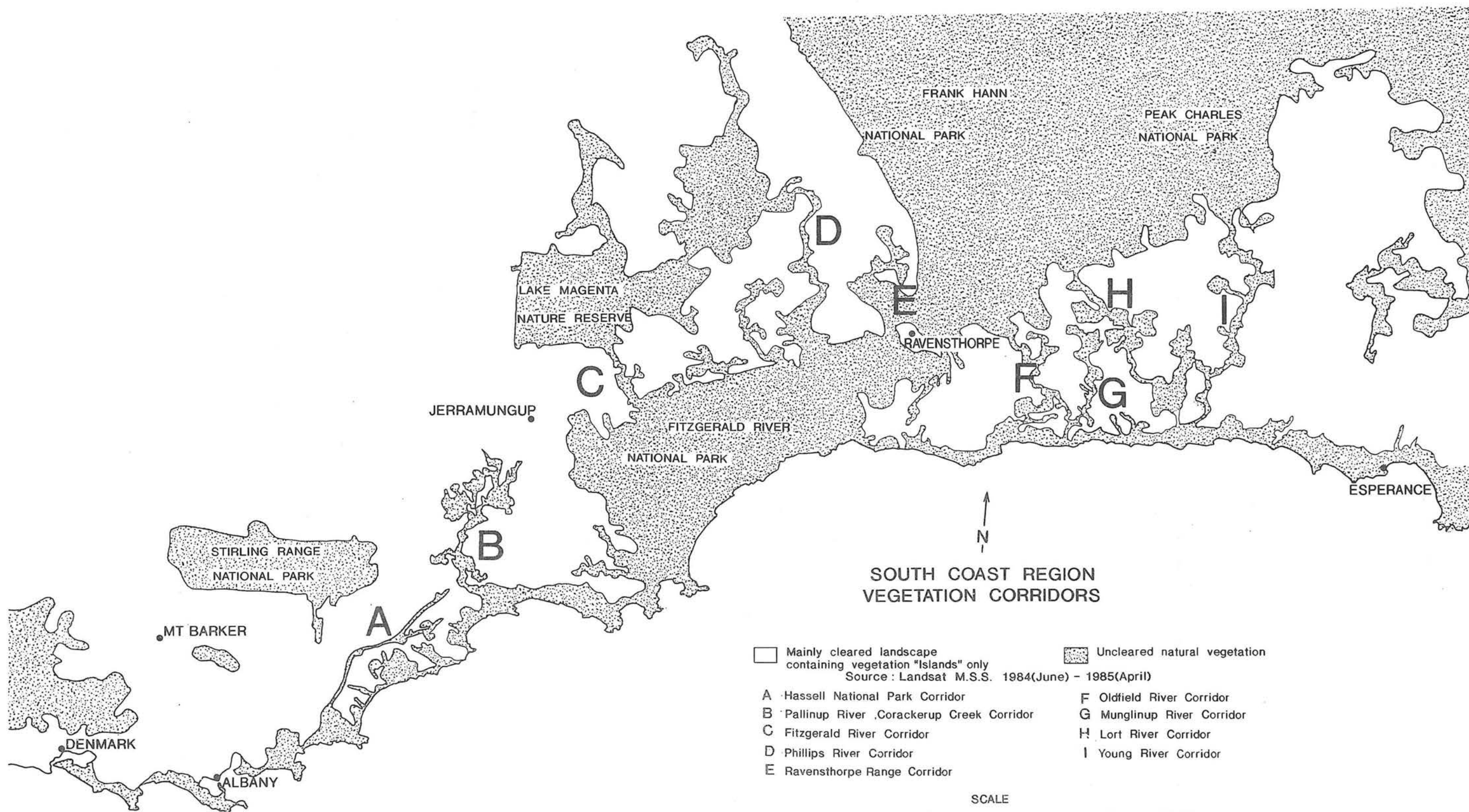


FIG 10

Regional Strategies

In addition to implementing departmental policies and guidelines the Department should:

- (i) check that CALM operations do not impact upon known aboriginal sites;
- (ii) collate existing information on Aboriginal sites on CALM estate in the region and ensure that sites are known by the Registrar of Aboriginal Sites at the W.A. Museum. Seek to maintain a confidential register in the regional office and each district;
- (iii) train staff in the recognition of Aboriginal sites and update registers when new sites are found;
- (iv) develop and implement management guidelines for Aboriginal sites on lands managed by CALM in liaison with the W.A. Museum, tertiary institutions and Aboriginal organisations.

HISTORIC SITES

There are numerous sites of historic interest and value on lands managed by CALM in the region. These include old homesteads, stockyards, wells and examples of early fencing, mines, railway formations and bridges, townships, sawpits, the overland telegraph line, jetties, the rabbit proof fence and remnants of bay whaling operations.

Existing records of historic sites in the region have been derived largely from historical research undertaken by CALM during the establishment of a heritage trail network (Sandiford 1988). Considerable work would be required to set up more complete records for the region.

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

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

- * Radar station ruins, Torndirrup National Park;
- * Sealers oven, proposed Waychinicup National Park;
- * Old sawpit, Porongurup National Park;
- * Waddy's hut, Porongurup National Park;
- * Red Gum Springs, Stirling Range National Park;
- * Rabbit Proof Fence No 2, Fitzgerald River National Park;
- * Overland Telegraph (numerous reserves, but best preserved within Nuytsland Nature Reserve);
- * Various homestead and outstation ruins, Fitzgerald River National Park;

Moir homestead (ruins), Stokes National Park;
 Hill Springs (ruins), Cape Arid National Park;
 Baxter memorial, Nuytsland Nature Reserve;
 McIvers grave, Cape Arid National Park;
 Graves, Cape Arid National Park;
 Pine Hill water supply, Cape Arid National Park;
 * Old Telegraph Station, Israelite Bay Reserve;
 Eyre Telegraph Station, Nuytsland Nature Reserve.

There are many threats to the preservation of historic sites, including damage caused by visitors.

Regional Strategies

In addition to implementing Departmental policies and guidelines the Department should:

- (i) collate existing information on historic sites located on land managed by CALM in the region and maintain a register of sites in the regional office and in each district. Liaise closely with the National Trust and the Heritage Commission in the preparation and maintenance of registers;
- (ii) develop management guidelines for historic sites on land managed by CALM in the region in liaison with the W.A. Museum, National Trust, Heritage Commission, tertiary institutions and historical societies;
- (iii) where appropriate establish a programme to maintain and restore historic sites. Develop facilities and visitor information where appropriate;
- (iv) maintain the South Coast Heritage Trail Network;
- (v) maintain liaison with local historical societies regarding volunteer work and other activities.

PROTECTION

The Department is responsible for the protection of wildlife, lands managed by CALM and other resources from fire, erosion, disease, weeds, feral animals, pests and pollution and for the rehabilitation of the harmful effects of these or other agencies.

FIRE

Fire is a natural phenomenon because of summer drought and lightning storms. It was used deliberately by Aborigines before European settlement (Hallam, 1975), but since the advent of European settlement, fires seem to have become more common, especially in the moister southern forests. It is generally undesirable for uncontrolled wildfires to burn on or out of lands managed by CALM.

The overall objectives of fire management within CALM are:

- 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.

In essence the Departmental policy on fire requires that:

all possible steps should be taken to prevent wildfires

if wildfires do occur, attempts should be made to restrict their spread or confine them within predetermined buffer zones

an effective organization should be established to detect and suppress fires; liaison should be maintained with local Bush Fire Brigades

where appropriate, fire suppression should be made easier and safer by the practice of cyclic prescribed burning, generally along external boundaries, on adjacent lands or along internal corridors such as roads

a continuing research programme into fire ecology and fire control should be given high priority.

All 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 substantial resources available through the volunteer bush fire brigades in the region and the co-ordination and communication resources of the Bush Fires Board. Assistance from the Police and other agencies is also provided when life and property are threatened.

CALM should also assist with fire suppression on lands adjacent to CALM managed estate.

Regional Strategies

In addition to implementing Departmental policies and guidelines the Department should:

- (i) establish and maintain an efficient fire detection system and improve the effective fire fighting forces and equipment within the resources available;
- (ii) reduce fuels by prescribed burning, slashing or chaining in carefully selected strategic buffer areas;

- (iii) consistent with the requirement to protect life, property and ecological values, provide for diversity in prescribed burning fire regimes;
- (iv) use fire to develop or favour habitat for specific flora and fauna species;
- (v) maintain close liaison with local bush fires brigades, local authorities and other agencies and through the mechanism of District Fire Plans, establish mutual aid arrangements;
- (vi) develop fire protection plans and fire emergency plans for land managed by CALM;
- (vii) develop neighbour and public knowledge about community fire protection needs and departmental fire management objectives and response procedures;
- (viii) establish and maintain an efficient radio communications network across the region.

DISEASE

The major plant disease of concern to the Department is dieback. This is caused by the introduced soil-borne fungus Phytophthora cinnamomi. This disease is known to attack at least 900 plant species in many different families. The Proteaceae (eg Grevillea, Banksia), Myrtaceae (eg Eucalyptus, Bottlebrush, Myrtles), and Epacridaceae (the Heaths), which together dominate many plant communities of the South Coast Region, are highly susceptible.

Parts of the region have a warm, moist climate which favours the production of fungal spores, particularly after summer rains. Poorly drained soils which typify some of the region also favour the production of spores and spread of the fungus. Clay and laterite act as impeding layers causing sub surface ponding necessary for the production of spores, and the water tends to drain laterally spreading the fungus further. Plants growing on soils developed from limestone appear to be less susceptible to the disease.

Dieback cannot be easily eradicated once it is established at a specific site. Control measures, therefore, concentrate on:

- (a) preventing the disease from establishing in new areas;
- (b) minimising additional spread in areas where the disease already occurs.

The Department has developed policies regarding dieback protection in the South Coast Region. These are addressed in detail in the South Coast Region Dieback Protection Plan 1989-93 (CALM, in preparation), and include:

definition of an essential system of roads and firebreaks which are to be retained in a well formed and well drained condition. Non-essential vehicle access to be closed;

construction of new roads and firebreaks to only take place where essential;

offroad vehicle use to be prohibited (except for approved beaches);

all operations to be carefully evaluated for potential dieback impact;

all operations to be undertaken with strict hygiene practices;

research to be undertaken on dieback spread, control and susceptibility of plants to attack.

Virtually all lands managed by CALM within the Albany District and within the western coast of the Esperance District (Starvation Boat Harbour to Israelite Bay) are thought to have the potential to become infected by dieback. However, some areas already have widespread infection (eg Stirling Range National Park, Two Peoples Bay Nature Reserve), some are intermediate (Torndirrup National Park, Cape Le Grand National Park) and a few areas have minimal infection (Fitzgerald River National Park). Overall public response to the closure to vehicles of non-essential roads, which was instigated in 1986/87, has been very good. Several roads have been subsequently upgraded and re-opened for public use.

Other isolated plant disorders are present on lands managed by CALM, including diseases caused by other species of Phytophthora and Armillaria. These are less damaging than Phytophthora cinnamomi within the South Coast Region.

Regional Strategies

As listed in the South Coast Region Dieback Protection Plan (1989-93) and in addition to implementing other Departmental policies and guidelines the Department should:

- (i) reduce artificial spread of dieback disease as much as possible;
- (ii) assess all operations and uses with an evaluation test for potential dieback impact;
- (iii) undertake all operations under hygienic conditions and monitor the effectiveness of such hygiene;
- (iv) identify priority areas within the region for protection from dieback based on conservation values, risk of introduction and predicted hazard;

- (v) assess dieback protection in the preparation of Interim Guidelines for Necessary Operations and in area management plans;
- (vi) improve understanding by the public and by CALM personnel of the dieback problem and protection measures on lands managed by CALM;
- (vii) undertake dieback mapping and dieback research;
- (viii) monitor the spread of known infections and implement action plans;
- (ix) adopt similar strategies for other plant disease species including Phytophthora citricola and Armillaria;
- (x) encourage other government departments and local authorities to adopt similar dieback control strategies.

WEEDS, FERAL ANIMALS 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 the responsibility to eradicate, control or contain declared weeds and animals on the lands it manages in specified shires or areas, under Section 37 of the Agriculture and Related Resources Protection Act. The main weed of concern is the blackberry (Rubus fruticosus) which is widespread within Porongurup National Park and also occurs in several other reserves of the Albany District. Other declared weeds in the region include: penny royal (Mentha pulegium L.) and arum lily (Zantedeschia aethiopica also at Porongurup National Park and saffron thistle (Carthamus lanatus L.) at the Fitzgerald River National Park. Non-declared weeds may also have undesirable ecological effects such as gene-mixing with endemic varieties through cross-pollination with closely related introduced species.

Feral animals such as the cat (Felis catus), fox (Vulpes vulpes), goat (Capra hircus) and rabbit (Oryctolagus cuniculus) cause widespread environmental problems on CALM lands, including some islands. Other feral animals which occur, generally in the eastern sections of the region include, the pig (Sus scrofa) the horse (Equus caballus), the camel (Camelus dromedarius), and the domestic dog (Canis familiaris). Occasionally the starling (Sturnus vulgaris) is located within Western Australia. Outbreaks have occurred in the Nullarbor area, at Cape Arid (1983/84),

elsewhere around Esperance (1980, 1982, 1986) and at Bremer Bay (1988), and at Manypeaks (1988). Control of starlings is undertaken by the A.P.B., however, CALM staff should assist A.P.B. officers if sightings are made on lands managed by CALM.

Native fauna such as the red capped parrot (Purpureicephalus spurius), grey kangaroo (Macropus fuliginosus) and emu (Dromaius novaehollandiae) can occasionally be pests to CALM neighbours.

The larva of the native moth, the jarrah leaf miner (Perthida glyphopa) is the most damaging insect pest of jarrah in the west of the region. However, some areas of jarrah woodland have recently been attacked by caterpillars of the gum leaf skeletoniser moth (Uraba lugens). Another insect, Lerp (Cardiospina species) has had a major effect on yate trees in recent years. Currently there are no economically feasible methods of controlling these native insect pests which tend to multiply and the decrease in cycles.

Regional Strategies

In addition to implementing Departmental policies and guidelines the Department should:

- (i) in conjunction with the Agriculture Protection Board, develop programs to control declared weeds and pests as funds allow;
- (ii) maintain liaison with neighbours to optimise control of boundary weed infestations;
- (iii) carry out monitoring and control programs, as resources allow on declared and non declared weeds and pests;
- (iv) assess the efficiency of control on target species and any effects on non-target species;

REHABILITATION

Rehabilitation includes the processes necessary to return disturbed land to a predetermined landform and vegetation condition, land use or productivity,

Rehabilitation may be required after any site disturbance such as mining, gravel pit working, road works, clearing, disease, or pest attack. Rehabilitation may also be required after recreation activity or the effects of fire or fire suppression activities such as installation of fire breaks. In the broader sense, historic buildings may require rehabilitation.

