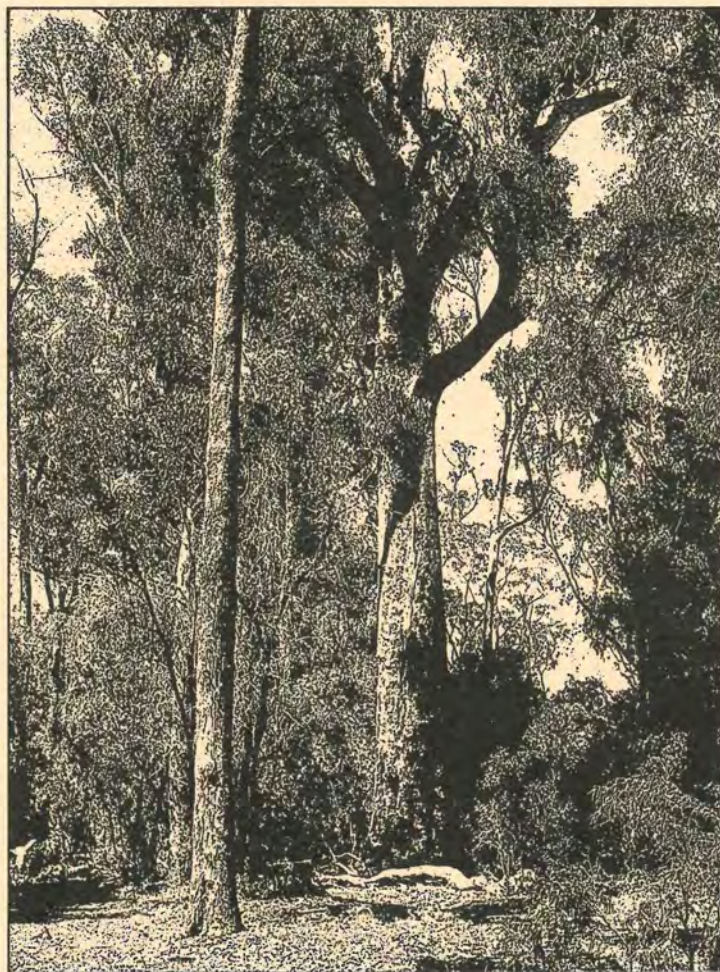


CENTRAL FOREST REGION



Draft Management Plan

April 1987



Department of Conservation and Land Management, W.A.

DRAFT

CENTRAL FOREST REGION

REGIONAL MANAGEMENT PLAN

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PREFACE

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

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

The aims of this plan are:

- to describe the land and wildlife resources in the region managed by CALM;

- to outline the land use and land management strategies proposed for this area;

- to provide for public participation in the planning process by making a draft plan available for public comment;

- to provide guidance to CALM regional staff on land use and land management priorities.

The strategies in a regional plan largely derive from the overall objectives and policies of the Department. These are separately described in the Supporting Papers - a document which applies to all regions and contains appropriate extracts from the CALM corporate plan and various CALM policy statements.

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

The time frame for this regional plan will not exceed ten years, although review and restatement of some policies will inevitably be necessary during this period.

1. THE REGION

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

The population of the region at the time of the 1981 census was 70 000, including Bunbury city, Collie, Busselton, Harvey and Donnybrook.

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

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

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

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

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

2. MANAGEMENT AND RESOURCES

ADMINISTRATION

Regional Responsibilities

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

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









Districts Within the Region

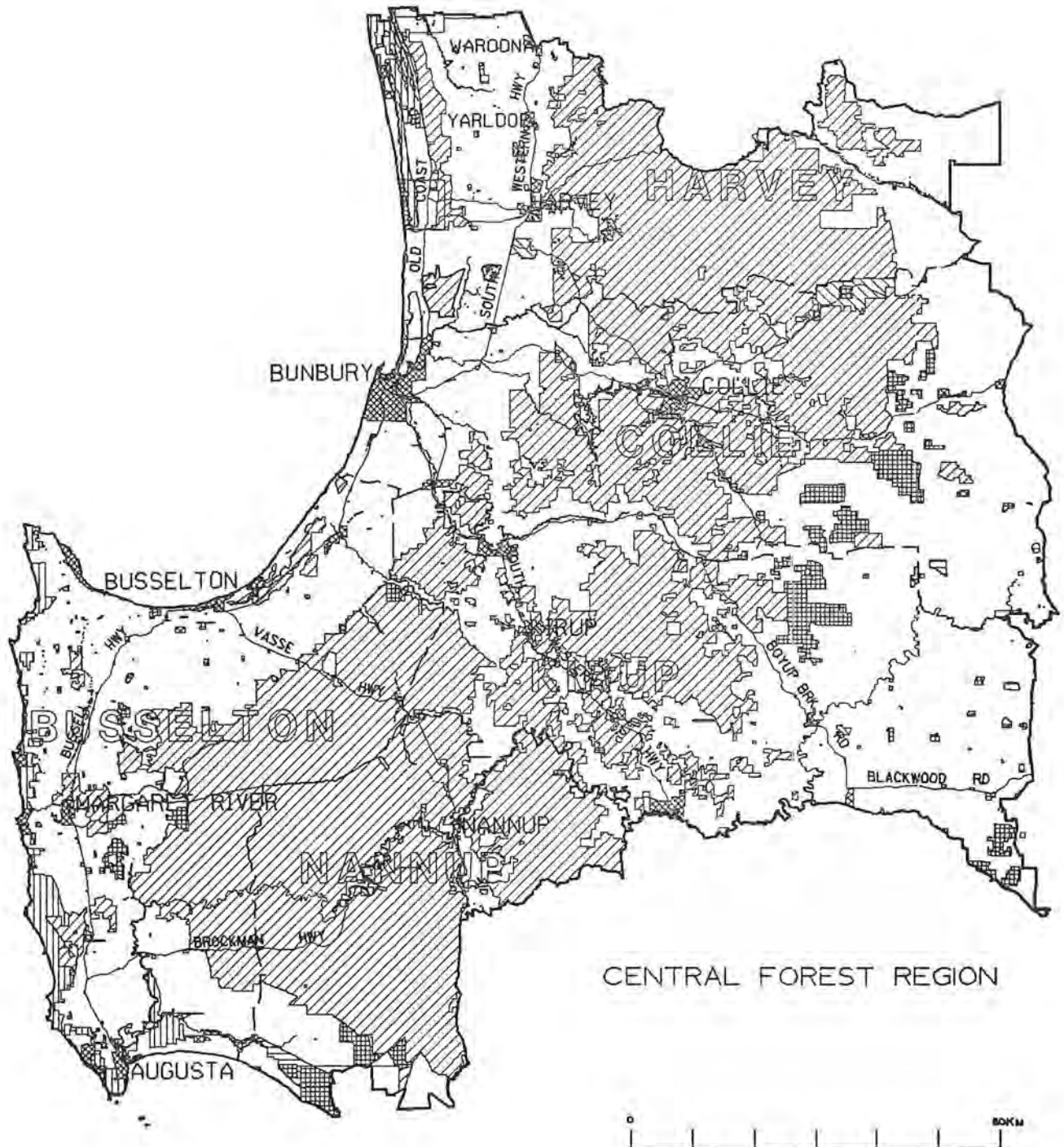
The region is divided into five districts, as shown in Map 1.

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

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

MAP 1
CURRENT LAND TENURE

-  NATIONAL PARK (CALM)
-  NATURE RESERVES (CALM & UNVESTED)
-  STATE FOREST AND OTHER CALM LAND
-  TOWNSITES AND LOCAL AUTHORITY LAND
-  VESTED IN OR OWNED BY GOVERNMENT DEPTS
-  UNVESTED CROWN LAND
-  PRIVATE PROPERTY
-  DISTRICT BOUNDARY



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

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

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

Specialist Branches

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

Personnel

At 1 July 1986, 418 Departmental personnel were based in the region, as shown in Table 1.

TABLE 1

Department of CALM personnel employed
in the Central Forest Region as at 1 July 1986

Professional staff	25
Field staff	93
Administration and Clerical staff	22
Wildlife Officers	3
National Park Rangers	6
Wages Employees and Mechanics	256
Casual, seasonal, part time staff	13
	—
Total	418
	—

Departmental Vehicles, Plants, Boats and Aircraft

Table 2 summarises the above resources based in the region as at 1 July 1986.

TABLE 2

Department of CALM vehicles,
plant, boats and aircraft in the Central Forest Region
as at 1 July 1986.

Motorcycles	4
Sedans and Utilities 4 x 2	54
Sedans and Utilities 4 x 4	54
Light Trucks	28
Heavy Trucks	42
Prime Movers	2
Graders	3
Tractors, Loaders	32
Dozers	4
Buses	2
Caravans	3
Boats	1
Aircraft	3
	—
Total	232
	—

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 in Perth and Bunbury.

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

Local people and other agencies frequently assist with fire fighting.