Since the early 1980s a major effort has taken place within all coastal national parks and at Two Peoples Bay Nature Reserve to rehabilitate blowouts and other erosion often caused by poor location of facilities and footpaths to the

coast. Major projects have occurred at William Bay National Park, Torndirrup National Park (numerous sites), Two Peoples Bay Nature Reserve, Fitzgerald River National Park, Stokes National Park, Cape Le Grand National Park (numerous sites) and Cape Arid National Park.

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

The plant species used for rehabilitation on parks and reserves should be local species and preferably have resistance to dieback, fire, and environmental stresses, e.g. drought and nutrient deficiencies. Integration with the aesthetics and the use of surrounding lands is necessary.

Much of the rehabilitation site works on land managed by CALM is undertaken by the agency responsible for the site disturbance, e.g. gravel pit rehabilitation by Main Roads Department, and shires.

Many areas of land managed by CALM were disturbed long ago and are yet to be rehabilitated, e.g. old gravel pits. These areas should be progressively restored as resources become available for their rehabilitation.

Regional Strategies

In addition to implementing Departmental policies and guidelines the Department should:

- (i) survey lands managed by CALM and specify the areas that require rehabilitation programmes;
- (ii) prepare rehabilitation prescriptions for all disturbed areas;
- (iii) where rehabilitation is the responsibility of the user, establish a schedule of conditions between the user and CALM.

RECREATION

CALM aims to cater for the widest range of recreational activities giving the most satisfying experiences 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 and wildlife, consistency of recreational activity with purpose of vesting, equity, and the capacity of the department to manage the activity.

Recreational use of CALM land derives from use by local residents and by visitors from further afield, including tourists. The direct expenditure by tourists in Western Australia in 1986/87 was \$528 million including \$33.5 million in the Great Southern (W A Tourism Commission, 1987).

The number of recreational visits to national parks and nature reserves of the region probably exceeds 1 million per year, and is expanding annually. The most heavily visited areas are Torndirrup National Park (estimated annual visitation up to 300 000 per annum, Watson, 1984), the Stirling Range National Park and Cape Le Grand National Park (estimated at over 100,000 visitors per annum).

Recreation opportunities occur throughout lands managed by CALM in the region but major sites are within national parks and at Two Peoples Bay Nature Reserve.

The development of new recreation opportunities will be dependent upon the outcome of area management plans. The upgrading of existing sites should be addressed where existing use is resulting in site degradation or safety hazards.

Important aspects for management are:

- camping;
- day use;
- motorised recreation;
- bicycle riding;
- horse riding;
- pets;
- swimming, fishing and boating;
- adventure activities;
- visitor safety;
- visitor information and interpretation.

CAMPING

Camping is a traditional activity on many lands managed by CALM and in many of the areas proposed for future management by CALM.

Camping may be either as an adjunct to back packing or vehicle based. Back pack camping is permitted in almost all areas of national parks but is not generally allowed in nature reserves. Vehicle based camping is allowed on designated sites.

Some issues of importance to managers with respect to camping are:

- provision of suitable camping areas (both in terms of site stability and in meeting visitor needs);
- minimising conflicts with day users;
- managing and maintaining campsites.

Regional Strategies

In addition to implementing Departmental policies and guidelines the Department should:

- (i) identify and consider the development of sites where camping can occur;

- (ii) cater for a range of camping requirements, e.g., small or large group camping;
- (iii) maintain campsites in good condition;
- (iv) maintain liaison with individuals or organisations who provide campsites on nearby of adjacent lands;
- (vi) provide information on camping opportunities.

DAY USE

Most recreational pursuits on land managed by CALM are carried out during the course of one day. These include picnicking, barbecuing, bushwalking, photography, painting, fishing and nature study.

Major issues with respect to day use recreation are:

- location and design of facilities such as toilets, footpaths, barbecues, parking areas;
- provision of facilities for the disabled;
- maintenance of recreation areas and footpaths, including litter disposal;
- visitor safety;
- provision of recreation facilities for commercial tourist operations;
- visitor information and interpretation.

Regional Strategies

In addition to implementing Departmental policies and guidelines the Department should:

- (i) assess requirements for developed recreation sites;
- (ii) evaluate existing sites in terms of location, design and suitability, and restore or redevelop as appropriate;
- (iii) consider the provision of new recreation areas, including facilities and footpaths where appropriate as resources for their development and maintenance become available and as provided for in area management plans;
- (iv) minimise conflicts between the general public and commercial tourist operations;
- (v) maintain recreation sites in a safe clean and tidy condition;
- (vii) minimize impacts of recreation activities on ecological and aesthetic values;
- (viii) provide information on opportunities for various types of day use recreation.

MOTORISED RECREATION

CALM lands in the South Coast Region (particularly coastal areas and major national parks) are in great demand for motorised recreation.

Licensed vehicles are permitted on public roads on lands managed by CALM and normal road traffic rules apply. There are numerous "management tracks" on lands managed by CALM. These tracks are not maintained for public use. Some beaches are regarded as part of the road system.

Car and motorcycle rallying for sport is not permitted 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.

The second is conflict with other groups. Many recreational activities require peace and solitude in natural environments and are not compatible with intensive vehicular use of the same areas due to noise, windscreen glare and, in some instances, wheel tracks on beaches.

Visitor safety is also important.

Regional Strategies

In addition to implementing Departmental policies and guidelines the Department should:

- (i) identify areas of land managed by CALM currently being used for motorised recreation and examine impacts on the environment and on other users;
- (ii) direct motorised recreation to the most appropriate areas and prescribe conditions of use which will minimize environmental and social impacts;
- (iii) subject to area management plans develop potentially suitable sites in the region to which displaced activities can be relocated;
- (iv) provide information on motorised recreation opportunities.

BICYCLE RIDING

Occasionally bicycles are used by visitors to departmental lands as an alternative form of transport to motor cars. Recently, some interest has arisen in the recreational use of "mountain bikes" on reserves vested in other agencies, particularly near to Albany and Esperance towns. Outside the region, and overseas, mountain bikes have been used on bushwalking paths away from roads. Such use has obvious ramifications for the comfort and safety of walkers, potential to spread dieback disease on infected soil, and footpath "scuffing" leading to erosion.

Regional strategies

In addition to implementing Departmental policies and guidelines the Department should:

- (i) consider the designation of some paths or tracks for use by bicycles;
- (ii) otherwise restrict the use of bicycles, including mountain bikes, to those roads and tracks which are open to other types of public vehicles.

HORSE RIDING

Horses are generally not permitted on nature reserves, national parks and conservation parks except in specially designated areas. In some areas unauthorised use of management tracks such as firebreaks has resulted in extensive erosion which has made the tracks inaccessible to vehicles transporting water for fire fighting purposes.

Horses can create other problems. They may spread weeds (through their droppings), trample native vegetation or erode trails and, depending on conditions, may also spread dieback. Any impacts are likely to be greater in small reserves.

Conflicts between horse riders and other visitors can occur.

Regional Strategies

In addition to implementing Departmental policies and guidelines the Department should:

- (i) consider the designation of some areas for horse riding in the context of preparing area management plans;
- (ii) otherwise restrict use of horses to those roads and tracks which are open to public vehicles;
- (iii) monitor horse riding in any approved areas;
- (iv) develop ways of minimising the environmental impacts of horse riding;
- (v) liaise with equestrian groups to seek use of alternative areas.

PETS

Many visitors take their pets with them when they travel. The most common pets are dogs.

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 allowed on land which is managed by CALM for multiple use, but are not permitted on nature reserves. Dogs may be allowed in some sections of national parks and conservation parks. Seeing-eye dogs accompanying blind persons are allowed in national parks. Tracker dogs are allowed for search operations on all of the lands managed by CALM.

Regional Strategies

In addition to implementing departmental policies and guidelines the department should:

- (i) explain the departmental policy to the public to enforce it as necessary;
- (ii) minimise social and environmental impacts of pets in those areas where they are permitted.

SWIMMING, BOATING AND FISHING

Swimming, boating, and fishing are the major water based activities which occur in the region.

Further background information on water based recreation activities is available from several sources, including:

A review of water-based activities on the South Coast (Watson 1982)

Reports on visitor surveys at Jerramungup (Van Steveninck, 1984) and Esperance (Craig and Oma, 1984).

Fisheries Department "Recreational Fishing, A Guide to the Rules" (1988)

Department of Marine and 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 the Department should:

- (i) list sites at which water-based recreation may occur;
- (ii) determine which activities are appropriate for each site;
- (iii) develop plans to separate potentially conflicting uses at a single site;
- (iv) publicise alternative sites for users whose traditional recreation is considered to be inappropriate at a particular location;
- (v) monitor the effects of water-based recreation on the environment in and around water bodies and modify plans as necessary.

ADVENTURE ACTIVITIES

Due to the variety of terrain including the main mountain peaks within easy reach of the State's South West, the CALM South Coast Region is popular with the participants of several adventure activities including bushwalking, rock climbing, hang gliding, cave exploration and cave diving.

Furthermore there appears to be growing interest shown by tour operators and other concessionaires to offer adventure activities within lands managed by CALM. This is covered in detail later this chapter under the heading "Tourist operations and other concessions".

Bushwalking

Bushwalking is particularly popular in the coastal parks and reserves around Albany, in the Porongurup and Stirling Ranges, in the Fitzgerald River National Park, and at Cape Le Grand National Park. The more rugged terrain is mostly located within the Stirling Range and Fitzgerald River National Parks and walks in both areas have been included in bushwalking journals and books (Pawley, 1982; Meney and Brown, 1985). In both areas there is also a high concentration of rare flora and fauna species and, in the Stirling Range a widespread problem with dieback disease. Bushwalking clubs occur in Perth and Albany. There is no statewide or national organisation co-ordinating bushwalking.

Rock Climbing

Major rock climbing areas are located at West Cape Howe, Torndirrup, Porongurup, Stirling Range and Peak Charles National Parks. The climbing at West Cape Howe and the Stirling Range is renowned at the national level. Although Peak Charles has high climbing potential its remoteness tends to keep visitation very low. The State's main climbing club is located in Perth but a loose knit group of climbers operates from the Albany/Porongurup area. Rock climbing is not co-ordinated at a national level.

Hang Gliding

One of the premier sites for hang gliding in Western Australia is located near Shelly Beach in West Cape Howe National Park. Torndirrup National Park is also popular. Sporadic use is made of other areas within the region. The Hang Gliders Association of WA has a registration and accreditation system which forms the basis for existing access agreements to designated hang gliding zones within the CALM South Coast Region.

Cave Exploration

The caves of the Nullarbor Plain are visited regularly by speleologists and scientists from throughout Australia. Many of the more significant caves occur on lands which are managed by the department or proposed for future management. Several caves are considered to be of international significance. Caving standards and speleological study in Australia are co-ordinated through the Australian Speleological Federation (ASF) which in turn is affiliated with the International Union of Speleology. Two speleological societies in Western Australia are affiliated with the ASF. The ASF has established a number of "commissions" on various aspects such as conservation, safety, tourism, etc. Over the past 20 or 30 years the ASF has been the major driving force on promulgating cave conservation and world trends in cave management throughout Australia, with numerous instances of direct advice to government through voluntary submission and formal consultancies (see for example Davey, 1978).

Cave Diving

Diving within submerged caves systems is a relatively new phenomenon on the Nullarbor. The activity has previously been largely restricted to areas within South East Australia, such as the Piccaninie Ponds near Mount Gambier. The Cave Diving Association of Australia (CDAA) was formed largely as a result of a multiple fatality in 'the Shaft' at Piccaninie. The CDAA has a formal registration and accreditation system which forms the basis for access agreements to cave diving areas in public lands managed by government agencies (and others) within other states.

Regional Strategies

In addition to implementing departmental policies and guidelines the Department should:

- (i) Recognise adventure activities to be legitimate forms of public recreation on lands and waters within areas managed by CALM subject to recognition of conservation values, safety and the enjoyment of people;
- (ii) establish and maintain liaison with the existing and any future representative bodies of adventure activities to encourage "feed back" and advice on management and controls and to share knowledge of safety and rescue procedures;

- (iii) encourage "low impact" bushwalking and camping;
- (iv) designate some areas within land managed by CALM to provide for a range of bushwalking opportunities suitable for different users;
- (v) consider the special requirements of wilderness users (for example, scenic quality, feeling of remoteness, need for self-reliance) in the preparation of area management plans;
- (vi) retain existing approved hang gliding zones and only approve new sites after liaison with the Hang Gliding Association of WA;
- (vii) adopt the ASF code of ethics for entry to caves by all persons, including CALM personnel;
- (viii) adopt strict permit entry control to areas of interest to cave divers in parallel with the South Australian National Parks and Wildlife Service;
- (ix) prepare a plan for the management of adventure activities within the CALM South Coast Region.

VISITOR SAFETY

Lands managed by CALM within the South Coast Region have a very high level of visitation. The region has rugged terrain including mountains, gorges, forests, cave systems and the coastline. The area is popular for a variety of specialised adventure activities.

The Department encourages safe use of areas under its control. In addition the Department recognises that it has skills and resources which may be required from time to time by the Police for dealing with emergencies outside areas managed by CALM.

Serious accidents or deaths have occurred in national parks throughout the region with the most regular accident record at Torndirrup National Park. This is due to the very high public visitation at Torndirrup (possibly the highest in the state outside the metropolitan area) and the potentially hazardous coastline. A special effort has therefore been made at this area to warn visitors of the potential hazards and an emergency response plan has been prepared in liaison with the Albany Police.

To date there have been no fatalities directly associated with adventure activities. This probably reflects the relatively small number of participants in comparison with general visitation, the self regulation and accreditation systems used in some activities, and the high level of safety awareness of participants of these "high risk" activities. There have, however, been several accidents and major searches. In one recent incident over 150 people were involved in the search for a missing bushwalker.

The co-ordination of search and rescue operations is a Police responsibility. However, when incidents occur on land managed by CALM it is very often CALM staff who have to organise the initial response. Sometimes the police will request that field control is continued by CALM staff.

In 1984 the CALM South Coast Regional Manager visited North America under the auspices of a Churchill Fellowship to investigate the management of national parks and wilderness areas with special reference to visitor safety. The report on this study tour (Watson, 1988) makes a number of recommendations on improving visitor safety management and the rescue equipment available.

Regional Strategies

In addition to implementing departmental policies and guidelines the Department should:

- (i) encourage visitor safety and safe working practices for CALM personnel within the region;
- (ii) in liaison with the Police Department prepare plans for dealing with accidents and search and rescue operations;
- (iii) provide information for visitors which highlights potentially hazardous areas and activities;
- (iv) regularly inspect roads and recreation sites to ensure that potential hazards are identified and either removed or avoided by relocation of the facility;
- (v) provide basic rescue equipment and staff training so as to be able to assist the Police in emergency situations;
- (vi) ensure that permits (where used) are strictly adhered to, otherwise encourage voluntary registration before participants embark upon adventure activities in areas away from roads or other facilities.

PUBLIC PARTICIPATION AND LIAISON

There is high public interest and concern for the management of public lands and ecosystems in the State. CALM encourages this through community education, interpretation, public participation and advisory services.

COMMUNITY EDUCATION AND INTERPRETATION

Most national parks and some nature reserves of the South Coast Region have a high public profile either being actively promoted for tourism or by virtue of their visibility from surrounding areas (eg mountain peaks and inshore islands). Further, the region contains a high proportion of the State's rare flora and fauna. Many visitors to the State enter via the Eyre Highway at Eucla

and a large proportion of these continue west via the coastal route through Esperance, Ravensthorpe and Albany. Also, local residents throughout the region use the reserves for recreational pursuits. As a result there is excellent opportunity to promote an awareness of conservation, land management and natural systems and processes within both the local community and visitors.

All CALM personnel in the region have some involvement with community education and interpretation work, mainly through provision of information to visitors, informal contact and talks to community and school groups.

More recently, a Heritage Trails Research Officer was appointed for fifteen months to research the historical development of CALM estate within the region and to establish a network of trails throughout the region. This project has involved the establishment of interpretive trails at key sites across the region plus the publication of a regional guide to the heritage network (Sandiford, 1988).

A range of other publications on recreation facilities and activities and technical information is available at departmental offices and ranger outstations throughout the region.

Regional Strategies

In addition to implementing departmental policies and guidelines the Department should:

- (i) prepare an interpretative and community education plan for the South Coast Region;
- (ii) seek to establish a full time Interpretation Officer in the region;
- (iii) seek to improve existing interpretive facilities in the region;
- (iv) develop improved interpretive material, especially at high use areas such as all major national parks, Helms Arboretum (Esperance) and at Two People Bay Nature Reserve;
- (v) develop basic Regional and District libraries to cover information and advisory needs;
- (vi) prepare and distribute information on conservation and land management through various media;
- (vii) liaise closely with other agencies, organisations and individuals who have similar interests in the interpretation of land managed by CALM, such as, tourism agencies, schools and museums.

COMMUNITY INVOLVEMENT

The CALM Act (Sections 14, 57-59) makes statutory provision for public participation in the preparation of management plans. A range of less formal public involvement in other departmental planning matters is also desirable. The department wishes to co-operate with local communities and establish projects of mutual interest where appropriate.

Examples of community involvement include:

- staff involvement on local tourist committees and with agricultural shows;
- advice about landscaping and tree planting and assistance to "Greening Australia";
- co-operating with schools, e.g., work experience and Arbor Day;
- various advisory committees, "Friends of the Park", and volunteer groups;
- involvement with soil conservation committees;
- liaison with bushfire brigades.

Public participation programmes require considerable staff resources to plan, implement, review and follow-up. Volunteer programmes such as the South Coast Volunteer Conservation Programme require staff time for supervision and materials for the implementation of works programmes.

A National Park Advisory Committee existed in Esperance from 1978-1984. The role of the committee was to advise on the preparation of draft management plans for national parks of the Esperance District. It was comprised of representatives from local government, government departments other local interests and community groups. In 1987 a similar group, the Fitzgerald River National Park Advisory Committee was established to assist with the preparation of a management plan for the Fitzgerald River National Park.

Regional Strategies

In addition to implementing departmental policies and guidelines the Department should:

- (i) continue existing involvement with local committees and other groups with an interest in conservation, and land management;
- (ii) re-establish the South Coast Volunteer Conservation Programme;
- (iii) in conjunction with the preparation of management plans foster the establishment of advisory committees in Esperance and in the Albany area;
- (iv) subject to the recommendations of the Fitzgerald River National Park Management Plan establish a new Advisory Committee to provide ongoing local advice on the Fitzgerald River National Park and other land managed by CALM in the surrounding areas;

- (v) seek regular "feed back" from the public on departmental policies and management practices through both informal and formal contacts.

INFORMATION AND ADVISORY SERVICES

The public, other government departments, local authorities, farmers and business people are provided with a wide range of information and advice from the department on matters of conservation, wildlife, land management and tree establishment.

Information and advice is provided at local, district, regional or departmental level. Enquiries are referred to other departments and authorities when appropriate.

Regional Strategies

In addition to implementing Departmental policies and guidelines the Department should:

- (i) continue to provide information on conservation, tree planting, wildlife management and land management matters on request;
- (ii) when appropriate continue to participate in workshops, seminars and displays.

PRODUCTION AND OTHER COMMERCIAL USE

Numerous activities associated with the production or use of natural resources occur on lands managed by CALM. For example: forest produce (timber, wildflowers, seed and honey), gravel extraction, water, shore based commercial fishing, commercial tourist operations, and military exercises.

WATER

Catchments are managed to optimise both the quantity and quality of water produced. In some instances land on gazetted water catchments and water reserves is jointly administered by CALM and the W.A. Water Authority.

The quantity of water collected varies according to seasonal rainfall, soil storage and natural use of forests and agricultural crops.

Water quality is assessed by colour, turbidity, salinity, chemical pollutants, bacteria and viruses. Increased salinity is regarded as a serious threat.

Surface water supplies are localised within the region. Significant underground water supplies also exist, notably on the coastal fringe and these have been developed using borefields at Albany and Esperance.

Currently there is concern over the quality of water within the Frankland, Kent, Hay, King and Kalgan catchments with

particular reference to salinity and possible eutrophication of inlets such as Wilson Inlet and Oyster Harbour.

There is much interest in various tree planting programmes on cleared land within these catchments in an attempt to help the reverse process.

Regional Strategies

In addition to implementing Departmental policies and guidelines the Department should, in conjunction with the Water Authority:

- (i) evaluate the impact of any water supply proposals on lands managed by CALM;
- (ii) manage lands to minimise impacts on water quality and quantity;
- (iii) apply management strategies required to achieve Water Authority standards;
- (iv) continue close liaison between regional and district officers of CALM and the Water Authority of W.A.;
- (v) as required, develop management plans jointly with the Water Authority of W.A. where lands managed by CALM lie within important water catchment areas.

HARDWOOD TIMBER

The timber industry is a significant contributor to the State's economy, 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 in the Albany area began from the earliest days of European settlement when forested areas were cleared for settlement and agriculture. The industry grew rapidly in the 1890's as export markets were developed for karri and jarrah timber. The period of heavy exploitation earned the state valuable export income. It also led to township development in the region and provided the roads and basic infrastructures that assisted the development of other industries. An industry based on sandalwood also flourished early this century, using Albany as a port for export. Cutting for mining timber occurred in the Ravensthorpe and Norseman areas.

Today the hardwood industry in the Albany area is of only minor importance. There are 6 small sawmills operating on private property and collectively cutting only a few thousand cubic meters of sawlogs per annum. There is one larger sawmill based in Albany but this is supplied from Crown land in the CALM Southern Forest Region.

Recently, however, a hardwood sharefarming scheme based on bluegum (E. globulus) plantations for pulpwood, has been launched. In the Albany area, hardwood plantations are to

be established in conjunction with softwood plantations along similar lines.

There is a strong demand for minor forest produce such as firewood, fence posts and craftwood which is serviced from Crown Land and vacant Crown land in or adjacent to the region.

Regional Strategies

In addition to implementing Departmental policies and guidelines the Department should:

- (i) implement the strategies described in "Timber Production in Western Australia" CALM (1987b);
- (ii) provide minor forest produce (including firewood) for public use and commercial sale based on resource plans to be developed through the life of this plan and ensure that the availability of Crown Land for this purpose;
- (iii) manage production forest for sustainable yield;
- (iv) seek to obtain the necessary land and funds to plant the target area of hardwood forest each year;
- (v) review the planting rate, establishment, tending and other silvicultural techniques annually and implement appropriate changes.

SOFTWOOD TIMBER

Pine planting in the region commenced in 1987 through an expansion of the Softwood Sharefarming Scheme to the Albany area. The target is to establish 15 000 hectares at the rate of 1 000 hectares per year within 100 km of Albany (this covers part of the Southern Forest Region). The aim is to establish a softwood industry in the Albany area.

As at 1 February 1989, the area of Sharefarming properties established within 100 km of Albany is 1380 hectares. This is all P.radiata.

Regional Strategies

In addition to implementing Departmental policies and guidelines the Department should:

- (i) seek to obtain the necessary land and funds to plant the target area of pine forest each year;
- (ii) review the planting rate, establishment, tending and other silvicultural techniques annually and implement appropriate changes;
- (iii) undertake research and trials to determine suitable sites and appropriate treatments;

- (iv) undertake public education programmes on sharefarming and pine planting by holding information tours, developing demonstration trials and regular contact with the media.

MINING

Mining (including exploration) is regulated by the Mining Act. It is through this Act that the Minister for Conservation and Land Management may consent to mining activity, subject to conditions.

The largest current mining activity in the region is around Ravensthorpe and Norseman. Some mining for gypsum occurs north of Esperance. No mining is located in national parks or nature reserves, however, nearby nature reserves have been subject to exploration activity as has Brockway Timber Reserve near Norseman. Further, mining exploration activity and leases occur over many of the areas recommended in the Environmental Protection Authority systems reports for addition to the Fitzgerald River National Park or for establishment as nature reserves in the Ravensthorpe Range (EPA, 1976).

In the past few years there has been interest in a high grade magnetite deposit near Wellstead between Albany and Bremer Bay, Although not located on lands managed by CALM, development of the deposit may have an impact on nearby reserves due to infrastructure utilities and greater public use.

Exploration activity on Crown Land is subject to environmental protection conditions including dieback hygiene prescriptions. All mining on national parks and nature reserves is subject to Government policy (Government of W.A., 1988).

Regional Strategies

In addition to implementing Government policies and Departmental guidelines the Department should:

- (i) where exploration or mining is proposed on lands managed by CALM, prepare (in conjunction with the Mines Department and companies) a "Notice of Intent" for planning, clearing, mining, rehabilitation, monitoring, maintenance and fire protection.

GRAVEL, SAND AND STONE

Natural lands within the region offer a range of materials for land management and community use, including gravel, quartzite, sand and limestone. These materials are also defined as minerals under the Mining Act.

The major demand is for gravel for road construction and maintenance.

Such materials may be required by CALM itself to maintain roads on lands managed by CALM, or by other agencies.

Leases for these materials may be provided from land managed by CALM to other Government departments and local authorities if alternative supplies do not exist on other Crown land or private property, providing that there are no conflicts with the land use priority and providing the roads being constructed or maintained service lands managed by CALM.

Regional Strategies

In addition to implementing Departmental policies and guidelines the Department should;

- (i) develop working arrangements with agencies extracting gravel, sand and stone from lands managed by CALM;
- (ii) ensure that correct rehabilitation procedures are undertaken at any extraction sites.

WILDFLOWERS

Wildflower production is an important industry in this State and was valued at over \$2 million in 1980/81. It is not possible to obtain a more up to date figure. However there is little doubt that the picking industry has escalated in the South Coast Region.

All flora is protected and a licence is required before any wildflowers can be picked on private property or Crown Lands.

Commercial picking of wildflowers is not permitted on national parks or nature reserves within the South Coast Region except for bona fide research programmes and for departmental nurseries.

Under the Wildlife Conservation Act the Department administers control of the taking of flora on other public lands.

Three forms of licence are issued by CALM;

- commercial purposes licences, which allow the taking of protected flora from 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 (for which a special Ministerial permit is required). No picking is allowed within 50m of public roads. Commercial picking is allowed on State forest, but not on nature reserve, national park or conservation park.

Commercial collection of flora is not restricted to the flowering sprays, it also includes various parts of flora such as leaves, nuts, fruits and seed which are used for a variety of uses both in the floral trade, hobbyist fields and for propagation.

Commonly collected species in the South Coast Region are;

Flowering stems:

<u>Adenanthos</u>	<u>cuneatus</u>	native temp
<u>Adenanthos</u>	<u>obovatus</u>	basket flower
<u>Agonis</u>	<u>parviceps</u>	tea tree
<u>Agonis</u>	<u>juniperina</u>	
<u>Anigozanthos</u>	<u>rufus</u>	
<u>Banksia</u>	<u>baxteri</u>	
<u>Banksia</u>	<u>coccinea</u>	
<u>Beaufortia</u>	<u>sparsa</u>	
<u>Dryandra</u>	<u>formosa</u>	
<u>Evandra</u>	<u>aristata</u>	kangaroo grass
<u>Johnsonia</u>	<u>lupulina</u>	hooded lily
<u>Juncus</u>	<u>holoschoenus</u>	fern rush
<u>Leptocarpus</u>	<u>scariosus</u>	seeded rush
<u>Stirlingia</u>	<u>latifolia</u>	

Nuts and Leaves:

<u>Banksia</u>	<u>grandis</u>
<u>Banksia</u>	<u>occidentalis</u>
<u>Banksia</u>	<u>gardneri</u>
<u>Daviesia</u>	<u>cordata</u>
<u>Eucalyptus</u>	<u>calophylla</u>
<u>Eucalyptus</u>	<u>tetragona</u>
<u>Eucalyptus</u>	<u>tetraptera</u>
<u>Eucalyptus</u>	<u>marginata</u>
<u>Eucalyptus</u>	<u>macrocarpa</u>

There are currently six commercial cut flower merchants and one wildflower seed merchant operating in the South Coast Region. There are up to 30 regular flower pickers in the region plus a large number of itinerant pickers. The main picking period is through Winter and Spring. There are only a minimal quantities of brown boronia available on private land and licence endorsements to pick this species are generally only applicable to the Walpole District of the Southern Forest Region. An unknown quantity of the produce picked in the South Coast Region is sold to dealers in other areas.

Regional Strategies

In addition to implementing Departmental policies and guidelines the Department should:

- (i) protect lands managed by CALM through liaison with other departments and the public;
- (ii) develop liaison with local merchants and pickers to identify areas of harvest and levels;

- (iii) Monitor areas identified as harvest areas and recommend to authorities on management according to impact on conservation values and potential for spread of dieback disease;
- (iv) develop and recommend implementation of management controls to prevent adverse effects;
- (v) monitor costs of administration and supervision of industry.

NURSERIES AND ARBORETA

There are no nurseries run by CALM within the region. However, both the Albany and Esperance offices act as receipt posts for plants and seedlings ordered from departmental nurseries at Narrogin and Manjimup.

Helms Arboretum was established within the Esperance Timber Reserve in 1965. Currently there are demonstration plots of approximately 150 species of trees and shrubs many of which have potential for windbreaks and amenity planting in the Esperance District.

Staff have also assisted with the design and development of arboreta on non-CALM managed land at Ravensthorpe and at Grass Patch north of Esperance.

Regional Strategies

In addition to implementing Departmental policies and guidelines the Department should:

- (i) maintain Helms Arboretum near Esperance;
- (ii) provide advice on the establishment and management of arboreta located on non-CALM managed lands.