PHYSICAL AND BIOLOGICAL RESOURCES

System 6 Study





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

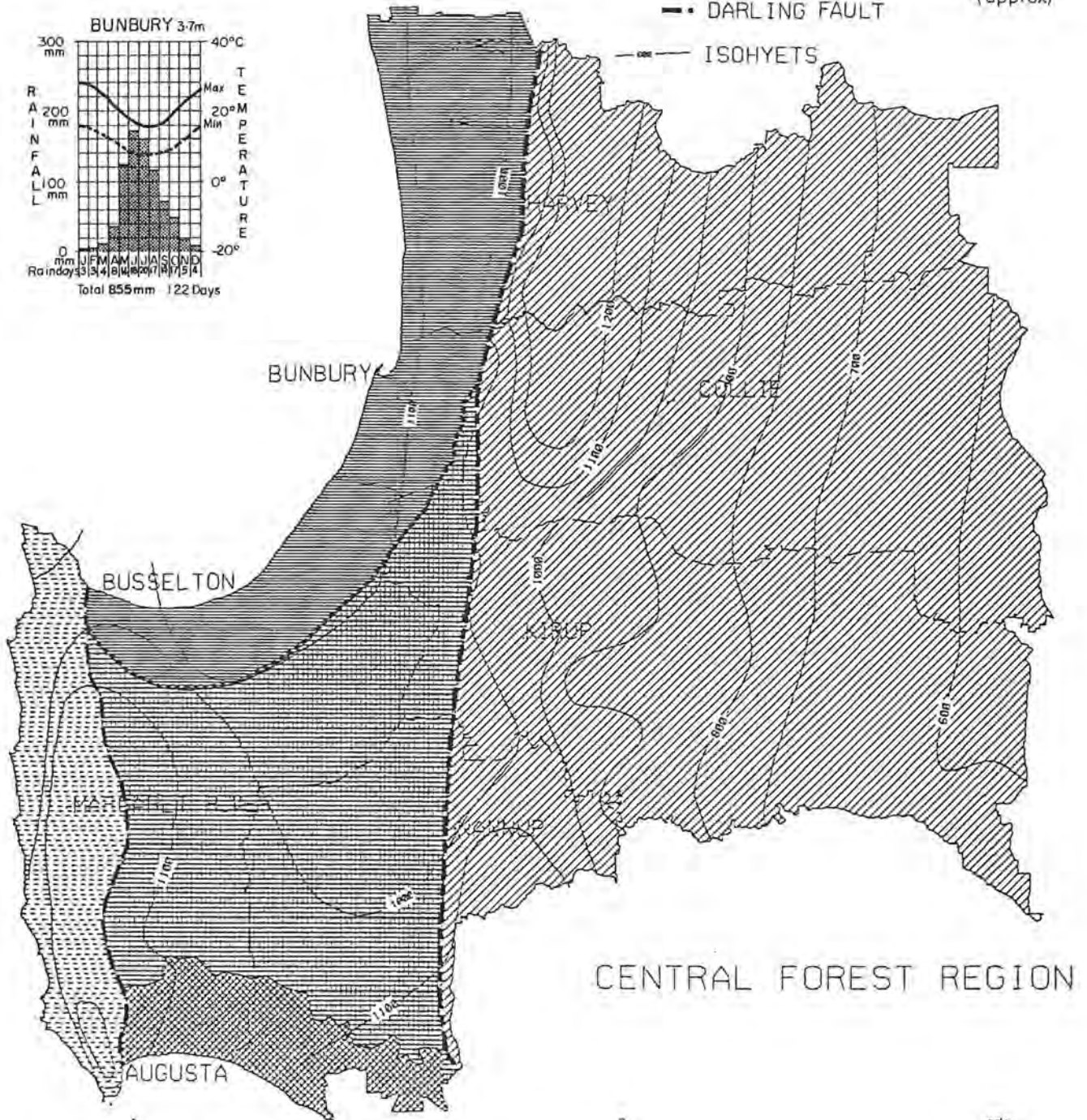
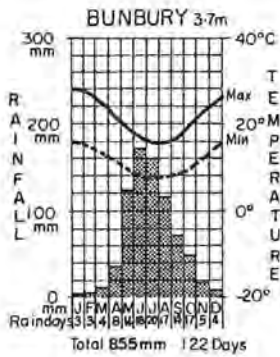
Climate

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

Average annual rainfall varies from about 900 mm on the coast near Bunbury and Busselton, to a maximum of over 1 250 mm, as shown in Map 2.

MAP 2
GEOMORPHIC UNITS AND CLIMATE

-  SWAN COASTAL PLAIN
-  DARLING PLATEAU
-  BLACKWOOD PLATEAU
-  SCOTT COASTAL PLAIN
-  LEEUWIN NATURALISTE RIDGE
-  WHICHER SCARP
-  LEEUWIN NATURALISTE FAULT (approx)
-  DARLING FAULT



A detailed account of the key climatic features of the region is given by the Bureau of Meteorology (1965). Some climatic data for Bunbury is presented in Map 2.

Geology and Geomorphology

The region can be divided into five main geomorphic units or natural regions according to Beard (1981), based on Clarke (1926). These are: the Darling Plateau, Swan Coastal Plain, Leeuwin-Naturaliste Ridge, Blackwood Plateau, Scott Coastal Plain, as shown in Map 2. The Darling Scarp separates the Darling Plateau from the Swan Coastal Plain and Blackwood Plateau (Donnybrook Sunklands) and the Whicher Scarp separates the Blackwood Plateau from the Swan Coastal Plain.

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

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

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

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

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

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

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

For further details about the geology of the region see the 1:250 000 scale geological maps prepared by Wilde et al. 1978, 1982, 1984 and Lowry (1967). Landform and soil information for parts of the region are available from Churchward and McArthur (1980), Finkl (1976), McArthur et al. (1977), McArthur and Bartle (1980), McArthur and Bettenay (1960), Northcote et al. (1967).

Hydrology

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

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

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

Vegetation











The vegetation of the region has been mapped by Beard (1981) and Map 3 is based on that work.

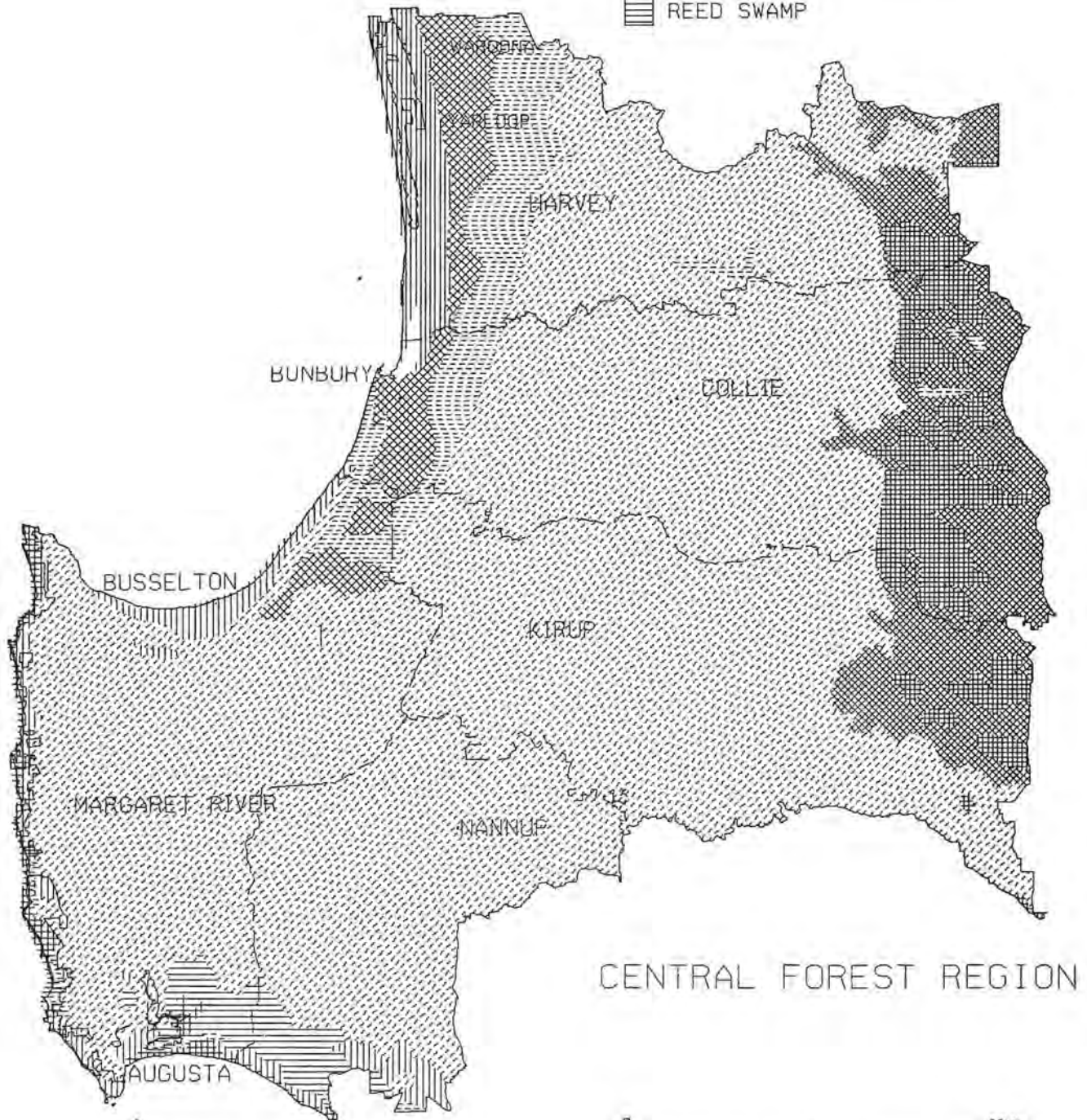
Vegetation mapping by Heddle et al. (1980) is also available for most of the region. The latter mapping is to a large extent based on the landform, site, vegetation work by Havel (1968, 1975 a and b). Vegetation maps or plant species lists for parts of the region have also been produced by Christensen et al. (1985); Dames and Moore (1980, 1985); Forest Department (1979); Fluor-Maunsell (1983); Fox et al. (1980, 1984); Frewer (1987); Heddle et al. (1980); Helleman et al. (1985); Hodgkin (1975); Napier (1985); Nichols et al. (1986); Schwinghammer (1978); Smith (1972-73-74); South West Development Authority (1985); Trudgen (1984); Watkins (1986); Worsley Alumina Pty Ltd (1985).

A.P.I. Maps

CALM air photo interpretation (A.P.I.) forest type maps have been prepared for much of the region. Table 3 shows the areas of the main vegetation types in the region, based on these maps and more recent work.