APICULTURE

In 1985/86 annual production from apiary sites in the State was of the order of 2 600 t of honey and 47.3 t of beeswax with a gross value of over \$2.4 million. Much of this production was from apiary sites on lands managed in CALM. The Department acts as the central registration authority for apiary sites on all Crown lands.

Currently apiarists hold over 160 registered sites within this region, some of which are on land managed by CALM. The number of sites available is limited. There are numerous sites on private property with the bees using adjoining land managed by CALM. Feral bees are present throughout the region (Moore et al. 1983). Their environmental effects are the subject of current research.

Regional Strategies

In addition to implementing Departmental policies and guidelines the Department should:

- (i) continue liaison with beekeepers to ensure most efficient use of sites and minimal impact upon land managed by CALM and on other land users;
- (ii) continue research into environmental effects;
- (iii) relocate sites to more appropriate areas where necessary.

FISHING

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

Commercial fishing is not permitted in waters currently managed by CALM in this region. However, fishermen do require access through land managed by CALM to marine waters for parking or transporting their vehicles, boats, fishing gear or produce. Several fishermen camp on land managed by CALM on occasions. The fishermen involved include abalone divers, rock lobster fishermen, estuarine fishermen operating mainly at Stokes Inlet, and various in-shore fishermen in search of shark, mulies (pilchards), salmon and other commercial species.

The establishment of areas as Marine National Parks does allow for multiple use such as conservation, recreation and production.

Wherever possible the Department has assisted fishermen by the provision of special campsites. However, there continues to be conflict between fishermen and other park visitors, with the result that some special arrangements have been established including;

- no special provision for camping by commercial fishermen at Lucky Bay in Cape Le Grand National Park;
- a half yearly closed season at Stokes Inlet (November - April), introduced by the Fisheries Department in 1982, which helps to protect fish stocks but also minimises use of the area by commercial fishermen during the main tourist season;
- guidelines regarding fishing operations at Two Peoples Bay Nature Reserve due to conflict with other reserve visitors and safety considerations at the very small launching area.

Details of the number and distribution of permits for commercial fishing from land managed by CALM during 1988 are provided in Table 7.

TABLE 7 PERMITS FOR COMMERCIAL FISHING
IN SOUTH COAST NATIONAL PARKS 1988 (CALENDAR YEAR)

	Abalone	Rock Lobster	Estuarine	Other (Salmon, herring, Shark etc)
Cape Arid	9	2	-	7
Cape Le Grand	8	1	-	6
Stokes	9	-	11	3
West Cape Howe	4	-	-	2
William Bay	2	-	-	5
Two People Bay N.R.	1	-	-	16

Note: The total number of permits issued was 26.
In most cases the same permit covered 2 or
more parks, hence the higher absolute totals
in the above table.

Amateur fishing is permitted on land managed by CALM except nature reserves, under conditions established under 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, 1988).

Access for fishing (and other recreational activities) in all national parks and reserves of the South Coast Region will need to be addressed in area management plans. Currently draft area management plans for the Fitzgerald River National Park and for Two People Bay Nature Reserve are nearing completion.

Regional Strategies

In addition to implementing Departmental policies and guidelines the Department should:

- (i) identify and encourage access routes to fishing spots which cause least impact on the environment;
- (ii) identify areas where vehicle access for fishing is not permitted;
- (iii) bring together known data on amateur and professional fishing on lands and waters in the region managed by CALM (e.g., spots fished, target species, fishing effort), with a view to minimising impacts and maintaining populations;

- (iv) involve fishing clubs and interested community groups in helping to plan fishing access routes;
- (v) develop working arrangements with the Fisheries Department and the fishing industry.

TOURIST OPERATIONS AND OTHER CONCESSIONS

Three main types of tour operators and concessionaries operate within the region:

- tourist coach operators, frequently promoted as either general sightseeing tours or as wildflower tours;
- 4WD "safari" type operators who seek out areas which are inaccessible to conventional vehicles and generally involve their clients in "bush" camping;
- adventure activity operators who lead people in activities such as bushwalking, rock climbing and cave exploration, usually but not always, in a "safari" type excursion.

It is recognised that tourist operators do have a potentially significant contribution to make in terms of bringing more people in to appreciate the values of lands managed by CALM.

However all three broad types of operation pose management challenges for CALM. For example, tourist coaches require the design of roads and carparks to accommodate the manoeuvring of large vehicles. Also, toilet facilities have to cater for large numbers of people.

Safari type 4WD excursions generally like to offer the excitement of large open campfires at night and of challenging access (often promoted in their publicity material by pictures of a bogged vehicle and the party pushing it). These activities are divergent from the department's wish to maintain dry "safe" access tracks to minimise dieback spread, and the concept of low impact camping preferably using bottled gas or solid fuel stoves for cooking. Adventure activities present difficulties with regard to the environmental impact of groups camping on sites which have limited capability to withstand heavy use, safety aspects and the competence of group leaders, and potential damage to sensitive areas such as caves on the Nullarbor Plain.

Regional Strategies

In addition to implementing departmental policies and guidelines the department should:

- (i) generally grant written approval for commercial tour operators and other concessionaries to operate on land managed by CALM;

- (ii) protect land managed by CALM from any undue environmental impact caused by concession activities and require operators to adopt safe procedures for the activities they provide;
- (iii) identify the sustainable level of tourist operator use of each area of national park and selected nature reserves where concessionaires wish to operate;
- (iv) establish and promote regular contact with tour operators so that they are kept abreast of regional and local management initiatives, developments and road conditions.

GROUP TRAINING EXERCISES

Several areas in the south coast region have a history of use for training purposes by various organisations including, for example, some sections of the armed forces. The natural areas of the region make it a sought after location for group training.

CALM recognises the potential of natural areas for these purposes, but also has to take into account important contemporary factors, such as the rapid spread of dieback disease in many of the natural areas, and the increasing use of areas for recreational purposes.

Regional Strategies

In addition to implementing Departmental policies and guidelines, the Department will:

- (i) Direct group training towards areas designated for multiple use, such as State forest;
- (ii) ensure that activities do not impose long term environmental threats, e.g. dieback spread, to the region;
- (iii) allow group training to occur in national parks and other conservation areas of the region, only in special circumstances, where there is no other acceptable alternative for these specific activities, and where impact on other visitors and the environment is minimal;
- (iv) continue to approve specialist rock climbing and rescue training activities subject to:
 - a) selection of areas where any environmental impacts and impacts on other park visitors are at acceptable levels;
 - b) sharing of knowledge with regard to rescue techniques with Departmental staff;
 - c) full acceptance of risk by the visiting organisation.

PUBLIC UTILITIES, SUB DIVISIONS AND ENCLAVE RESERVES

Lands managed by CALM are subject to impact by various public utilities, radio communication sites adjacent subdivisions, and by developments on enclave areas.

PUBLIC UTILITIES

The main public utility organisations with responsibilities affecting land managed by CALM are:

- W.A. Water Authority;
- State Energy Commission;
- Local Government Authorities;
- Westrail;
- Telecom;
- Main Roads Department;
- Department of Land Administration.

Public utilities provide essential community needs but can have serious visual effects and cause permanent loss of natural resources.

Existing public utilities will be maintained and new developments will be proposed during the period of this plan.

Regional Strategies

In addition to implementing departmental policies and guidelines the Department should:

- (i) require officers in charge of key public utilities to provide information to CALM on any proposals likely to affect land managed by CALM;
- (ii) negotiate to obtain relocation or rescheduling of operations where this is necessary to minimise impact on land managed by CALM.

RADIO COMMUNICATIONS FACILITIES

Many agencies including CALM, other Government Departments, Local Authorities, emergency organisations (eg bushfire brigades, search and rescue units, ambulance groups), and some private organisations, use two way radio communications within sections of the South Coast Region. In the case of the VHF frequencies, which are commonly used the area of radio communication coverage is generally improved if the transmission point (ie radio mast) can be raised as high as possible. As a result radio masts tend to be erected on high points within the landscape, many of which occur within lands managed by the department.

The presence of radio masts within lands managed by CALM does raise several issues including:

- landscape impact as the masts are generally visible from a large area of the surrounding countryside;
- access requirements for construction and subsequent maintenance;
- direct impact (e.g., rock drilling, vegetation removal), at the transmitter site;
- safety of visitors and potential vandalism;
- potential for radio interference caused by multiple use of the same radio mast by different organisations;
- potential for dieback disease to be introduced to high points in the landscape during initial construction or maintenance operations.

Although future developments in radio communication technology may result in greater use of satellite communications during the period of this regional plan the requirements for land based radio communications are not expected to ease.

Regional Strategies

In addition to implementing Departmental policies and guidelines the Department should:

- (i) review existing facilities on land managed by CALM and where no serious environmental problems occur allow them to remain;
- (ii) where possible encourage the establishment of radio facilities at alternative sites which are not located on land managed by CALM;
- (iii) only allow sharing of CALM facilities where the reliability and effectiveness of CALM communications will not be impeded;
- (iv) restrict the sharing of sites on land managed by CALM to approved Government agencies, local government and essential emergency services;
- (v) ensure that the costs of joint facilities are shared on an equitable basis by all users;
- (vi) introduce formal leasing arrangements.

SUBDIVISIONS

From time to time proposals are made for the subdivision of private land which lies adjacent to national parks or nature reserves. In many cases subdivision is likely to create increased impact upon the land managed by CALM due to a higher risk of fires occurring, greater public use by neighbours, roaming of pets and domestic stock.

In some instances there may be effects upon important natural features such as wetlands, for example pollution or changes in water level, and there may be undesirable impacts upon wildlife or special habitat.

Regional Strategies

In addition to implementing departmental policies and guidelines the Department should:

- (i) assess all subdivision proposals adjacent to land managed by CALM and advise the State Planning Commission if desirable or undesirable effects are likely;
- (ii) seek to have subdivisions "self sufficient" with regard to fire protection by requiring that adequate fire control buffers be located within the subdivision and not on adjacent land managed by CALM;
- (iii) if subdivision is approved, establish contact and maintain liaison with all landowners to ensure that CALM policies and management practices are understood and respected.

ENCLAVE RESERVES

Throughout the region there are several enclave reserves which are effectively surrounded by land managed by CALM. These enclaves usually have a different gazetted purpose from that of the land managed by CALM. Sometimes they are unvested but usually they are vested in another government department or in a local authority.

Enclave reserves can present problems particularly in national parks because of the differing purposes and regulations or bylaws applying.

However to the visiting public the enclaves are usually perceived to be part of the surrounding land managed by CALM and this leads to an expectation of similar standards of management.

Where enclave reserves occur there are several options for future management. Assuming that the enclave is desirable, ie not degraded, in order of decreasing compatibility with CALM interest these options are:

- (a) amalgamation of the enclave with the surrounding land managed by CALM and vesting in the NPNCA or the LFC;
- (b) joint vesting of the enclave with the Executive Director of CALM and the other authority or department, generally with a change of purpose of the reserve to reflect the interests of both parties;
- (c) alter the purpose of the enclave reserve to reflect CALM's interest but without formal vesting in the NPNCA, the LFC, or the Executive Director;

- (d) status quo but with CALM's interests properly addressed in a management plan for the enclave reserve or by formal agreement or liaison with the controlling department or authority.

Regional Strategies

In addition to implementing department policies and guidelines the Department should:

- (i) seek to obtain necessary compatability between enclave reserves and surrounding lands managed by CALM, in the case of national parks by negotiating changes in purpose and vesting;
- (ii) seek to maintain good liaison with the agencies controlling enclave reserves;
- (iii) regularly review the management implications caused by enclave reserves.

ROAD RESERVES

The control of most roads and tracks within lands managed by CALM rests with CALM, however some roads fall within (or approximate) surveyed road reserves and are controlled by either the local authority or the Main Roads Department. Such roads reserves are effectively linear enclave reserves.

Where such roads reserves exist they are of varying widths and the arrangements between CALM and the responsible authority with regard to construction work, maintenance and road verge management vary.

It is in CALM's interests to encourage the management of enclave road reserves so as to have consistency of road design, construction and management standards (maintenance, dieback hygiene, signposting, etc) between roads on enclave reserves and roads wholly within land managed by CALM.

Regional Strategies

In addition to implementing departmental policies and guidelines the Department should:

- (i) oppose the creation of new road reserves within land managed by CALM except where these are preferable to existing road reserve alignments;
- (ii) address the tenure and management of enclave road reserves on land managed by CALM through direct negotiation with the controlling authority and through the medium of area management plans;
- (iii) liaise with authorities in whom enclave roads are vested so as to maximise protection and management of road verges as if they were part of the adjacent land managed by CALM.

Research activities within the South Coast Region are undertaken by CALM staff, by volunteers working with CALM and by members of academic and research institutions and other departments. Current efforts are directed towards social research (including historical and archaeological research), ecosystem studies (including research into specific species or groups of species), silviculture (tree growing) research and fire research.

SOCIAL RESEARCH

Archaeological

The department does not undertake any archaeological research within the South Coast Region. However research on aboriginal occupation has been undertaken by others at Fitzgerald River National Park and at Cape Le Grand National Park and Cape Arid National Park (Smith, 1982). Linguistic research of relevance to the region has been undertaken by von Brandenstein (1988) from oral sources mainly in the Esperance and Norseman areas.

Historical

Historical, ie European, research is widespread through a network of amateur historians and local historical societies. Recently a comprehensive review of past events affecting lands managed in CALM of the region was undertaken as background research for the CALM South Coast Heritage Trails Network (Sandiford, 1988).

Visitor Surveys

Currently the department is establishing a series of "benchmark" areas across the State in order to monitor public visitation to areas managed by CALM and also to detect changes in visitation patterns. Within the South Coast Region five areas have been nominated for inclusion in this CALM research programme:

- Torndirrup National Park;
- Two Peoples Bay Nature Reserve;
- Stirling Range National Park;
- Cape Le Grand National Park;
- Cape Arid National Park.

In addition, monitoring of selected sites within the region has occurred as follows:

- Ellens Peak log book: Stirling Range National Park, continuous from 1971.
- Bald Head log book: Torndirrup National Park, continuous from 1981.
- Coastal Trail log book: Cape Le Grand National Park, continuous from 1983.
- Mt Ragged log book: Cape Arid National Park, continuous from 1981.

Blowholes, Torndirrup National Park, annual since 1980.
Madfish Bay, William Bay National Park, intermittent from 1985.

Traffic counters have been used intermittently in several parks and reserves since 1981.

In 1987/88 extensive visitor surveys were undertaken by CALM in the Fitzgerald River National Park to provide background information for use in preparation of a management plan (Cavana and Moore, 1988).

ECOSYSTEM STUDIES

There are many recent and current ecosystem oriented research studies within the region.

Biogeography

Major departmental work has occurred recently in the Nullarbor area including the establishment of an ecological survey base, and the biogeography of Nullarbor flora. Similar work has begun in the Cape Arid area at the western margins of the Nullarbor. Some work is on-going within the Recherche Archipelago. A biological survey of Stokes National Park has also commenced. This is being undertaken privately but the survey design is such that the results will have valid input to the department's ecological data base. The same approach was used for a similar study of the Fitzgerald River National Park undertaken by consultants (K Newbey and A Chapman) to the Fitzgerald River National Park Association.

Other more specific departmental programmes include flora studies of the Stirling Range and environs (G.Keighery) and of Middle Island in the Recherche Archipelago and Two Peoples Bay Nature Reserve (A.Hopkins). Private fauna oriented studies have been undertaken by A.Chapman in the Ravensthorpe Range and the Kybulup area (north-east of the Fitzgerald River National Park), and by V.Smith at Torndirrup National Park. The latter study has located a new population of the rare dibbler (Antechinus apicalis) with two animals reported to July, 1988.

The RAOU maintains the Eyre Bird Observatory located within Nuytsland Nature Reserve. The resident staff and visitors conduct on-going studies into birds and vegetation types. The Albany branch of the W.A.Wildflower Society is very active and has established a fully operational herbarium of approximately 5000 specimens which is accommodated within the Regional office. The society undertakes general recording and study of flora within the Albany District but also carries out special tasks from time to time on request from the Department.

All regional staff record whale sightings and each year the Wildlife Officer in Albany undertakes an aerial reconnaissance for whales along the southern and western coasts of the State in conjunction with the W.A. Museum and Australian National Parks and Wildlife Service. Speleologists have undertaken some cave research, generally of a sporadic nature but nevertheless, in most instances,

the only information recorded to date (see for example Dunkley and Wigley, Eds, 1978).

Entomology

The department has recently commenced a study on the lerp building insect, Cardiaspina brunnea.

This insect severely affects the health of flat-topped yate. Initial work will examine the biology, ecology and behaviour of this insect in relation to the ultimate aim of biological control. The study will be conducted in the Stirling Range and Fitzgerald River National Parks and will include sites of remnant flat-topped yate stands in the agricultural areas of Jerramungup and Tambellup.

Fauna Conservation

The Department has two major on-going specific fauna conservation studies specific to the region viz the Noisy Scrub Bird translocation project and studies of the Ground Parrot. Many of the biogeography programmes and other projects described in following sections involve the recording of fauna.

Flora Conservation

Orchid studies of the Stirling Range National Park, Fitzgerald River National Park and Cape Le Grand National Park are completed or in progress. There are several studies which are not specific to the region but which have involved a major effort there including preparation of the WA Banksia atlas, preparation of the WA rare eucalypts atlas and studies of the eucalypts of WA salt lakes.

Wetlands and Water birds

Departmental studies include studies of the state of the wetlands of the South West and studies of the fringing vegetation of wetlands. In addition the department co-ordinates the annual duck count on wetlands which is undertaken mainly by volunteers. Several CALM staff of the South Coast Region have contributed to the duck count in a voluntary capacity.

Dr E Hodgkin of the EPA is undertaking a series of descriptive studies of the inlets and estuaries of the South Coast (Hodgkin and Clark, 1987, 1988a, 1988b). Departmental staff are assisting in this work by collecting water samples and recording river flow and major events such as the natural breaking and forming of inlet sand bars.

Fire Research

Work is now being undertaken on the heathlands of the South Coast Region.

Fire research plots will be established in the Stirling Range National Park for the purpose of studying both fire behaviour and fire effects on plants and animals. Fire behaviour models will assist with planning for both wildfire control and in habitat management.

The fire ecology research will ensure the appropriate fire regimes are implemented for the conservation of park wildlife.

Specific departmental studies on the effects of fire include work by A.Hopkins at Two Peoples Bay and the Recherche Archipelago. A.Chapman and K.Newbey have undertaken monitoring work on fire effects in the core area of the Fitzgerald River National Park following a 1985 wildfire and, as consultants to the department, they undertook similar studies in the Marningerup Block of the Fitzgerald River National Park in 1985/86. The recolonisation of burnt heaths by insects was studied in 1985/86 at Torndirrup National Park (P.Dyer and J.Lyon).

Plant Diseases and Pests Programme

Since 1986 a major on-going effort has been made towards monitoring and attempting to understand more fully the distribution and control of Phytophthora cinnamomi in the national parks and nature reserve of the region. The effects of other plant pathogens is also under scrutiny.

A 12 month study on the impact of dieback on flora in the Stirling Range National Park was initiated in August 1988.

SILVICULTURE RESEARCH

Sharefarming plantings of Pinus radiata and Eucalyptus globulus have been made in the South Coast Region. Some research work has been carried out on the nutrient requirements of Pinus radiata at establishment. A range of herbicides are being evaluated to determine the most effective method of controlling competition from weeds during the initial phase of plantation establishment. Work will begin shortly on the determination of growth rates and growth patterns of Pinus radiata. The evaluation of site suitability for Pinus radiata also requires further examination to ensure that all sites planted to pine are capable of producing a crop.

Where rainfall is greater than 600 mm, tree crops have the potential to provide a viable new farmcrop and to generate secondary benefits such as treatment of salinity and eutrophication. With the assistance of two major commonwealth grants research is now underway to investigate the integration of tree crops into farming systems. The objective of this work is to create viable agricultural systems which maintain water and environmental quality. Large long term studies have commenced in the upper Denmark Catchment and on the King River and Kalgan River Catchments. The silvicultural development of short rotation eucalypts (especially E. globulus) has also been commenced and numerous plots will be established in the South Coast Region.

Agroforestry trials are being conducted at the Esperance Timber Reserve in conjunction with the Department of Agriculture.

Implementation of the regional plan involves subsequent planning in a programmed manner, research and monitoring work, personnel, legal responsibilities and on-going liaison. Each of these aspects is addressed in turn;

SUBSEQUENT PLANNING

This regional management plan will form the basis for six major types of more detailed plans:

- area management plans;
- interim guidelines for necessary operations;
- issue plans;
- wildlife management programmes;
- operational plans;
- input to planning by other agencies.

In the case of area management plans, it is possible to identify priorities as of 1989 and to prepare a 10 year programme with a target of having in place defined management intentions on all lands managed by CALM in the region by 1999. This programme will be discussed shortly.

In the case of the other five categories of planning it is more difficult to predict a future structured programme. Certainly some requirements for issue plans have been made earlier in this regional plan and these topics are addressed here but it is likely that many new issues and operational requirements will occur over the next ten years.

Area Management Plans

The CALM Act (Section 33) requires the Department to manage land covered by the Act in accordance with management plans covering a specific area or set of areas such as one or more national parks, nature reserves, State forests or other reserves. These are the most detailed management plans prepared by CALM and they address the management details specific to an area which cannot be adequately covered by a regional management plan.

Interim Guidelines for Necessary Operations

Section 33 of the CALM Act 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 and 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.

In the absence of area management plans staff of the South Coast Region have prepared, or are preparing interim guidelines for most national parks and some nature reserves as follows:

Cape Arid National Park	1988
Cape Le Grand National Park	1986
Stokes National Park	1988
Fitzgerald River National Park	1986
Stirling Range National Park	1987
Porongurup National Park	1987
Two Peoples Bay Nature Reserve	Proposed 1989
Torndirrup National Park	Proposed 1989
West Cape Howe National Park	Proposed 1989
William Bay National Park	Proposed 1989
Quarram Nature Reserve	Proposed 1989
Esperance Lakes Nature Reserves	Proposed 1989

Interim guidelines comprise a short section giving basic background information on the area and a series of objectives, goals and strategies for dealing with fire protection, environmental protection (dieback disease, pest and weed control, rehabilitation) and maintenance of recreational facilities including roads, footpaths and campsites etc.

Interim guidelines are conservative, especially with regard to recreational facilities, so as not to pre-empt options presented later in the gazetted management plan for an area.

Interim guidelines are prepared in consultation with all other relevant branches of the department and they are endorsed by the relevant policy director of the department. In addition they are reviewed annually. Liaison also occurs outside the department with regard to the sections on fire control. In some instances this section has been gazetted under Section 34 of the Bush Fires Act as a fire management plan meeting Bush Fires Board and local authority requirements.

Once an area management plan is prepared and gazetted the need for guidelines to necessary operations will, by definition, cease. However, the need will still remain in most cases for detailed operational prescriptions which are subject to regular (annual) review and these will be addressed through "operational plans" which are described below.

Ten year programme for the preparation of area management plans

A desirable ten year programme for preparation of area management plans is presented in Table 8. This programme represents the Region's view of planning priorities as at 1 February 1989 and is based on the following premises:

- all current and proposed national parks, conservation parks and marine national parks will require area management plans because they involve the interaction of conservation purposes and recreational use by people in an appropriate balance which must be clearly defined;
- many nature reserves and areas of State forest will not require a specific area management plan in the short term and can be adequately managed under the guidance of this regional plan, interim management

guidelines for necessary operations and general departmental policy for the time being;

- it will be acceptable to group together some nearby of similar reserves for the purposes of area management plans;
- for obvious reasons the programme is approximate only, especially after the first few years, and it will require regular review. Furthermore, the planning priorities of the department as a whole and the resources available for planning will have a major bearing on the ability to maintain the proposed schedule.

Despite the above constraints the programme provides a framework for structured planning of areas managed by CALM in the South Coast Region over the next 10 years. The programme does not include all further additions to areas currently managed by the Department. For example, as new areas become managed by the Department the priorities may need to be modified.

TABLE 8

APPROXIMATE TIMETABLE FOR PREPARATION OF
AREA MANAGEMENT PLANS

	Approximate Time	Comment
<u>ALBANY DISTRICT</u>		
Quarram N.R.	Desirable within 5yrs	
William Bay N.P.	Desirable within 3-4yrs	
West Cape Howe N.P.	to commence in 1989	High priority
Torndirrup N.P.	Desirable within 4-6yrs	
Waychinicup N.P.	Desirable within 3-4yrs	
Two People Bay N.R.	Draft plan to be available in 1989	Management Plan under preparation
(Proposed) Gull Rock N.P.	Desirable within 3-4yrs	
Porongurup N.P.	Desirable within 4-6yrs	
Stirling Range N.P.	Desirable within 2-3yrs	
Fitzgerald River	Draft plan to be available in 1989	Management plan under preparation
Other reserves managed by CALM in the Albany Dist.	Desirable within 5-9yrs	Under constant review for management plan

Islands of the Albany District Coastline	Desirable within 5-9yrs May be included in category listed above	Under constant review for each specific island e.g., Breaksea
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Esperance District

Peak Charles N.P.	Desirable within 3-5yrs	
Stokes N.P.	Desirable within 2-3yrs	
Helms Arboretum Esperance Forestry Reserve	Desirable within 4-6yrs	
Cape Le Grand N.P.	Desirable within 3-5yrs	
Cape Arid N.P.	Desirable within 2-3yrs	
Nuytsland N.P.	Desirable within 2-3yrs	Joint area management plan desirable
Eucla N.P.	Desirable within 5-7yrs	Subject to other reservation on WA and SA Nullarbor
Esperance Lakes N. Reserves	Desirable within 4-5yrs	Depends on RAMSAR Wetland Nomination
Other reserves managed by CALM in the Dundas Shire	Desirable within 5-9yrs	Under constant review for management plan
Coastal reserves managed by CALM in Esperance District (excluding specific areas listed elsewhere)	Desirable within 3-5 yrs	
Other reserves managed by CALM in the balance of the Esperance District	Desirable within 7-9yrs	Under constant review for management plan
Archipelago of the Recherche and Rocky Islets	Desirable within 7-9yrs May be included in category listed above	Under constant review for management plan

Regional classification of national parks

National parks provide the major interface between CALM and the community in the South Coast Region. Annual visitation is estimated to be in excess of 1 million persons, parks form major "attractions" as perceived by the tourist industry, and all but one of the departments ten outstations within the region are in national parks and manned by national park rangers.

National parks are relatively large areas of predominantly natural systems with a high scenic and conservation value but which are generally free from exploitation of natural resources within them and where visitors are allowed to enter for inspirational, educative, cultural and recreational purposes.

In its broadest sense, national park management is about simultaneously catering for the recreational requirements of the present generation whilst protecting the natural attributes of the area and leaving options open for future generations.

Furthermore, national parks show great diversity in the scenery, climate, vegetation, history of use *etc.* Hence some, such as Torndirrup National Park near Albany and Cape Le Grand National Park at Esperance are oriented towards high visitor use relative to their size. Others such as Cape Arid National Park, Fitzgerald River National Park, and Stirling Range National Park are more clearly oriented towards the "wilderness" end of the spectrum in which natural values are more likely to obtain.

The Recreational Opportunity Spectrum

The concept of a Recreational Opportunity Spectrum (ROS) involves a recognition that different people seek different forms and levels of recreation and that provision of a range of opportunities and types of recreation will ensure that most users are catered for. In the context of recreation in natural areas, in particular national parks, this may be simply interpreted as meaning that zoning should try to cater for different degrees of accessibility and development of facilities. Within the spectrum of park users there are many who visit parks to get away from the organisation and gadgetry of modern day society and for these people the ability to visit wilderness with no signs of other human activity is an essential experience. Conversely, elderly and handicapped people also have legitimate requirements for modern facilities and the opportunity to easily visit at least some major attractions within national parks. The ROS concept cannot, however, stand alone and when applied the inevitable impacts upon the natural environment of any human use must be taken into account. The concept called Limits of Acceptable Change (LAC) has been introduced to cater for the on going assessment of site durability and public impact. Further detail on ROS and LAC is provided by Stankey *et al* (1985), Clark and Stankey (1979) and on wilderness management by Hendee *et al* (1978) and Watson (1988).

The ROS concept clearly has potential for application within each individual national park (although in small national parks wilderness opportunity will be absent). However, the national parks of the South Coast Region are distributed somewhat like a "string of beads" along the coastline and immediate hinterland, with only Peak Charles being located any major distance inland. Use by tourists tends to be on a regional rather than local basis. For example interstate travellers and many Perth based visitors travel along the coast visiting a selection of national parks along the way. Similarly local use tends to be on a district basis, especially around Esperance (three parks within about one hours drive - Cape Arid, Cape Le Grand, Stokes - and one to two hours distance - Peak Charles) and around Albany (five parks within one hours drive - William Bay, West Cape Howe, Torndirrup, Porongurup, Stirling Range). Therefore, there exists an opportunity to place the management emphasis of these parks within a spectrum of opportunity which relates to the major population and tourist centres of the region. This is illustrated in Figure 11.