MAP 3
VEGETATION

-  KARRI MARRI JARRAH FOREST
-  JARRAH MARRI FOREST
-  TUART WOODLAND/FOREST
-  JARRAH WANDOO WOODLAND
-  MARRI WANDOO WOODLAND
-  MARRI WOODLAND
-  JARRAH BANKSIA/OTHER LOW WOODLAND
-  HEATH, SCRUB, SAND, ROCK
-  SWAMP/SANDRIDGE MOSAIC
-  REED SWAMP



CENTRAL FOREST REGION



TABLE 3

Vegetation types in the Central Forest Region
as at 1 January 1986

	State forest*	Other Crown land	Private property
	(ha)	(ha)	(ha)
Karri	3 000	2 000	1 000
Jarrah, marri, etc.	647 000	53 000	206 000
Wandoo	12 000	6 000	34 000
Tuart	3 000	3 000	8 000
Exotic eucalypts	-	-	4 000
Pine	34 000	-	5 000
Other native vegetation	36 000	40 000	45 000
Cleared	8 000	15 000	617 000
Sand	-	1 000	2 000
Lakes, water	1 000	10 000	-
TOTAL	744 000	130 000	922 000

Note

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

Vegetation Mapping by Beard

Beard's 1981 1:1 000 000 scale vegetation map of the south-west identifies 13 vegetation systems in this region, within four botanical subdistricts. A vegetation system is a particular series of plant communities recurring in catenary sequence or mosaic pattern, linked to topographic, soil or geological features. Brief descriptions of the 13 vegetation systems are as follows:

Drummond Subdistrict (on Swan Coastal Plain)

(1) Rockingham System

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

(2) Spearwood System

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

(3) Bassendean System

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

(4) Pinjarra Plain System

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

(5) Ridge Hill Shelf System

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

Dale Subdistrict (Northern Darling Plateau)

(6) Darling System

This comprises the Northern Jarrah Forest, which occupies the most humid portion of the Darling Plateau. The major catena in the system comprises:

open vegetation of 'granite' rock outcrops, protruding through the laterite mantle;

jarrah forest on the laterite plateau;

marri-wandoo woodland on the younger red soils of the scarp and the eastern valleys;

flooded gum and paperbark (Melaleuca raphiopylla) along the water courses.

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

(7) Bannister System

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

(8) Williams System

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

Menzies Subdistrict (Southern Darling Plateau)

(9) Bridgetown System

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

(10) Chapman System

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

(11) Beaufort System

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

(12) Boranup System

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

(13) Scott River System

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

Native Fauna

Some information about the fauna of the region is available from Christensen et al. (1985); Dames and Moore (1980); Forests Department (1970); Hodgkin (1975); Nichols et al. (1980, 1984, 1986); Schwinghammer (1978); Watkins (1986); and Worsley Alumina Pty Ltd (1985).

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

Jarrah forest

Western grey kangaroo (Macropus fuliginosus), western brush wallaby (Macropus irma), southern brown bandicoot (Isoodon obesulus), mardo (Antechinus flavipes), bush rat (Rattus fuscipes), dugite (Pseudonaja affinis affinis), black tiger snake (Notechis ater occidentalis), emu (Dromaius novaehollandiae), silvereye (Zosterops lateralis), scarlet robin (Petroica multicolor), grey fantail (Rhipidura fuliginosa), white-tailed black cockatoo (Calyptorhynchus baudinii), tawny frogmouth (Podargus strigoides).

Karri forest

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

Wandoo woodland

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

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

Western grey kangaroo, southern brown bandicoot, western brush wallaby, bush rat, dugite, emu, whistling kite (Haliastur sphenurus), purple crowned lorikeet, Port Lincoln ringneck, scarlet robin, golden whistler, grey fantail, red wattlebird, New Holland honeyeater, silvereye, Australian raven (Corvus coronoides), silver gull (Larus novaehollandiae).

Wetlands and estuaries

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

SOCIAL AND ECONOMIC RESOURCES

History and Land Use

Aborigines

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

Exploration

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

Agriculture

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

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

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

Timber Production

The first sawmills in the region operated at Quindalup in 1854 (Yelverton) and Worsley and Karridale in 1883 (Davies). Other early sawmills included Crooked Brook (1890), Yarloop (1895), Mornington (1898), Nanga Brook (1904) and Barrabup (1908). The first State forest in the region was dedicated in 1919 at Ludlow, followed by an area at Collie in 1920. By 1930 much of the current area of State Forest was dedicated. Until about 1970 virtually all of State forest was available for timber production. Since then, increasing areas have been allocated to other uses.

Mining and Processing

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

Conservation and Recreation

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

Local Government and Population

The region includes all of seven shires (Harvey, Collie, Augusta-Margaret River, Busselton, Donnybrook-Balingup, Dardanup and Capel) plus the City of Bunbury and parts of seven shires (Waroona, Boddington, Williams, West Arthur, Boyup Brook, Nannup, Bridgetown-Greenbushes), as shown in Map 4.

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

Bunbury (city)	21 749
Collie	7 667
Busselton	6 463
Harvey	2 479
Donnybrook	1 197

As the regional boundaries do not follow shire boundaries, the population of the region is difficult to determine. Based on 1981 census data it was probably about 70 000 at that time.

LAND TENURE

Area Statement

Table 4 summarises land tenure in the region as at 1 July 1986.

National Parks, Nature Reserves and Other Parks

There are three national parks managed by CALM in the region (see Map 5). A further four national parks are unvested or vested in a local authority.

There are 31 Nature Reserves managed by CALM in the region (see Map 5). A further 23 Land Act reserves, with a conservation of flora and/or fauna purpose, are unvested or vested in other authorities.



CALM is responsible for the management of unvested nature reserves under Section 130 of the CALM Act.

The proposed State parks and forest parks/reserves in the region are shown in Map 7.

There are currently no marine parks or marine nature reserves in the region. Some nature reserves are on islands, but they are not marine reserves as the existing reserve is above high water mark.

Proposed Changes in Tenure, Vesting or Purpose

A number of changes to tenure, vesting or purpose are proposed (see Map 6).

These proposals derive from the following sources:

Conservation reserve proposals

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

Land Proposed for State forest or timber reserve (CALM Act)




Areas still under consideration by the Department of Land Administration.

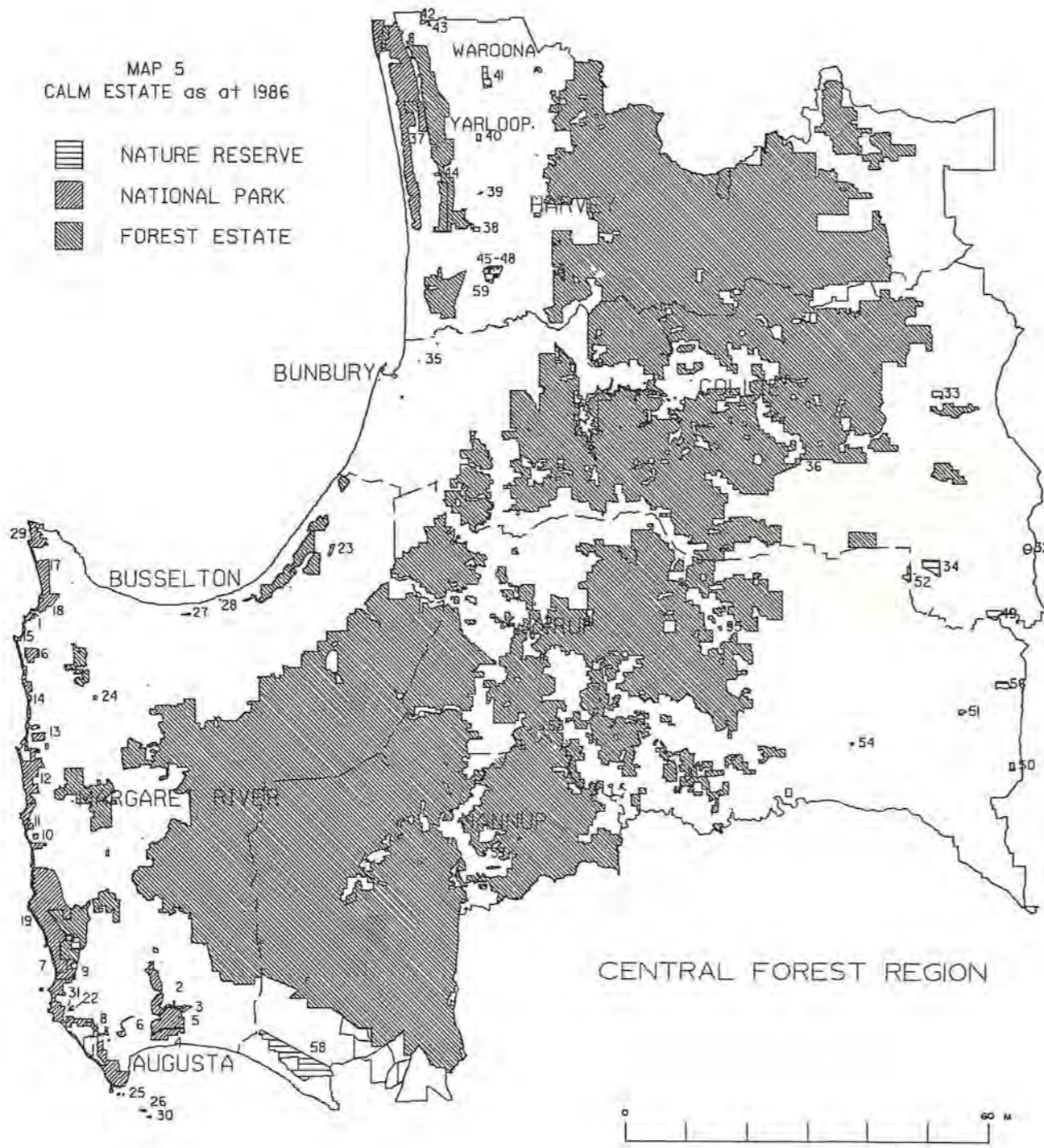
Unvested nature reserves being considered for vesting in the NPNCA.

Changes Proposed in this management plan

Map 7 shows the CALM estate proposed by this plan.

MAP 5
CALM ESTATE as at 1986

-  NATURE RESERVE
-  NATIONAL PARK
-  FOREST ESTATE








NATIONAL PARKS

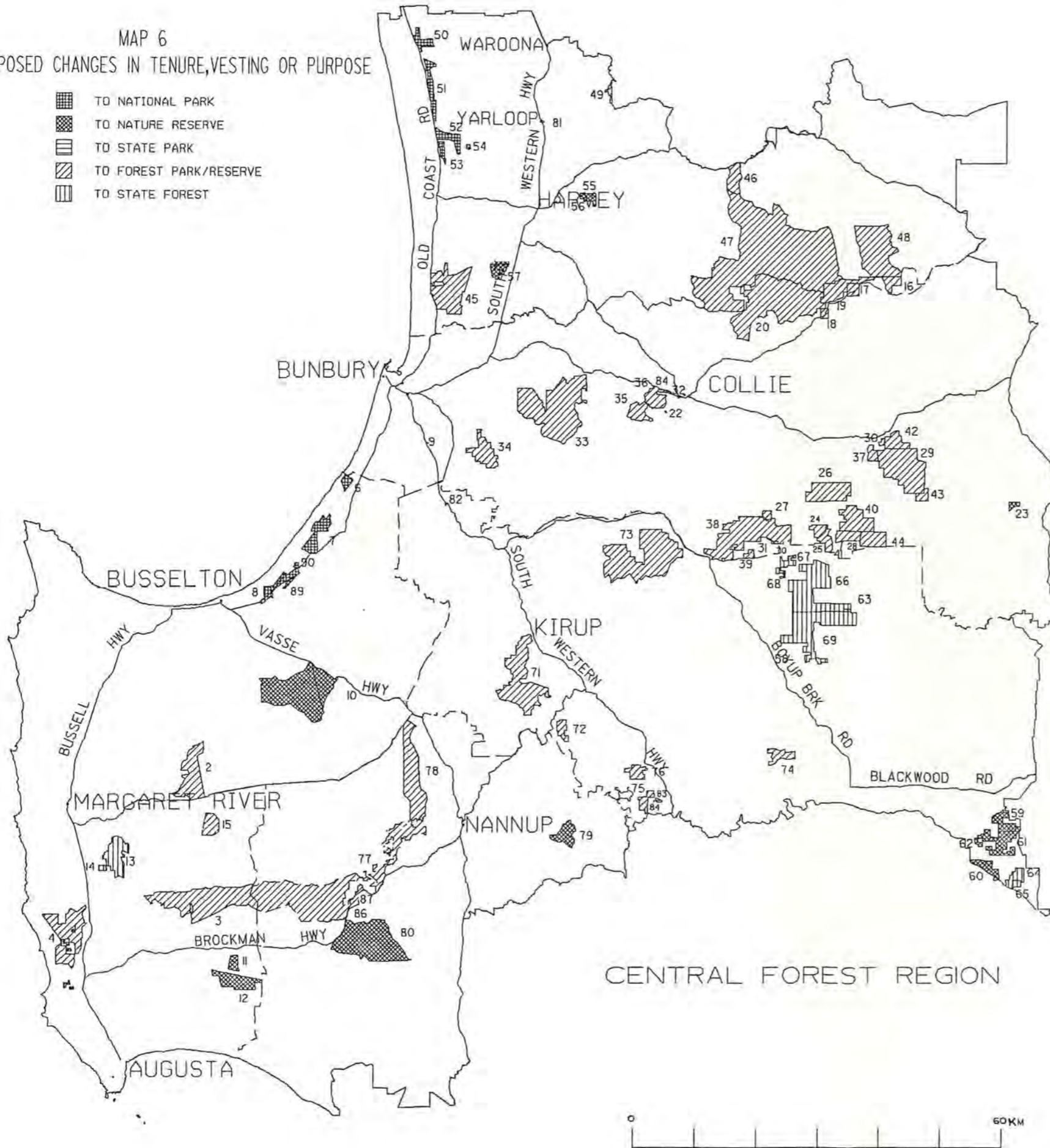
ID	NAME
DISTRICT: BUSSELTON	
1,6-19	LEEWIN-NATURALISTE
2-5	SCOTT
DISTRICT: HARVEY	
37	YALGORUP

NATURE RESERVES

ID	NAME	NUMBER
DISTRICT: BUSSELTON		
22	(STOCKDILL)	C 1394
23	CAPEL	C 16144
24	(WALBURRA)	C 20258
25	SEAL ISLAND	A 25645
26	ST. ALOURAN ISLETS	A 25646
27	BROADWATER	C 27080
28	SABINA	A 31188
29	SUGARLOAF ROCK	A 31634
30	FLINDERS ISLET	A 39421
31	(STOCKDILL)	C 39465
DISTRICT: COLLIE		
32	(LAKE TOWERING)	C 24917
33	BOOLADING	C 25904
34	(MOORDIARUP RD WEST)	C 31913
35	(EGRET COLONY)	A 38393
36	(COLLIE RIVER)	C 38415
DISTRICT: HARVEY		
28	(BYRD SWAMP)	C 2517
39	(WELLDARD ROAD)	C 2547
40	HARVEY FLATS	C 12049
41	BULLER	C 22199
42-43	KOOLJERRENNUP	A 23756
44	CRAMPTON	C 24472
45-48	BENGER SWAMP N.R.	C 34811
59	BENGER SWAMP N.R.	C 34811
DISTRICT: KIRUP		
49	(WILD HORSE SWAMP)	C 1740
50	(WAHKINUP)	C 9708
51	KULIKUP	C 18239
52	HADDLETON	C 23886
53	POWALUP	C 25446
54	(SIX MILE ROAD)	C 26508
55	(WILGA)	C 29121
56	RED HILL	C 30217
DISTRICT: NANNUP		
57	(EAST NANNUP ROAD)	C 22482
58	GINGILUP SWAMPS	C 30626

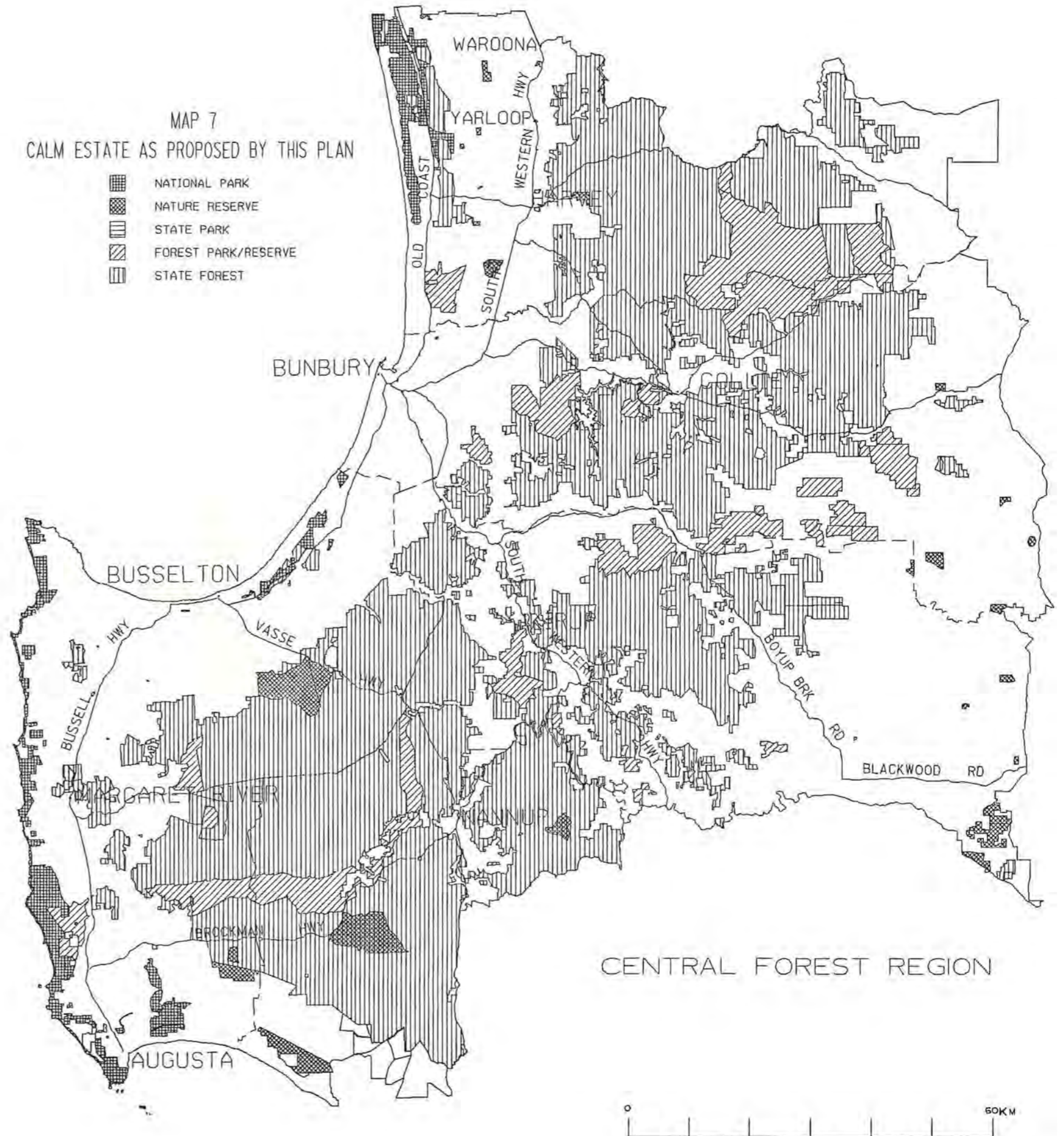
MAP 6
 PROPOSED CHANGES IN TENURE, VESTING OR PURPOSE

-  TO NATIONAL PARK
-  TO NATURE RESERVE
-  TO STATE PARK
-  TO FOREST PARK/RESERVE
-  TO STATE FOREST



MAP 7
CALM ESTATE AS PROPOSED BY THIS PLAN

-  NATIONAL PARK
-  NATURE RESERVE
-  STATE PARK
-  FOREST PARK/RESERVE
-  STATE FOREST



CENTRAL FOREST REGION



TABLE 4

Land tenure statement for the
Central Forest Region
as at 1 January 1987

	Area (ha)	%
CALM LAND - vested - State forest	685 830	
- CALM Act timber reserve	40 340	
- National parks	27 510	
- Nature reserves	5 440	
- Other reserves	1 840	
- owned - Executive Director	18 110	
Sub Total	779 070	44%
UNVESTED LAND - Land Act timber reserves	3 630	
- National parks	20	
- Nature reserves	660	
- Other reserves	10 930	
- Vacant Crown land	42 420	
Sub Total	57 660	3%
OTHER GOVT LAND - Land Act timber reserves	100	
- National parks	600	
- Nature reserves	380	
- Other reserves	36 640	
Sub Total	37 720	2%
PRIVATE PROPERTY	922 150	51%
TOTAL	1 796 600	100%

Note: 1. Other Government land includes Commonwealth, State and Local Government land.

2. Townsites are included under 'other reserves'.

3. LAND CLASSIFICATION AND LAND USE PROPOSALS

There is a detailed discussion of the vesting, tenure and purpose of land managed by CALM, and of the Department's approach to multiple use planning and management in the Supporting Papers to this plan.