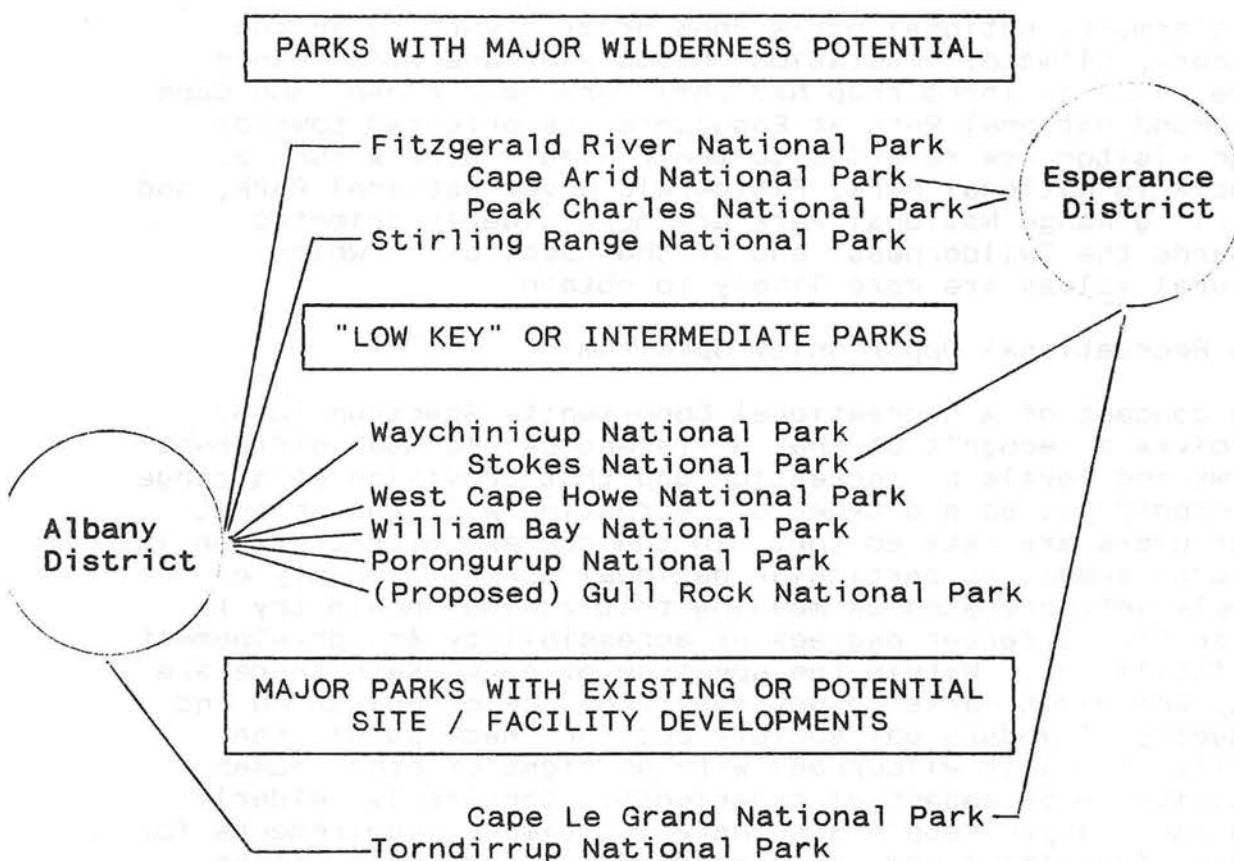


FIGURE 11 A CONCEPTUAL OPPORTUNITY SPECTRUM FOR MAJOR SOUTH COAST REGION NATIONAL PARKS

(This figure refers to the "overall" or "major" perception of each park - there will of course be a range of use zones within most parks).

In summary it is proposed that the Fitzgerald River National Park, which is "remote" from both major centres, should have an emphasis towards conservation and wilderness recreation.

Within the Esperance group, Cape Le Grand National Park is seen as the major "development" park with good access from the town and well designed facilities and the ability to withstand heavy use including regular tourist activity. Cape Arid National Park and Peak Charles National Park are seen as providing for wilderness opportunity, and Stokes National Park is seen as providing for low key camping and nature study. Whereas park interpretation will occur at all areas there is special scope at Cape Arid National park due to its varying land forms and landscapes, its diversity of flora and fauna and its archaeological and historical significance. In the Albany District, Torndirrup National Park is seen as providing for the main tourist use, William Bay National Park clearly has great potential for interpretation and nature study, Porongurup National Park has potential for a network of developed footpaths and the Stirling Range National Park has some potential for wilderness type activity and adventure activities in addition to its major landscape and conservation values. West Cape Howe and Waychinicup National Park are seen to provide primarily for low key recreational use.

Whereas these proposals may be modified with time and during the preparation of area management plans for each park they provide for the basic emphasis of current management within interim operational guidelines and they foreshadow the likely emphasis of recreational use to be addressed within area management plans.

Issue Management Plans

Several issue management plans have been mentioned within the previous chapters of this regional plan including a plan for the management of adventure activities and a plan to address interpretation and community education. One issue plan is now in its second term viz the South Coast Region Dieback Plan, originally drawn up to address dieback management in the period 1986-1988 (CALM, 1986) and recently renewed for a further five years (CALM, 1989 in preparation).

As with the area management plans, it may be possible to time table priorities for preparation. However, in the case of issue plans, major involvement is required by other branches and timing will therefore also be dependent upon branch priorities at the wider State level.

Wildlife Management Programmes

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

During the period of this regional plan it is likely that several wildlife management programmes will be prepared and the Noisy Scrub Bird Management Programme will require revision by 1996.

Operational plans

Operational plans show 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 topics listed, will be addressed by operational plans:

- emergency operations including search and rescue and whale strandings;
- fire control;
- noxious weed and feral animal control;
- prescribed burning;
- pine silviculture;
- pine planting;
- recreation sites;
- road construction and maintenance.

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 the Department and for some jobs carried out by contractors.

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

- Dieback hygiene manual (1986);
- Seven Way Test Guidelines (1983);
- Rare flora register;
- Recreation operations manual;
- Signs manual;
- Chemicals manual;
- Foresters Manual (to be progressively incorporated into a CALM Operations Manual);
- Pine management guide;
- Code of Softwood Logging Practice (1985);
- Code of Hardwood Logging Practice (1987);
- Manual of Hardwood Logging Specifications (1987);

Input to 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 with 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
- Contingency plans for marine oil spills (jointly with State Government).

State Government

- Environmental Protection Authority: Coastal management plans, (as prepared by the former Department of Conservation and Environment prior to mid 1986), conservation reserve proposals for Systems.
- Great Southern Development Authority: miscellaneous development plans
- Main Roads Department: Proposals for major roadworks, etc.
- State Emergency Commission: Proposals for new electricity or gas lines.
- State Planning Commission: Regional or area plans, coastal management plans (since mid 1986).
- Tourism Commission: regional and local tourist development 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.
- Tourist industry: Accommodation and concession proposals.

RESEARCH AND MONITORING

As discussed in the previous chapter research to date has mainly comprised social research, ecosystem studies and silvicultural research.

Whereas these research activities should continue it is considered that emphasis needs to be placed within the following areas:

Archaeological Research

Archaeological research should be encouraged by the WA Museum and by individuals. This is a specialist area in which departmental staff are unlikely to have the necessary skills.

Historical Research

Historical research will likewise generally fall to persons and organisations outside the department, however, opportunistic studies such as the recent heritage trails study should continue when funding and staff allow.

Social Research

The region has a major commitment to the CALM VISTAT programme on monitoring visitation to selected areas managed by CALM. In addition, studies of remote area use should continue through retention of log books. Specific visitor surveys should continue to be a major input to the preparation of area management plans.

To date no detailed attitudinal surveys or landscape perception studies have been undertaken within the region. Whilst such research is currently outside the scope of existing staff resources and skills it is hoped that opportunities will occur for such work during the period of this regional plan.

Ecosystem Studies

Biogeographical studies are required in more lands managed by CALM in the region so as to provide the best available information as a base for management plans. Such studies are also required in the various "corridors" of uncleared bushland, generally along river systems, which appear to form important links between major groups of reserves. The flora conservation programme has set a 20 year goal to have management programmes in place for all declared endangered flora. If this is to be realised there will need to be a major effort in studies of rare or endangered flora within the region, including the establishment of permanent monitoring quadrats.

The value of fauna studies such as the work by V. Smith at Torndirrup National Park where dibblers have been discovered cannot be underestimated. Many of the fauna species of the region are highly sensitive to fire regimes through changes in habitat. The knowledge that dibblers occur in at least one locality within Torndirrup National Park has immediately required that the area involved be protected from fire if at all possible. Quite apart from the impact of fire on particular species, little is known of the long term effects of fire intensity and frequency upon vegetation types of the region. Research is also required into factors affecting the rate of spread and other characteristics of fire for use in controlled (prescribed) burning operations.

Applied Management Research

There is currently a lack of applied research which is oriented specifically to immediate management needs. For example, research is urgently required to identify the best methods of constructing and maintaining footpaths. As highlighted earlier in this plan, footpath erosion and maintenance is a major issue within the region. Studies are needed to identify the most cost effective way of stabilising footpaths and making them durable.

There are many other examples of the need for applied research within the region affecting day to day management and operational strategies.

Silvicultural Research

The particular fertiliser requirements for Pinus radiata on various South Coast soil types require on-going research. The likely growth patterns of pine trees within the region is unknown and hence research will be required into the optional silvicultural treatments such as pruning, subsequent fertiliser levels and effects of understrong grazing in later years of the rotations.

In the event that commercial tree growing extends to other species or to the other areas of the region parallel silvicultural studies will be required.

PERSONNEL

Although increase in personnel numbers is justified in many areas within the region, in the current economic situation rapid increases are unlikely to occur. In the short term there are some obvious deficiencies in staffing skills and expertise and in administrative support staff including:

- regionally based co-ordination of research;
- regionally based interpretation / community education;
- permanent field presence in the Nullarbor area;
- sub district office in Ravensthorpe;
- improved nature reserve management capability throughout the region.

In addition, this Regional Plan has identified several additional areas for management by CALM within the region. Numerous strategies have been proposed, many of which require extensive research, monitoring and liaison programmes. If the plan is to be implemented it will need to be matched by provision of the necessary resources including personnel.

Training

In accordance with the Departmental training policy, 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.

Volunteers

Subject to staff capability attempts should be made to re-establish the South Coast Volunteer Conservation Programme and to foster interaction with groups such as "Friends of Parks", the Fitzgerald River National Park Association and the Albany branch of the WA Wildflower Society. Efforts should also be made where possible to support private research work of potential value to the Department provided this is undertaken in a professionally competent manner.

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 within the region are:

Bush Fires Act, 1954 as amended
Land Tax Assessment Act, 1976 as amended
Mining Act, 1978 as amended

Other Acts which affect the Department's land management responsibilities in the region 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
Financial Administration and Audit Act 1987 as
amended
Fisheries Act, 1905 as amended
Great Southern Development Authority Act, 1987
Land Act, 1933 as amended
Local Government Act, 1960 as amended
Main Roads Act, 1930 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
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 Endangeres 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
Customs

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;
Great Southern Development Authority;
Main Roads Department;
Police Department;
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 shires and towns which contain land managed by CALM.

Private Sector

Industry groups e.g. tourism, wildflowers,
agriculture, fishing, timber
production.
User groups e.g. clubs, organisations who
regularly visit CALM lands.
The Media
and last but not least The General Community.

Advisory Committees

There is provision for the establishment of committees to advise on the preparation of area management plans and general management of land managed by CALM. Currently one such committee exists at the Fitzgerald River National Park, with the specific task of advising the department on the preparation of an area management plan.

Committees such as this are invaluable in helping to establish a two way flow of information between CALM and the general community. Similar committees should be established during the period of this plan for the Esperance District, and the balance of the Albany District. However, the timing for establishment of such committees will need to be in tandem initially with the preparation of area management plans.

APPENDIX 1

PROPOSED CHANGES IN TENURE, VESTING AND PURPOSE IN SOUTH COAST REGION

Please Note:

1. The great majority of recommendations made here are not "new" but rather they are either:
 - outstanding from previous reports, for example, the E.P.A. Red Books, E.P.A. South Coast Reserves Working Group Recommendations, various coastal management plans pertaining to the Shires of Denmark, Jerramungup, Ravensthorpe and Esperance, and reports on the Nullarbor from 1978 (E.P.A./A.S.F.) and 1987 (joint W.A./S.A. biological survey assisted by the Australian National Parks and Wildlife Service).
 - simply formalising the vesting of existing but unvested reserves and national parks by recommending formal vesting in the NPNCA.
 - already agreed to by the various interested parties, for example, local authorities and relevant Government departments, but not yet actually implemented due to administrative delays such as the need for survey of boundaries.
2. Where "new" recommendations have been made, in most cases notional agreement has been obtained from the local authority and from relevant Government Departments. For example, most of the recommendations that involve areas with "Water" in the reserve purpose have been discussed with the W.A. Water Authority to ensure that changes proposed adequately reflect future interests. This seeking of notional agreement was also applied to the National Parks and Nature Conservation Authority and to the Lands and Forest Commission, both of whom are effectively serviced by the Department of CALM, to ensure that recommended changes of purpose or vesting within areas currently vested in either of the two controlling bodies would be supported.
3. During the preparation phase of this plan, all ten local Government Authorities within the region have been visited or briefed at least twice. The land tenure proposals have been discussed either in detail on an individual basis or at a broader level for the Jerramungup/Ravensthorpe areas where many recommendations involve the Fitzgerald River National Park and surrounding lands such as the Cocanarup area and the Ravensthorpe Range. In the case of the Fitzgerald River National Park, a separate area management plan has been completed to draft stage. This has been prepared in liaison with the Shires of Jerramungup and Ravensthorpe. The Cocanarup and Ravensthorpe Range areas remain outstanding from the 1976 E.P.A. Red Book.