BACKGROUND

The present system of land classification and reservation in CALM is as follows:

Categories of Land vested in the Controlling Bodies and managed by the Department

The CALM Act lists seven categories of land to which the legislation applies. These are:

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

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

State forests and timber reserves are vested in the Lands and Forest Commission. Other categories are vested in the National Parks and Nature Conservation Authority, or either body.

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

Security of Tenure of Lands Managed by CALM

The security of tenure of Crown land varies, depending upon whether the reserve is classified as Class A, B or C.

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

In a B Class reserve, tenure can be changed by the Governor, following a report to Parliament and proclamation of the change in the Government Gazette.

The tenure of a C Class reserve can be changed by the Governor and then announced by proclamation in the Government Gazette.

Most national parks and many nature reserves are A Class reserves. The security of tenure for State forest is similar to that of an A Class reserve.

Drawbacks with the Present System

The present system:

does not adequately provide for security of purpose, particularly in State forest;

does not provide a satisfactory category of reserve for many small recreation and conservation areas;

is confusing when areas of different tenure are managed for the same purpose.

For these reasons a new system is proposed.

THE PROPOSED SYSTEM

It is proposed that there be seven categories of land managed by CALM:

- nature reserve (including marine nature reserve);
- national park (including marine national park);
- State park;
- forest park/reserve or marine park;
- State forest;
- timber reserve;
- miscellaneous reserves.

and these will be defined in terms of vesting, tenure and purpose as set out in Table 5.

TABLE 5

Proposed Reserve and Classification System for Lands Managed by CALM

Name	Tenure	In Whom Vested	Purpose	Comments
Nature Reserve	A, B or C	NPNCA	Wildlife conservation and study.	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	Normally A	NPNCA	Wildlife and landscape conservation, scientific study, preservation of features, recreational.	<p>National parks may be terrestrial or marine. In general, commercial exploitation of flora and fauna is not permitted and only those recreational pursuits which do not adversely affect ecosystems and landscapes are permitted.</p> <p>The classification of 'national park' is generally to be given to areas of major national or international significance for scenic, cultural or biological values.</p>
State Park	Normally A	NPNCA	Identical to national park.	State parks differ from national parks only in their size or condition. They are areas managed like national parks, but do not have major national or international significance, either because of small size or because of the effects of past use on the land, landscape or biota.

Name	Tenure	In Whom Vested	Purpose	Comments
Forest Parks/ reserves, Marine Parks	Normally A	NPNCA or LFC, or jointly vested	Wildlife and landscape conservation and recreation.	<p>No State parks currently exist. It is proposed to convert some of the smaller areas now designated as national park to State park.</p> <p>This classification is generally in accord with the internationally accepted concept of a managed resource area. It allows for management for conservation and recreation, plus controlled exploitation where appropriate. Thus in sections of a marine park, controlled commercial fishing may be permitted; in parts of a forest park/reserve, managed timber production may occur.</p> <p>The category may be extended in future to encompass other ecosystems in W.A., so that there might be a desert park, woodland park, or spinifex park.</p>
State Forests	A (equiv- alent)	LFC	Production of water and timber, protection of water catchments.	<p>Although the primary use of State forests is for water and timber production, they will continue to be managed to provide for wildlife conservation, recreation, and public utilities and mineral production where appropriate.</p>

Name	Tenure	In Whom Vested	Purpose	Comments
Timber Reserves	Normally B or C	LFC	Timber production.	In general timber reserve is regarded as a transitional classification. As timber reserves are progressively evaluated, they may in the future be reclassified as State forest or nature reserve, whichever is most appropriate.
Miscellaneous Reserves	Normally B or C	LFC or NPNCA	Wide variety.	These are various small reserves, normally with a purpose closely related to conservation of flora and fauna, or recreation, but which do not fit into the above categories.

PRESENT LAND USE IN THE REGION

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

A number of changes to this plan are now proposed. These changes will allow the introduction of proposed new categories (such as State park or forest park/reserve), will improve the security of purpose for some areas and will change the name and vesting of other areas to better reflect the purpose for which they are managed.

PROPOSED CHANGES IN TENURE, VESTING OR PURPOSE

Changes to the tenure, vesting or purpose of lands managed by CALM in the Central Forest Region are proposed as follows and shown on Map 6.

TABLE 6

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

Ident. No.	Area Name	Current Classification	Proposed Classification	Comments
1	-	NR unvested	Forest park/reserve	Within SF 45
2	Rapids MPA	State forest	Forest park/reserve**	
3	Blackwood MPA	State forest	Forest park/reserve	
4-5	Boranup MPA	State forest	Forest park/reserve	Karri
6-8	Ludlow MPA	State forest FFL	National park	Tuart
9	*North Boyanup Rd	NR unvested	Nature reserve	vest in NPNCA
10	Whicher MPA	State forest FFL	Nature reserve	Rare species
11	Chester MPA	State forest FFL	Nature reserve	Karri
12	Paget MPA	State forest FFL	Nature reserve	
13-14	Witchcliffe	VCL	State forest	
15	Mowen MPA	State forest FFL	Forest park/reserve**	
16-20	Extension to Lane Poole Reserve	WAWA land, Other reserves	Forest park/reserve	Lane Poole management plan
22	*Wyvern Road	NR unvested	Nature reserve	vest in NPNCA
23	*Capercup North	NR unvested	Nature reserve	vest in NPNCA
24-26	Muja Block	VCL	Forest park/reserve	
27	-	VCL	Forest park/reserve	
28	Muja MPA	Other res.	Forest park/reserve	
29	Bennelaking MPA	Other res. unvested	Forest park/reserve	
31	Bennelaking MPA	Other res.	Forest park/reserve	
32	Westralia MPA	State forest FFL	Forest park/reserve	
33	Lennard MPA	State forest FFL	Forest park/reserve	EPA
34	Dardanup MPA	State forest FFL	Forest park/reserve	
35-36	Westralia MPA	State forest FFL	Forest park/reserve	
37	Bennelaking MPA	State forest	Forest park/reserve	

Ident. No.	Area Name	Current Classification	Proposed Classification	Comments
38-39	Goonac MPA	State forest, VCL	Forest park/reserve	
40-41	Muja MPA	VCL	Forest park/reserve	
42-43	Bennelaking MPA	VCL	Forest park/reserve	
45	Kemerton	Executive Director	Forest park/reserve	
46-47	Extension to Lane Poole Reserve	State forest	Forest park/reserve	Lane Poole management plan
48-49	Stene MPA	State forest	Forest park/reserve**	Virgin wandoo
50	Clifton MPA	State forest FFL	National park	add to Yalgorup
51	McLarty MPA	State forest FFL	National park	add to Yalgorup
52-53	Myalup MPA	State forest FFL	National park	add to Yalgorup
54	Riverdale	NR unvested	National park	vest in NPNCA
55-56	*Falls Brook	NR unvested	Nature reserve	vest in NPNCA
57	Benger Swamp	Executive Director	Nature reserve	addition to NR
58	*Boyup Brook Rd	NR unvested	Nature reserve	vest in NPNCA
59-62	*Wournbelup	VCL	Nature reserve	
63	Camballan	Other res.	State forest	
64-65	*Chowerup	Other res. unvested	State forest	
66-69	Camballan	VCL	State forest	
70	Goonac MPA	Other res.	Forest park/reserve	
71	Mullalyup MPA	State forest	Forest park/reserve**	
72	Greenbushes MPA	Executive Director, SF	Forest park/reserve**	
73	Preston-Noggerup	State forest FFL	Forest park/reserve**	
74	Nollajup MPA	State forest FFL	Forest park/reserve	
75-76	Greenbushes MPA	State forest, other	Forest park/reserve	
77	Blackwood MPA	State forest	Forest park/reserve	
78	St John Brook MPA	State forest	Forest park/reserve	
79	Dalgarup MPA	State forest FFL	Nature reserve	
80	Milyeannup MPA	State forest FFL	Nature reserve	
81	*Wagerup	NP unvested	State park	

Ident. No.	Area Name	Current Classification	Proposed Classification	Comments
82	*Gwindinup	NP unvested	State park	
83-84	*Bridgetown	NP unvested	State park	
85	*North Boranup	Nature reserve	National park	
86-87	Blackwood MPA	State forest, other	Forest park/reserve	
88	Leeuwin-Naturaliste	Timber reserve	National park	
89-90	Ludlow MPA	State forest FFL	National park	Tuart

Note

- * indicated unofficial name
- FFL = Flora, fauna, landscape
- MPA = management priority area
- NR = Nature reserve
- NP = National park
- res = reserve
- SF = State forest
- VCL = vacant Crown land

Forest park/reserves marked with a double asterisk will be zoned to preclude timber production.

ZONING OF STATE FOREST, PARKS AND RESERVES



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


Areas may be zoned to emphasise conservation, protection, recreation or production.

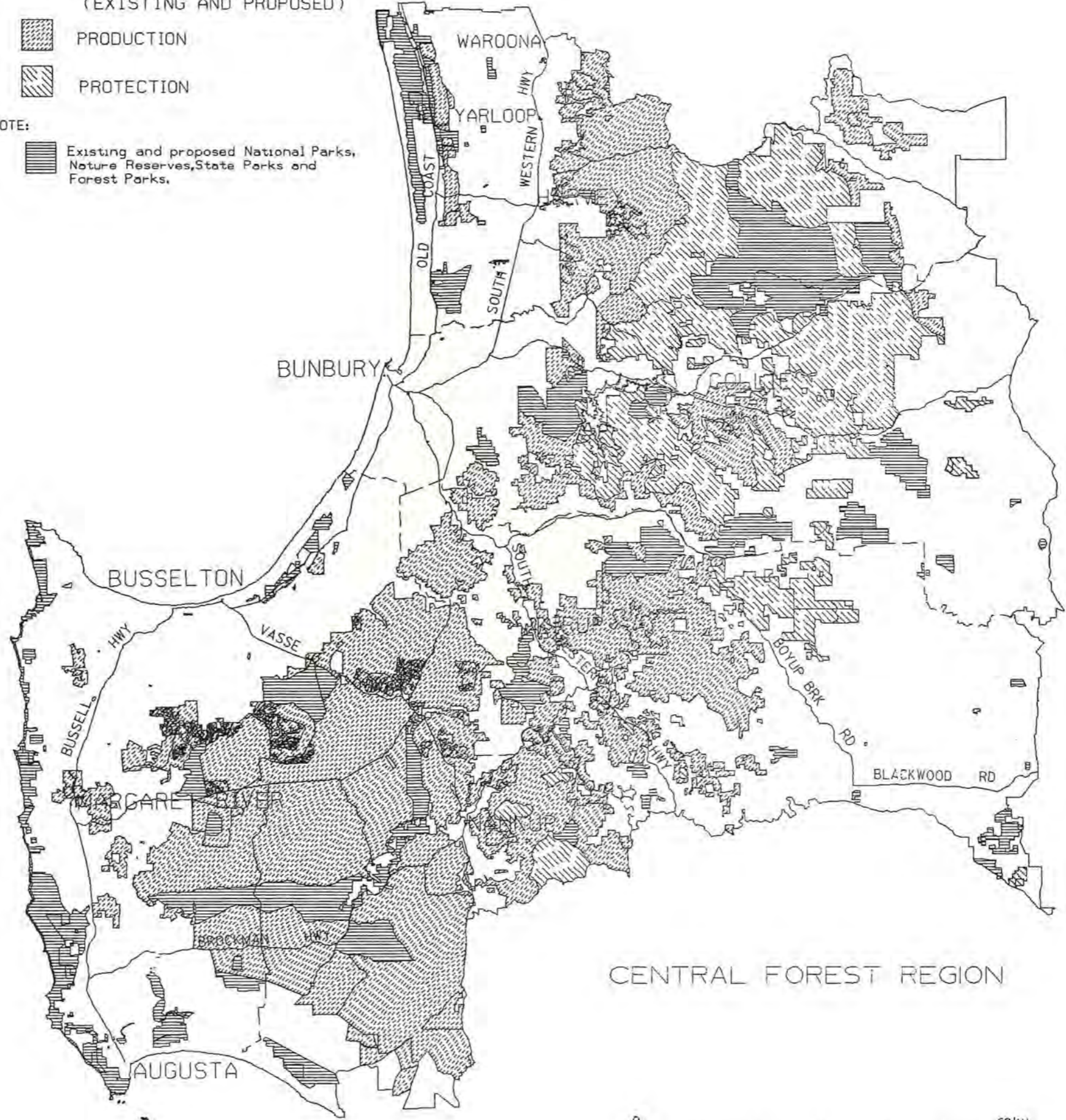
Apart from the Lane Poole Reserve where zoning was determined at time of creation, no management priority zones have yet been allocated for national park, nature reserve, State park and forest park/reserve. The zoning system for these areas will be determined later when their management plans are developed.

All of State forest is zoned. The management priorities for State forest and proposed State forest in this region are shown on Map 8.

MAP 8
 MANAGEMENT PRIORITY AREAS FOR STATE FOREST
 (EXISTING AND PROPOSED)

-  PRODUCTION
-  PROTECTION

NOTE:
 Existing and proposed National Parks, Nature Reserves, State Parks and Forest Parks.



CENTRAL FOREST REGION



4. MANAGEMENT PROPOSALS

The topics covered in this chapter are:

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

The format for this section of the Plan comprises:

- Introductory background information on resources and issues.

- Proposed regional strategies which add specific details to the Departmental policy guidelines presented in the Supporting Papers to this Plan.

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

LAND DEDICATION AND ACQUISITION

The classes of land controlled under the CALM Act are described in Supporting Papers to this plan, and areas within the region are listed in Table 4. CALM also manages some unvested land (proposed for CALM Act tenure) as shown in Map 6. Some CALM land is leased for grazing or other purposes under historical agreements. There are currently some 240 CALM Act leases covering about 18 300 ha in the region.

Regional Strategies

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

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

CONSERVATION OF FLORA, FAUNA AND LANDSCAPE

Conservation is defined as

'the management of human use of the biosphere so that it may yield the greatest sustainable benefit to present generations while maintaining its potential to meet the needs and aspirations of future generations. Thus conservation is positive embracing preservation, maintenance, sustainable utilisation, restoration and enhancement of the natural environment.' (State Conservation Strategy, 1987).

CALM manages 818 000 ha of land in the region, of which 165 000 ha or 20 per cent has a nature conservation priority as shown in Map 8. The question of whether this area was adequate was examined by the Conservation Through Reserves Committee. This culminated in the release of the EPA's 'Systems Red Books' in 1975-83. Numerous recommendations were made to improve the reserve system. Some of these recommendations have been implemented, but many have yet to be acted upon.

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

Landscape

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

Attractive landscape features of the region include:

- Darling escarpment;
- river valleys, e.g. Harvey, Collie, Blackwood;
- Darling Ranges;
- lakes, e.g. Lake Preston, Lake Clifton;
- mountains, e.g. Mt William, Mt Lennard;

cliffs and beaches, e.g. Leeuwin-Naturaliste;
jarrah forest;
tuart woodland;
wandoo woodland;
coastal plain.

Agencies which may have a deleterious effect on landscapes include:

insects and fungal disease;
logging;
mining;
prescribed burning;
wildfires;
public utilities.

Regional Strategies

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

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

- (vii) liaise with adjoining landholders wherever a mutual interest in the conservation of a high quality landscape is apparent;

Flora and Fauna

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

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

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

Currently, 17 plant species known to occur within the region are gazetted as rare or in need of special protection (Table 7A). During the period of the plan, the list will be revised, in the light of continuing survey and research. There are also 14 species of rare vertebrates (Table 7B).

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

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

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

TABLE 7A

Gazetted rare flora species known to occur
within the Central Forest Region as at March 1987.

Common name	Scientific name
Yellow jugflower	<u>Adenanthos detmoldii</u>
Stalked water ribbons	<u>Aponogeton hexatepalis</u>
Meisner's Scott River banksia	<u>Banksia meisneri var.</u> <u>ascendens</u>
Blue boronia	<u>Boronia tenuis</u>
Dwarf spider orchid	<u>Caladenia bryceana</u>
Shy spider orchid	<u>Caladenia triangularis</u>
Dawesville Conostylis	<u>Conostylis pauciflora</u>
Purdie's donkey orchid	<u>Diuris purdiei</u>
Hamelin Bay mallee	<u>Eucalyptus calcicola</u>
Plumed lanoline bush	<u>Franklandia triaristata</u>
Drummond's Grevillea	<u>Grevillea drummondii</u>
Collie Grevillea	<u>Grevillea ripicola</u>
Augusta Kennedia	<u>Kennedia macrophylla</u>
Round-leaf honeysuckle	<u>Lambertia orbifolia</u>
Green honeysuckle	<u>Lambertia rariflora</u>
Dark leek orchid	<u>Prasophyllum triangulare</u>
Skinner's pea	<u>Pultenaea skinneri</u>

TABLE 7B

Gazetted rare fauna species known to occur within the Central Forest Region or adjoining waters as at March 1987.

Common Name	Scientific Name
New Zealand fur seal	<u>Arctocephalus forsteri</u>
Woylie	<u>Bettongia penicillata</u>
Rufous bristle bird	<u>Dasyornis broadbenti</u>
Western quoll	<u>Dasyurus geoffroii</u>
Leathery turtle	<u>Dermodochelys coriacea</u>
Red eared firetail finch	<u>Emblema oculatum</u>
Southern right whale	<u>Eubaleana australis</u>
Peregrine falcon	<u>Falco peregrinus</u>
Humpback whale	<u>Megaptera novaeangliae</u>
Numbat	<u>Myrmecobius fasciatus</u>
Ground parrot	<u>Pezoporus wallicus</u>
Red tailed tropic bird	<u>Phaeton rubricauda</u>
Carpet snake	<u>Python spilotus</u>
Freckled duck	<u>Stictonetta naevosa</u>

Regional Strategies

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

- (i) continue to give gazetted rare flora first priority for flora management, and complete the Regional Register of Declared Flora for use by District Officers. Attention will then turn to geographically restricted species and any other population of plants thought to be in need of special protection;
- (ii) continue to maintain confidentiality of locations of plant populations in the Declared Flora Register;
- (iii) monitor populations of declared rare and geographically restricted plants;

- (iv) conduct systematic study of the management requirements for particular species or populations of flora;
- (v) conduct informal studies of particular flora management requirements;
- (vi) progressively develop management plans for all conservation reserves in the region, national parks and nature reserves will be first priority, interim protection plans will be produced in the meantime;
- (vii) take account of the conservation of wildlife in all prescriptions for operations on other CALM land (eg. State forest) ; where appropriate, areas amidst or adjoining production or protection operations will be protected for the benefit of wildlife;
- (viii) maintain close liaison with landholders, and other land management agencies and the general public regarding their responsibilities under the Wildlife Conservation Act;
- (ix) continue to conduct regular patrols in pursuit of suspected breaches of the Wildlife Act;
- (x) monitor particular wildlife habitats and important seasonal events in wildlife populations, eg. seasonal bird migrations, nesting, hunting seasons;
- (xi) conduct formal studies of fauna habitat, animal behaviour and management requirements subject to the Department's Statewide responsibilities and priorities;
- (xii) co-operate with public groups and organisations which can contribute to the understanding, appreciation and conservation of our wildlife;
- (xiii) continue to implement the Department's Kangaroo Management Program.

Wetlands and Estuaries

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

Major wetland areas managed by CALM are listed in Table 8.

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

Regional Strategies

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

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

TABLE 8

Major wetlands managed by CALM in the
Central Forest Region.

	Tenure
<u>Lakes and Swamps</u>	
Lake Preston	National Park
Lake Clifton	National Park
Benger Swamp	Nature Reserve
Gingilup Swamp	Nature Reserve
Wildhorse Swamp	Nature Reserve
Harvey Flats	Nature Reserve
<u>Rivers (parts of)</u>	
Harvey River	State Forest
Brunswick River	State Forest
Collie River	State Forest
Margaret River	State Forest
Blackwood River	State Forest
<u>Estuaries etc (parts of)</u>	
Some CALM Act land adjoins estuaries, eg:	
Hardy Inlet	National Park
Vasse Estuary	Nature Reserve

Marine Conservation

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

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

Regional Strategies

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

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

CULTURAL AREAS

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

Aboriginal Sites

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

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

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

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

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

Regional Strategies

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

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

Historic Sites

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

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

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

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

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

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

Regional Strategies

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

- (i) keep a register of historic sites containing all the available information in each district office and the regional office, and actively maintain these registers supported by advice from the Heritage Commission and National Trust;

- (ii) develop management guidelines for historic sites in the Region in consultation with the Heritage Commission, National Trust, W.A. Museum, tertiary institutions and historical societies;
- (iii) seek ways and means of restoring and maintaining historical sites, giving consideration to voluntary assistance from the public;
- (iv) expend resources on those sites of greatest significance and most threatened by deterioration. eg. Ferndale House;
- (v) open historic sites to the public (consistent with ensuring their preservation), continue to provide information to visitors, with improvements progressing in the order determined by public demand.