- D1 A 98 ha block, Forest Act Reserve 175/25, which contains karri regrowth and which would be more appropriately managed as a nature reserve.
- D2 Vacant Crown land and unvested reserve 10048 including Owingup Swamp and the lower reaches of the Kent River to be added to Quarram Nature Reserve No 33842. E.P.A. Red Book recommendation 2.12 (2) refers.
- D3 Stanley Island (vacant Crown land) located off Point Hillier to be added to Quarram Nature Reserve. E.P.A. Red Book recommendation 2.13 refers.
- D4 Approx 6 ha in the SE corner of William Bay National Park (Reserve A24482) to be transferred to Reserve A24913 Parklands and Recreation vested in the Shire of Denmark. This would enable the Shire to provide access and to manage the Lights Beach area as a total unit (currently Lights Beach and access thereto fall partly within A24913 and partly within A24482).
- A1 A 20 ha block, Forest Act Reserve 217/25, which contains karri regrowth and which would be more appropriately managed as a nature reserve.
- A2 An unvested Timber Reserve A7557 which is to be included within West Cape Howe National Park.
- A3 Migo, Richards and Seagull Islands, currently vacant Crown land, to become nature reserves. E.P.A. Red Book recommendation 2.13 refers.
- A6 Reserve 801, Parkland and Recreation, currently vested in the Shire of Albany, to be cancelled and added to Marbellup Nature Reserve No 24891 which lies adjacent. Reserve 801 is uncleared and has no known public use. It contains gazetted rare flora.
- A7 Reserve 20948, Water Supply, currently vested in the Minister for Water Resources, to be established as a nature reserve vested in the NPNCA but with 'Water' retained in the purpose.
- A8 Reserve 24000, Timber Firewood, unvested, to become State forest. This would enable the Department to more formally manage the area as source of domestic firewood on a sustainable basis.
- A10 Reserve 28503, Gravel Quarry, currently vested in the Shire of Albany, to be cancelled and added to Torndirrup National Park. The gravel source is exhausted and addition to the national park was agreed to several years ago but action to effect the change was overlooked.
- A11 Reserve 23923, an unvested flora reserve, to become a nature reserve vested in the NPNCA.
- A14 Reserve 33308, Recreation, Town of Albany and Class 'A'
- /15 Reserve 27107, National Park, unvested, to be amalgamated to form Gull Rock National Park

- vested in the NPNCA. The area contains several species of rare flora, rare fauna and provides a scenic backdrop to Albany and King George Sound. Existing recreational use would continue to be catered for and possibly expanded through the mechanism of a management plan.
- A16 Class "A" Reserve 28690, Conservation of Flora, unvested, to be added to Mount Mason Nature Reserve 28689 which is already vested with the NPNCA.
- A17 Reserve 22058, Conservation of Flora and Fauna, vested in the NPNCA to be cancelled and vested in the Town of Albany to form part of Council's Lake Seppings management proposals.
- A17a Class "A" Reserve 24991, Water and National Park, unvested, to become managed as part of Two People's Bay Nature Reserve. Subject to the requirements of the W.A. Water Authority 'Water' may be retained in the purpose of the reserve. The reserve contains rare flora and has potential habitat for the Noisy Scrub Bird.
- A18 Reserve A24705 Moodiarup Road, has a current purpose National Park (Flora). The purpose should be changed to 'Conservation of Flora and Fauna'.
- A19 Class "A" Reserve 23850, Recreation, Camping and Water, unvested, is in excellent condition and protects the wetlands of Lake Corimup. The area would provide a valuable nature reserve.
- A20, A21, A22, A23, A23a, A23b, A23c, A23d. Action is already nearing completion to establish Waychinicup National Park comprising Mount Manypeaks Nature Reserve No 36028, the Arpenteur Nature Reserve No 36719, Cheyne Road Nature Reserve No 27157, Reserves 25865, 27502, 31888, 29883 and vacant crown land. The Department has been managing the area in liaison with the Shire of Albany and the W.A. Water Authority since 1986. The amalgamation derived from a Cabinet endorsed E.P.A. South Coast Reserves Working Group recommendation following Recommendation 2.14 of the E.P.A. Red Book.
- A24 Hassell National Park, Reserve A26650, is a long narrow road reserve which does not meet the criteria for a national park. The area would be more appropriately vested under Section 5g of the CALM Act allowing for the existing multiple use to occur whilst still protecting roadside vegetation as the primary management objective.
- A25 Cheyne Island near Cape Riche, Reserve No 14944 is currently unvested with a purpose Parklands and Recreation. The island should become a nature reserve in line with E.P.A. Red Book recommendation 2.14.

A26, A27, A28, J8

Reserve 31240, Government requirements, unvested, extends from south west of Cape Riche in the Albany Shire to the Pallinup River in the Jerramungup Shire (A26/J8). This reserve, together with Class "A" Reserve 14943, Parklands and Recreation, unvested, and a narrow strip of vacant crown land at Cheyne Bay, should be amalgamated into a Conservation Park. The area has high conservation value including species of gazetted rare flora. As conservation park existing legitimate recreational use may continue.

A29

Reserve 1998, Camping and Conservation of Flora and Fauna, Shire of Albany. The reserve should become a nature reserve vested in the NPNCA.

A30

Reserve 5205, Gledhow Nature Reserve, is a small swamp area on the outskirts of Albany and is currently not vested. It should be vested in the NPNCA.

A31

Reserve 30791 is an unvested nature reserve adjacent to Mt Boyle Road near the Kalgan River. It should be vested in the NPNCA.

P2

Reserve 25965, Conservation of Flora, unvested, to become a nature reserve vested in the NPNCA. The reserve though small is in excellent condition and contains rare flora.

P3

Reserve 15771, Yellanup Road is currently an unvested reserve for Drainage and Conservation of Flora. The reserve should become a nature reserve vested in the NPNCA.

P4

Class "A" Reserve 10003, Conservation of Flora and Fauna, unvested, to be vested in the NPNCA.

P5

Reserve 17644 comprises a small disused gravel pit adjacent to Porongurup National Park. It should be cancelled and added to the national park.

P6, P7, P8

Reserves 800, Public Utility, unvested, 27605, Public Enjoyment, unvested and 27607, Recreation Golf Course, Shire of Plantagenet, at Kamballup lie adjacent to each other and collectively comprise approximately 120 ha of diverse topographic relief. The area has high floristic value with several species of flora at the limits of their natural range and one unnamed Eucalyptus species. Ideally the area should be established as a nature reserve, however, use by the local community and recent quarrying activities (soapstone) may necessitate a multiple use designation under Section 5g of the CALM Act.

P9

Reserve 1090, Water and Stopping Place, vested in the Minister for Water Resources, is an enclave reserve within the Stirling Range National Park.

It has been effectively managed as part of the national park for many years and the purpose should be ammended to National Park and Water, with vesting in the NPNCA.

- G1 Reserve 15756, Conservation of Flora, unvested, at Toompup, to be vested as a nature reserve in the NPNCA.
- J1 Reserve 22343, Water, unvested, lies adjacent to an existing nature reserve No 26792 which is vested in the NPNCA. It would be desirable to amalgamate the two reserves however as the reserves lie in two different Shires (Jerramungup and Gnowangerup) and because of the preference of the W.A. Water Authority to retain Water in the purpose, it is proposed that Reserve 22343 be retained as a separate reserve with a purpose Conservation of Flora, Fauna and Water, vested in the NPNCA.
- J2, J3a Reserve 33257, Parklands and Recreation, unvested and a corridor of vacant crown land along Corackerup Creek providing a link between the Pallinup Estuary (proposed Conservation Park) and the Corackerup and Peniup Nature Reserves. Both areas should become nature reserve vested in the NPNCA.
- J3 Reserve 29500, Government Requirements, unvested, is a large (6000 ha) reserve with very high conservation value including the presence of rare fauna. The reserve is to become a nature reserve vested in the NPNCA.
- J4, J5, J5a, J6, J7, J8 It is proposed to establish a Conservation Park around the Pallinup Estuary (Beaufort Inlet) by amalgamating the following areas:
Reserve 14986, Parklands and Recreation, unvested, Reserve 14987, Recreation and Camping, Shire of Jerramungup, Reserve 14988, Recreation and Camping, Shire of Jerramungup, Reserve 22353, Recreation and Camping, Shire of Jerramungup, (Portion) Reserve 27102, Common and Recreation, unvested, Reserve 33257, Parklands and Recreation, unvested. The Millers Point area, Reserve 21647, Recreation and Camping, should remain vested in the Shire of Jerramungup. Reserve 33257 extends west into the Albany Shire as recommendation A26. The area in question has been variously proposed as national park and nature reserve and has been addressed by the E.P.A. South Coast Reserves Working Groups for Jerramungup and formerly for Gnowangerup. The high conservation value of the area is addressed by Newbey (1987) and a study of the Beaufort Inlet has been documented by Hodgkin and Clark (1988b).

J8a Reserve 28283, Government Requirements, unvested, is a 101 ha reserve located on Gairdner South Road and contains remnant vegetation primarily open Yate and open Mallee woodlands and samphires along drainage lines. The reserve should become a nature reserve vested in the NPNCA.

J9, J10, J11, J12, J13

It is proposed to establish a nature reserve corridor link between the Lake Magenta Nature Reserve and Fitzgerald River National Park by amalgamating the following areas:
Reserve 26172, Water, unvested,
Reserve 36207, Recreation and Parkland, unvested,
Reserve 1028, Resting Place, unvested,
vacant crown land/Road No 8792,
Reserve 35398, Recreation, unvested,
The proposed corridor along the Fitzgerald River valley is in excellent condition throughout. It should be vested in the NPNCA as a nature reserve.

J14/R28, J15, J18, J21, J22, J23/J24, J33, J34, J35, J36

It is proposed that the Fitzgerald River National Park be extended to more logical cadastral and physical boundaries by adding the following areas:
Pt Reserve 32666, Government Requirements, unvested;
Reserve 1029, Resting Place, unvested,
vacant crown land (park headquarters);
Reserve 5051, Water, unvested, vacant crown land (south of Calyerup);
Portion Reserve 33258, Parklands and Recreation, unvested;
Reserve 2507, Water, unvested;
Reserve 3251, Resting Place for Travellers and Stock, unvested;
Reserve 2524, Water, Minister for Water Resources;
Reserve 23060, Public Utility, unvested.
Most of the land in this proposal was recommended for addition to the national park in E.P.A. Red Book recommendation 3.2 (figure 3.8). Reserves 2507 and 2524 may need to remain as separate reserves with a purpose "Nature Park and Water".

J25 An isolated portion of the Fitzgerald River National Park located at Dillon Bay is not appropriate as national park and would be better left as vacant crown land or made available for alternative reservation.

J19, J20 Reserve 10132, Water Supply/Rabbit Proof fence, unvested and surrounding vacant crown land in the Calyerup area. In the E.P.A. Red Book it was recommended that the area of vacant Crown land should be added to the Fitzgerald River National Park (Recommendation 3.2 figure 3.8). Whilst this outcome is favoured by CALM and the NPNCA in whom the area would be vested, it is recognised that there are mining and mineral prospecting activities in the area. It is therefore the Authority's preferred position that the area

should be managed under Section 5g of the CALM Act allowing for multiple use to occur. Management for conservation purposes and recreation would have priority except in areas of active mining interest.

- J17, J26, J27, J28, J29, J30, J31, J32, R20, R21, R22
The following enclave reserves located within the Fitzgerald River National Park should become part of the park:

Reserve 20393, Water, unvested,
Reserve 1406, Water, unvested,
Reserve 10133, Water Supply Rabbit Proof fence, unvested,
Reserve 12121, Water Rabbit Department, unvested
Reserve 12122, Water Rabbit Department, unvested
Reserve 12123, Water Rabbit Department, unvested
Reserve 10135, Water Supply Rabbit Proof fence, unvested,
Reserve 5055, Water, unvested,
Reserve 12124, Water Rabbit Department, unvested,
Reserve 512, Public Purposes, unvested,
Reserve 10865, Water Act, unvested.

- J37, J38 Reserve 22355, Recreation and Camping, Shire of Jerramungup, is an enclave reserve within the Fitzgerald River National Park which runs as a narrow foreshore strip along both sides of the Bremer River. It is proposed that the section along the NE bank of the river be cancelled and added to the national park. The section of the national park to the SW of the river is difficult to manage especially if the Wellstead Estuary sand bar at Bremer Bay is open when rangers have to take a long detour via Devils Creek Road to reach the area. It is proposed that this isolated section of the national park to the SW of the river be added to the remaining portion of Reserve 22355 along the SW bank of the river and be managed by the Shire of Jerramungup.

- R1a Reserve No 31424, Flora and Fauna, unvested should be established as a nature reserve vested in the NPNCA. The reserve contains a broad range of local vegetation associates and contains the Western whipbird, a rare and endangered bird.

- R2 Reserve No 39566, Preservation of Timber, currently vested in the NPNCA has already been recommended for divesting from the NPNCA as it is not appropriate as either national park or nature reserve.

- R3/R4 Reserve 7853, Common, unvested, and Reserve 23438, Recreation, unvested, near Hopetoun are to be established as a nature reserve vested in the NPNCA in accordance with a Cabinet endorsed recommendation of the E.P.A. South Coast Reserves Working Group.

- R5a Reserve 8457, Water, unvested, lies adjacent to Jerdacuttup Lakes Nature Reserve and should be cancelled and added to that reserve.
- R6 Reserve 11577, Water Supply, Minister for Water Resources, near Kundip, contains gazetted rare flora and is adjacent to Kundip Nature Reserve. It should have a change of purpose to Conservation of Flora, Fauna and Water and be vested in the NPNCA.
- R6a Three sections of vacant Crown land/road reserve along the Ravensthorpe-Hopetoun Road are recommended for multiple use reservation in the NPNCA under Section 5g of the CALM Act. The roadside reserves cross a variety of different landforms and soil types and contain a rich and diverse flora.
- R8 Reserve 27177, Conservation of Flora, unvested, should become a nature reserve vested in the NPNCA.
- R9, R9a, R9b, R9c, R9d, R9e
A large area of vacant Crown land in the Hatter Hill area should be established as a nature reserve vested in the NPNCA. The area represents substrates associated with outcrop hills of granite and ironstone. The plant communities associated with these outcrops include gazetted rare flora and many endemic species which are not represented on reserves elsewhere. The following reserves should also be included:
19866 Timber for use of Agriculture Department, unvested
9926 Water Supply Rabbit Department, unvested
Pt 13527 Water Supply Mines, unvested
13526 Water Supply mines, unvested
21168 Water, Minister for Water Resources. The latter area may need to remain as a separate reserve for Conservation of Flora and Fauna and Water, vested in the NPNCA.
- R10 Reserve 27023, Frank Hann National Park, vested in the NPNCA, would be more appropriate as a nature reserve due to its low recreational use. The area contains several species of gazetted rare flora.
- R11/R12 Under a Cabinet endorsed E.P.A. South Coast Reserves Working Group Recommendation Reserve 9393, Paddock Rabbit Department, unvested, and Reserve 7580, Rabbit Department, unvested, are to be established as nature reserves. It is proposed that the lands involved lying to the west of the Rabbit Proof Fence be added to Reserve A40156, Jerdacuttup Lakes Nature Reserve, and lands to the east of the fence be added to the west block of Reserve 32339, Lake Shaster Nature Reserve.