Caves

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

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

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

Regional Strategies

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

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

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

- (ii) base cave management on a classification system which reflects their conservation status and accessibility: tourist, adventure and wild caves;

- (iii) ensure the location of wild caves will be known only to members of the Committee and held in confidence;

- (iv) foster public safety by appropriate means eg. limiting access according to skills and equipment, a notification system, information on safe access, signs and a rescue capability for emergencies;

- (v) levy a fee on cave users to defray cave maintenance costs;

- (vi) seek a strengthening of Departmental powers under the CALM Act to manage and protect caves;

- (vii) manage field operations to prevent damage to caves.

PROTECTION

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

Fire

Fire is a natural phenomenon of the local environment because of summer drought and lightning storms. It was used deliberately by Aborigines before European settlement, but since the advent of European settlement, fires seem to have become more common. Certainly, over the last 150 years values have changed and it is considered generally undesirable for uncontrolled wildfires to burn on or out of CALM lands.

The Departmental policy on fire is given in detail in the Supporting Papers. In essence it requires that:

- all possible steps will be taken to prevent bushfires;
- an effective organisation will be maintained to detect and suppress fires;
- liaison will be maintained with local bush fire brigades and control officers;
- where appropriate, fire suppression will be made easier and safer by the practice of cyclic prescribed burning;
- a continuing research program into fire ecology and fire control will be given high priority.

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

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

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

Regional Strategies

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

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

Disease

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

The effects of dieback disease can include:

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

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

- proclamation of Disease Risk Areas (DRA) in State forests (currently 223 700 ha within the region is in DRA);

- a sophisticated photography and survey program for disease recognition and mapping;

- a major research program;

- devising and implementing disease hygiene measures;

- Training staff and forest and park users in disease management;

- trials of operations (eg. logging) in DRA to enable impact to be determined.

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

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

Regional Strategies

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

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

Weeds and Pests

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

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

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

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

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

Regional Strategies

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

- (i) continue to prescribe an annual program to control exotic weeds and pests, in conjunction with the Agriculture Protection Board;

- (ii) constantly review methods of control to maximise the effect and minimise the cost of the program;
- (iii) control procedures will be designed to minimise adverse effects on native fauna and flora;
- (iv) control efforts will be co-ordinated with neighbours.

Rehabilitation

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

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

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

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

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

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

rehabilitation of mining areas 210 ha/year (bauxite 80 ha, coal 50 ha, mineral sands 50 ha, tin 30 ha);

rehabilitation of gravel and other pits 40 ha/year;

rehabilitation of dieback areas 15 ha/year.

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

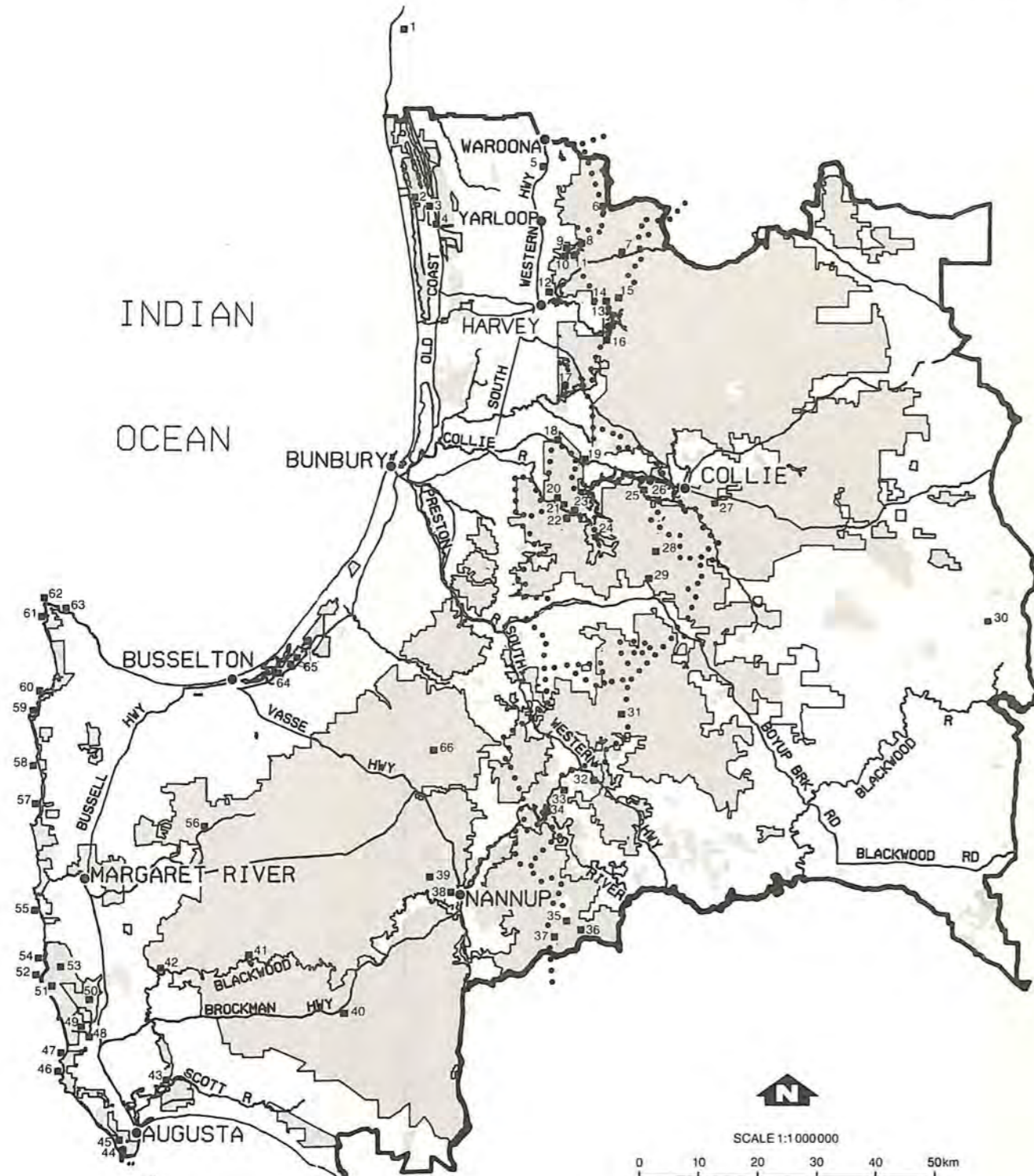
Also much of the coal and tin mining rehabilitation undertaken in the 1960s and early 1970s is of an unacceptable standard.

Regional Strategies

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

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

CENTRAL FOREST REGION RECREATION OPPORTUNITIES



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

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

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

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

RECREATION

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

Important aspects for management are:

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

Camping

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

Camping may be either an adjunct to back packing or vehicle based. Back pack camping is permitted in almost all areas of State forest and national parks, but is not allowed in nature reserves. Vehicle based camping is allowed in other areas at designated sites. Development of such sites should reflect the appropriate demand for use of the site.

Issues of importance are:

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

Regional Strategies

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

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

Day-use

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

CALM recreation sites are shown on Map 10.

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

Major issues are:

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

Regional Strategies

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

- (i) regularly assess the adequacy of day-use recreation sites;
- (ii) consult local Government Authorities when proposed changes to recreation sites affect their interests and responsibilities;
- (iii) seek to participate in regional studies relating to the recreation use of natural lands, eg. Wellington Dam/Harris River;
- (iv) periodically survey visitors to CALM lands to ascertain their views;
- (v) maintain all sites to a uniformly high standard;
- (vi) try new methods and materials to improve the quality of sites and reduce maintenance costs, eg. visitors encouraged to take their rubbish home;
- (vii) when upgrading sites, include improved traffic control, and provision for the disabled;

- (viii) consult organised groups and commercial recreation operations needing special facilities or access and negotiate their requirements;
- (ix) treat public safety with paramount importance in site design and maintenance;

Motorised Recreation

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

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

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

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

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

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

Regional Strategies

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

- (i) plan for the various kinds of motorised recreation by identifying suitable areas and routes;
- (ii) continue to liaise with motoring recreation and sporting groups to plan special events and access to CALM land;
- (iii) restrict access to areas where vehicles are unwanted. eg. recreation sites, dieback areas, sites with fragile vegetation or soil;
- (iv) educate drivers through signs, printed information, direct contact, the media, and by the provision of facilities suited to their needs;
- (v) monitor motorised recreation by attending events and conducting traffic surveys;
- (vi) negotiate with high impact motorised recreations for a degree of indemnity against environmental damage;
- (vii) provide for the ordinary motoring visitor to CALM land by issuing district maps, self-guided tours, maintaining road signs and constructing vantage points;
- (viii) when resources allow, provide a weekend presence in district Offices and patrols of popular routes and locations to assist drivers;
- (ix) wherever possible, publicise and signpost unusual road hazards, eg. fires, log trucks.

Horseriding

Horseriding is a common recreational pursuit on CALM lands.

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

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

Regional Strategies

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

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

Pets

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

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

Pets under control are normally permitted on CALM Land which is zoned for forest production, but are not permitted on developed catchments (W.A. Water Resources Council 1985) or nature reserves. Subject to provisions below, they may be allowed in specified zones of national parks, State parks and forest parks/reserves. Seeing eye dogs accompanying blind persons are allowed in national parks.

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

Regional Strategies

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

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

Swimming, Boating and Fishing

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

Details of permitted activities are given in Table 9.