- R13 The portion of Reserve 34410, Parklands and Recreation, unvested, lying between Aerodrome Road and Bell Road, should become a nature reserve vested in the NPNCA as it contains a diverse and undisturbed flora.
- R14 A block of vacant Crown land lying between Aerodrome Road and the northern boundary of Reserve 30795 should be established as a nature reserve vested in the NPNCA due to its diverse and undisturbed flora.
- R15, R16 Reserve 30795, Timber, unvested, known as Cocanarup Timber Reserve, is located both to the NW and to the SE of the Jerramungup-Ravensthorpe Road. The northern portion has been managed for timber cutting by the former Forests Department and subsequently by CALM. It is proposed that an area of vacant Crown land adjacent to the southern boundary of the northern portion, and the section of Reserve 30795 lying between the Highway and Cocanarup Road, should be added to the area currently available for cutting, and be established as State Forest.
- R17, R23, R24, R25, R26, R27 A large area roughly bounded by the Cocanarup Road, the Hopetoun-Ravensthorpe Road, and the northern boundary of the Fitzgerald River National Park comprises the following:
 (Pt) Reserve 30795, Timber, unvested, (section to S of Cocanarup Road)
 vacant Crown land.
 Reserve 20510, Stock and Water Tank, unvested
 Reserve 20509, Water, Travellers and Stock, unvested
 Reserve 26662, Conservation of Flora and Resting Place, unvested
 Reserve 9559, Water Act, unvested
 In the E.P.A. Red Book it was recommended that a substantial proportion of this area be added to the Fitzgerald River National Park (Recommendation 3.2, figure 3.9). Whilst such an outcome is favoured by CALM and by the NPNCA in whom the area would be vested, it is recognised that there are mining and mineral prospecting activities in the area. Is therefore the Authority's preferred position that the area should be managed under Section 5g of the CALM Act allowing for multiple use to occur. Management for conservation purposes and recreation would have priority except in areas of active mining interest. The area contains several species of gazetted rare flora and fauna.
- R29, R30 Reserve 32047, Parklands, unvested
 Reserve 18460, Water and Camping, unvested
 should be established as a nature reserve vested in the NPNCA. The area is on granite bedrock and

has no active mineral interest. It forms the northern part of the Ravensthorpe Range Reserve proposed under E.P.A. Red Book Recommendation 3.8 (figure 3.19).

R31, R32, R33, R34, R35, R36, R37, R38

The following areas form the balance of the E.P.A. Red Book Recommendation 3.8 (figure 3.19) for the Ravensthorpe Range:

Reserve 17880, Water, Minister for Water Resources vacant Crown land north of the

Ravensthorpe-Esperance Road

Reserve 17384, Water, unvested

(Pt) Reserve 16119, Common, unvested

Reserve 10021, Quarry Ironstone Flux, unvested

Reserve 12201, Recreation Ground, unvested

vacant Crown land to the south of the

Ravensthorpe-Esperance Road

Reserve 31979, Parklands and Recreation, unvested

In the E.P.A. Red Book it was recommended that this area become a nature reserve (Recommendation 3.19). This remains the favoured outcome by CALM

and by the NPNCA in whom the area would be vested. Due to the active mining and mineral

prospecting activities in the area, it is the authority's preferred position that the area

should be managed vested under Section 5g of the CALM Act allowing for multiple use to occur.

Management for conservation purposes would have priority except in areas of active mining

interest. The Ravensthorpe Range contains several species of gazetted rare flora and fauna.

R39

It is proposed that Cheadanup Nature Reserve, A31754, be extended by the addition of vacant Crown land to the north. The proposed addition contains the largest known population of a gazetted rare eucalypt.

E1

Approximately 100 ha of Lake Shaster Nature Reserve No 32339 should be excised for addition to Reserve 32337, Recreation, Shire of Esperance.

This is in accordance with a Cabinet endorsed E.P.A. South Coast Reserves Working Group Recommendation and will enable the Shire to improve its facilities at Munglinup Beach.

E1a

Lake Shaster Nature Reserve comprises a western block extending from Munglinup Inlet to Starvation Boat Harbour, and an eastern block between Munglinup Inlet and Stokes National Park which it adjoins. It is proposed that the eastern portion, less the area excised as per recommendation E1 above, be added to Stokes National Park.

E2

Reserve 25376, Timber and Water, unvested, is in good condition and would be valuable as a nature reserve vested in the NPNCA.

E3

Reserve 35659, Conservation of Flora, unvested, should be vested as a nature reserve in the NPNCA.

- E4 Reserve 31754, Conservation of Flora and Fauna, unvested, should be vested in the NPNCA.
- E5, E6, E7, E8 There is an opportunity to provide a corridor link between uncleared land on the margins of the Southern Goldfields, and the coastal reserves of the Esperance Shire by reserving land along the Young River as a linear nature reserve incorporating:
 Reserve A31762, Park, unvested
 Reserve A31751, Park, unvested
 Reserve A31750, Park, unvested
 Reserve A31749, Park, unvested
 Reserve 31751 may need to be reserved as multiple use under section 5g of the CALM Act due to a current mining lease at the centre of the reserve.
- E9, E10, E11 There is opportunity to provide a similar corridor along the Lort River by establishment of a reserve incorporating:
 Reserve A31739, Parklands, unvested,
 Reserve 26913, Park, unvested,
 Reserve A31761, Park and Protection of River and Foreshore, unvested,
 A nature reserve vested in the NPNCA is proposed.
- E12, E13, E14 An area of Crown land comprising:
 Reserve 27888, Conservation of Flora, unvested,
 Reserve 26885, Conservation of Flora, unvested,
 Pt Reserve 30672, Preservation of Natural Vegetation and Ocean Foreshore, unvested, is currently proposed as a nature reserve under a Cabinet endorsed E.P.A. South Coast Reserve Working Group recommendation. However, this recommendation predates the establishment of CALM and it is now proposed that the area which extends from Stokes National Park in the west to the east shore of Lake Quallilup in the east, be simply added to Stokes National Park.
- E15 Another Cabinet endorsed E.P.A. South Coast Reserves Working Group Recommendation seeks to add a portion of Reserve 24486, Flora, unvested, to Lake Mortijinup Nature Reserve A35557, which is already vested in the NPNCA.
- E16 Reserve 19628, Conservation of Flora and Fauna, vested in the NPNCA, located at Dalyup, is badly degraded due to rabbits and weed invasion. It is not appropriate to remain as a nature reserve and should become vacant Crown land or be vested for an alternative purpose.
- E18 A small (2 ha) disused gravel reserve is located on Reserve 14543, Gravel, unvested. The area is already effectively managed as part of Reserve 23527, Forestry Purposes, vested in the LFC. It is recommended that the reserve become part of the proposed Helms State Forest (E19a).

- E19 A small (10 ha) reserve, Reserve 34788, Explosives, unvested, is enclaved within Reserve 23527. It is recommended that the reserve become part of the proposed Helms State Forest (E19a).
- E19A Reserve 23527, Forestry Purposes, LFC, which includes Helms Arboretum should become State Forest.
- E20, E21 Two reserves in the Pink Lake area should be established as nature reserves vested in the NPNCA:
Reserve 24511, Conservation of Flora, unvested,
Reserve 4182, Water and Conservation of Flora and Fauna,
Minister for Water Resources.
Together these reserves provide a short, but potentially important, corridor link between coastal reserves west of Esperance and the western end of the Esperance lakes system of nature reserves.
- E25a, E25 The isolated eastern block of Reserve 28170, Use and Requirements of Government, unvested, lies adjacent to Cape Le Grand National Park and would provide a valuable addition. Part of the western block of Reserve 28170 adjacent to Mullet Lake Nature Reserve and including Bannitup Lake, should be added to Mullet Lake Nature Reserve which is already vested in the NPNCA. This recommendation derives from E.P.A. Red Book Recommendation 3.4 (4) and from the E.P.A. South Coast Reserves Working Group.
- E28a, E28 Vacant Crown land and Reserve 27087, Conservation of Flora and Fauna, unvested, between Munglignup Creek and Cape Arid National Park should be added to Reserve 27086 which is already vested in the NPNCA as a nature reserve.
- E31 Reserve 36002 at Israelite Bay, Preservation of Historic Buildings and Graves is jointly vested in the National Trust of Australia (WA) and the Executive Director of CALM. As the area adjacent to the reserve is proposed to become national park (see E32), it is recommended that Reserve 36002 have a change of purpose to National Park and Preservation of Historic Buildings and Graves, with joining vesting arrangements continuing.
- E32/DS14 It is recommended that Nuytsland Nature Reserve, A27632, vested in the NPNCA have a change of purpose from Primitive Area for the Study of Flora and Fauna, Geological and Anthropological Features, to National Park. This would recognise the scenic and recreational attributes of the area whilst still allowing for conservation as a primary purpose.

E33, E33a, DS4

It is proposed to extend Peak Charles National Park north to the Lake King-Norseman Road and east and south to the limit of agricultural land. The southern extension will provide a link to the proposed Lort River corridor reserve. Reserve 2786 Resting Place, unvested (The cups) should be included.

E34

Reserve 21362, Tank, Minister for Water Resources, contains gazetted rare flora. The purpose should be changed to Conservation of Flora and Fauna and Water, with vesting in the NPNCA.

DS1, DS2, DS3

New nature reserves vested in the NPNCA are proposed in the Mt Day area to the NW of Johnston Lakes, Knapp Rock area to the North of Johnston Lakes and in the Bremer Range. All three areas are currently vacant Crown land. The areas have been selected to represent the diversity of communities found in outcrop areas of the Southern Goldfields.

DS5

Reserve 8029, Water and Conservation of Flora and Fauna, Minister for Water Resources, 'Twenty Five Mile Rocks Nature Reserve' would be more appropriately vested in the NPNCA.

DS5a

Excellent stands of *Eucalyptus brockwayi* occur in the Mt Thirsty area 25 km NW of Norseman and in a second area approximately 15 km WNW of Norseman. Both areas are VCL. The latter area is proposed as an additional block to Brockway State Forest.

DS6/DS7

Reserve 17154, Water, Minister for Water Resources, and Reserve 6043, Water, unvested, are recommended to become a nature reserve vested in the NPNCA. The area is located a few km to the NE of Norseman and includes Bekker Hill and Jimberlana Hill. It also contains proposed rare flora.

DS8

A new nature reserve is proposed in vacant Crown land to the SE of Madoonia Downs pastoral station. Long term monitoring quadrats were established in the area ca 1980 to measure long term changes in the status of species in the region.

DS9

Two large areas of vacant Crown land, one between Balladonia and Caiguna, the other south of Madura, were recommended for addition to the Nuytsland Nature Reserve in a recent biological survey of the Nullarbor (McKenzie and Robinson, 1987). These areas should now become national park in line with recommendation E32/DS14.

- DS10 Two large areas of vacant Crown land, one to the north of Madura and one to the north of Eucla along the WA/SA border, were recommended as nature reserves in the biological survey of the Nullarbor (McKenzie and Robinson, 1987). Both proposals extend into the CALM Goldfields Region.
- DS11 Several caves of the W.A. Nullarbor are recommended for reservation as they fall outside existing or other proposed reserves. The caves would be best reserved under Section 5g of the CALM Act.
- DS12/DS13 A new national park was proposed in 1978 in the Abrakurrie-Eucla area. The proposal was endorsed by the more recent biological survey of the Nullarbor. The land in question is vacant Crown land and Reserve 19713, Water, unvested. This reserve should remain as a separate reserve with a purpose National Park and Water so as to protect any future water supply requirements. Vesting should be in the NPNCA.

GLOSSARY

- Active recreation:** Recreation which has a significant effect on one or more of the following: native flora, fauna, the environment, or other people
- Agroforestry:** Combining agriculture, grazing or cropping with forestry on the same land.
- Archaean:** Precambrian
- Catchment:** The surface area from which water runs off to a river or any other collecting reservoir, e.g. swamps, groundwater.
- 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.
- Clay pans:** Areas of clay deposition formed from small shallow lakes.
- 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.
- Declared plants:** "Weeds" which by law have to be destroyed or controlled by landowners or land managers.
- Doline:** A sink hole down which surface waters proceed underground in karst country:

Duplex soil: A double layered soil type, generally freely drained sand over clay or some other soil horizon that is essentially impervious to water.

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

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.

Eutrophication: Water pollution caused by excessive plant nutrients (mainly phosphorus and nitrogen) causing excessive plant growth e.g. algae, phytoplankton.

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

Fault: A fracture in a rock along which there has been an observable amount of movement.

Fauna: Animal life.

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

Flora: Plant life.

Forb: A herbaceous perennial.

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

Fold: A movement of the earth's surface. A flexure of rocks, that is, a change in the amount of dip of a bed of rock.

Freehold land: Land owned by a private person or organisation.

Geomorphology: The description and interpretation of landforms.

Granite: A coarse-grained igneous rock.

Greenstone: A field term for any slightly altered basic rock.

Gneiss: Banded rocks formed during high-grade regional metamorphism. Generally coarse-grained rocks.

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.

Igneous rocks: One of three main groups of rocks. The primary source of material on the earth's surface.

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

Joint: A fracture in a rock between the sides of which there is no observable relative movement.

Karst: Pattern of denudation in limestone and dolomitic rocks caused by ground waters and underground streams.

Laterite: Residual deposits of hydrated iron oxides and aluminium oxides (bauxite in particular).

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.

Marine: Of ocean or sea.

Metamorphic rock: End product of metamorphism.

Metamorphism: The processes by which changes are brought about in rocks within the earth's crust by the agencies of heat, pressure and chemically active fluids.

Multiple use management: The use of an area for several different purposes.

Passive recreation: Recreation which has an insignificant effect on native flora, fauna, the environment and other people.

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.

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 years ago.

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

Proterozoic rocks: Rocks from the precambrian time period.

Quartzite: metamorphosed sedimentary rock.

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 of productivity.

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.

Salt lake: Body of inland salty water.

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

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).

Sesquioxidic layer: A layer or horizon of soil which is rich in iron and aluminium oxides.

Shale: A sedimentary rock which easily splits along the planes of deposition.

Sharefarming: The commercial growing (farming) of trees by a landowner in association with the Department.

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

Skeletal soil: Very thin cover of soil over rock.

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

Species richness: A measure of the diversity of species. A "species rich" area has many different species present.

Speleologist: One who studies caves.

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.

Terrestrial: On land, land dwelling.

Tertiary: Period of geological time, from about 1 million to 65 million years ago.

Unconsolidated sands: Loose sands which have not been cemented together.

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

Vermin: Destructive animals or pests, usually introduced.

Volcanic rock: Fire grained or glassy rock.

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
APB	Agriculture Protection Board
ASF	Australian Speleological Federation
B.	Banksia
CALM	(Department of) Conservation and Land Management
CITES	Convention on International Trade in Endangered Species
CSIRO	Commonwealth Scientific and Industrial Research Organization
CTRC	Conservation Through Reserves Committee
E.	Eucalyptus
EPA	Environmental Protection Authority
ERMP	Environmental Review and Management Program
et al.	and others
ha	hectare
JAMBA	Japan Australia Migratory Birds Agreement
km	kilometre
L.	Lake
LAC	Limits of Acceptable Change
LFC	Lands and Forest 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

NPNCA	National Parks and Nature Conservation Authority (a controlling body established under Section 21 of the CALM Act, 1984)
RAOU	Royal Australasian Ornithological Union
ROS	Recreation Opportunity Spectrum
SAS	Special Air Services
SEC	State Energy Commission
t	Tonnes
TDS	Total dissolved solids
VCL	vacant Crown land
VHF	very high frequency
VISTAT	Visitor information statistics program (a system to record the number and use patterns of visitors to selected areas managed by CALM)
WAWA	Water Authority of Western Australia
10/3	1 000
10/6	1 000 000

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