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

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

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

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

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

Regional Strategies

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

- (i) consider existing patterns of use and potential future demand to determine which activities are appropriate for each site;
- (ii) develop plans to separate conflicting uses. This can be done by separating them physically or by restricting activities to particular times e.g. water skiing and fishing;

- (iii) consult water recreation and sporting groups. Co-ordinate site use and development with user groups e.g. Canoe course on Harvey River, skiing on Stockton water body.
- (iv) integrate camping, day-use recreation sites and water-based recreation opportunities and facilities wherever possible e.g. Lower Collie valley;
- (v) publicise alternative sites for users whose traditional recreation is considered to be inappropriate at a particular location;
- (vi) monitor the effects of water-based recreation on the environment in and around the water and modify plans in the light of any changes;
- (vii) continue close liaison with WAWA on the issue of recreation in catchments to ensure compatibility of recreation plans with all land management objectives e.g. Wellington Dam/Harris River development;
- (viii) check water-based recreation sites periodically for safety hazards;
- (ix) identify and promote sites for watching waterbird activity.

TABLE 9

Water based recreation activities permitted on CALM land
in the Central Forest Region

Recreation Activity	Nature Reserve	National Park State Park	Forest Park/ Reserve	Other State Forest
Power Boating*	No *5	Yes, where use already exists *2	No	Yes Except Catchments *1
Canoeing, Row boats, Sailing	No *5	Yes Except Catchments and specified areas*1	Yes Except Catchments *1	Yes Except Catchments *1
Fresh Water Fishing Marroning*4	No *5	Yes Except Catchments *1	Yes Except Catchments *1	Yes Except Catchments *1
Crabbing Prawning	No *5	Not applicable	Not applicable	Not applicable
Swimming Wading	No *3 *5	Yes Except Catchments *1	Yes Except Catchments *1	Yes Except Catchments *1
Duck Shooting	No Except *6	No	No	No

Note

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

Hunting

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

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

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

Regional Strategies

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

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

PUBLIC PARTICIPATION AND LIAISON

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

Community Education and Interpretation

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

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

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

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

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

Regional Strategies

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

- (i) promote increased public awareness and positive attitudes to conservation and land management issues in the region;
- (ii) further develop appropriate information, education and interpretive programs;

- (iii) develop comprehensive Regional and District libraries to assist staff providing public advice and extension services;
- (iv) develop a Departmental herbarium for public access;
- (v) maximise CALM staff presence in the field at weekends, to improve public access;
- (vi) train staff in outdoor expedition and natural environment interpretation skills;
- (vii) develop demonstration forests for public use;
- (viii) develop interpretive trails in national parks and other areas of high public use.

Community Involvement

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

Examples of community involvement include:

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

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

Regional Strategies

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

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

Information and Advisory Services

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

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

Regional Strategies

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

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

PRODUCTION

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

Water

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

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

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

soil-stored salts. Water quality in the Collie and Blackwood Rivers has been seriously degraded in this way.

The Resource

Surface water supplies on the main catchments in the region are shown in Table 10. Significant underground water supplies also exist on the Swan Coastal Plain. Some details about the principal dams in the region are presented in Table 11.

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

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

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

TABLE 10
Hydrological details for some of the catchments
in the Central Forest Region

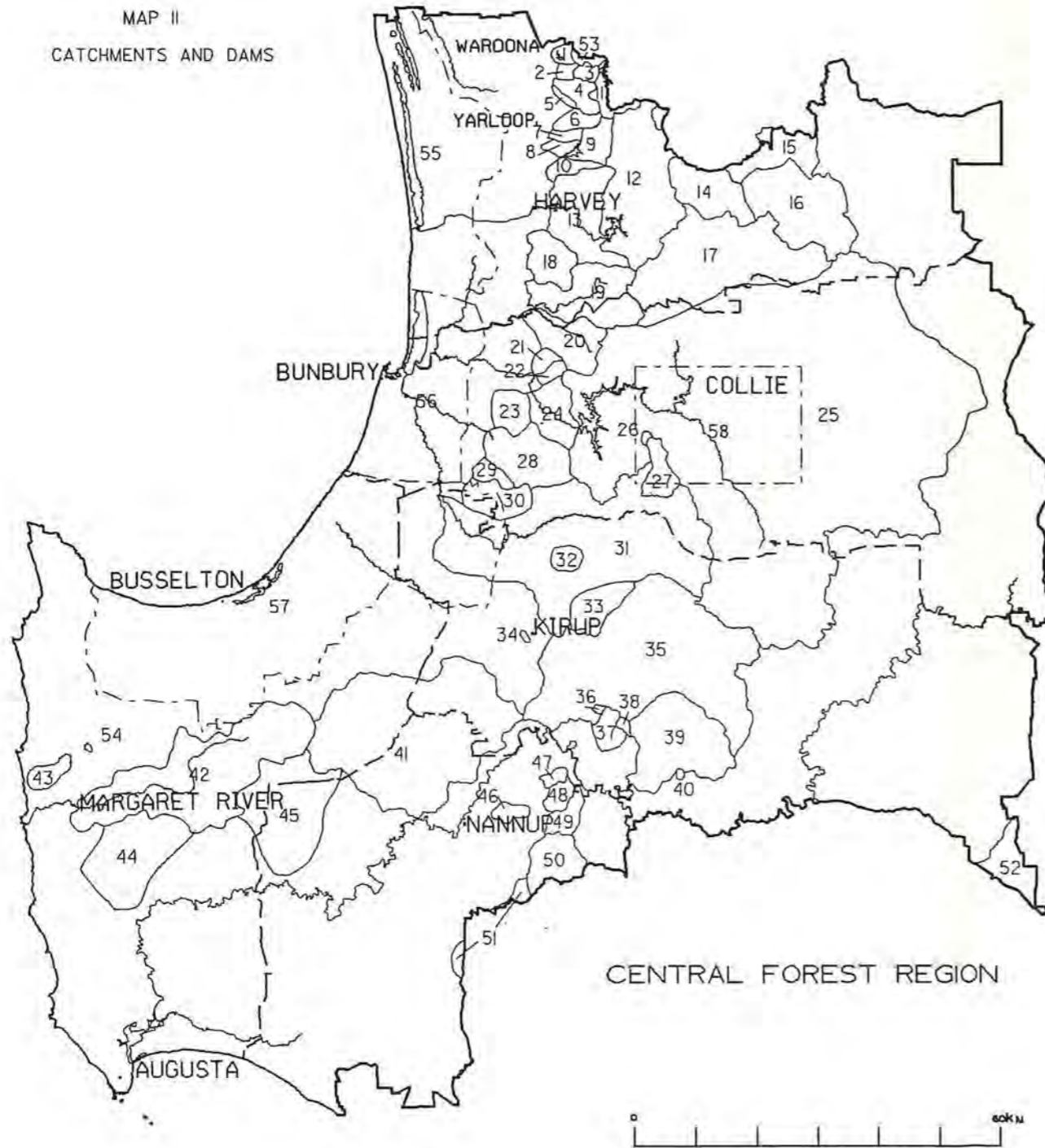
River	Catchment area above (likely) damsite		Mean annual flow	Mean annual salinity level
	km ²	% Cleared	m ³ x 10 ⁶	mg/L TDS
Harvey	380	0	113	200
Brunswick	213	25	78	230
Collie	2 830	23	185	750
Preston	603	40	97	250
Margaret	443	30	135	200
Blackwood	19 300	85	620	1 150

Data from Public Works Department (1979).

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

TDS - Total dissolved solids.

MAP II
CATCHMENTS AND DAMS



CATCHMENT CLASSIFICATIONS

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

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

1	DRAKES BROOK DAM	2b	30	JOSHUA CREEK	4
2	LOWER SAMSON	4	31	PRESTON RIVER	4
3	SAMSON BROOK P/H	2a (i)	32	CHARLEYS CREEK	4
4	McKNOE BROOK	4	33	THOMPSON BROOK	4
5	RED SWAMP BROOK	4	34	KIRUP DAM	2a (i)
6	BANKELL BROOK	2a (i)	35	BALINGUP BROOK	4
7	WATEROUS FORMATION BROOK	4	36	BALINGUP DAM	2a (i)
8	LOWER LOGUE	4	37	BORONIA GULLY	4
9	LOGUE BROOK DAM	2b	38	DUMPLING GULLY DAM	2a (i)
10	CLARKE BROOK	4	39	DALGARUP/HESTER BROOK	4
11	SAMSON DAM	2c (ii)	40	HESTER DAM	2a (i)
12	STIRLING DAM	2c (ii)	41	ST JOHN BROOK	4
13	HARVEY WEIR	2c (ii)	42	MARGARET RIVER	2a (i)
14	CHALK BROOK (MURRAY)	3	43	ELLEN BROOK	4
15	MURRAY	3	44	CHAPMAN BROOK	4
16	BELL BROOK (MURRAY)	3	45	ROSA BROOK	4
17	HARRIS RIVER	2c	46	TANJANERUP DAM	2a (i)
18	WELLESLEY CREEK	4	47	MILLSTREAM DAM	2a (i)
19	BEELA DAM	2a (i)	48	CAMP CREEK	4
20	BRUNSWICK RIVER	4	49	GREGORY BROOK	4
21	SHENTONS ELBOW BROOK	4	50	DONNELLY RIVER	3
22	ROE RANGE BROOK	4	51	UPPER BARLEE BROOK (DONNELLY)	3
23	HENTY BROOK	4	52	WARREN RIVER	3
24	COLLIE RIVER (BUREKUP)	4	53	WAROONA DAM	2b
25	WELLINGTON DAM	2a (i)	54	COWARAMUP W.S.	2a (i)
26	MUNGALUP DAM	2a (i)	55	SOUTH-WEST GROUNDWATER	1
27	GLEN MERVYN DAM	2b	56	BUNBURY GROUNDWATER	1
28	FERGUSON RIVER	4	57	BUSSELTON-CAPEL GROUNDWATER	1
29	CROOKED BROOK	4	58	COLLIE GROUNDWATER	1

TABLE 11

Some details about the principal dams in the
Central Forest Region.

Dam	Capacity m ³ x 10 ³	Supplying water to
Wellington	185 000	Collie Irrigation Area, Great Southern
Stirling	57 000	Harvey Irrigation
Logue Brook	24 300	Harvey Irrigation
Waroona	14 900	Waroona Irrigation
Samson Brook	9 170	Waroona Irrigation and Town
Harvey Weir	9 130	Harvey Irrigation and Town
Drakes Brook	2 290	Waroona Irrigation
Glen Mervyn	1 490	Preston Valley Irrigation
Mungalup	681	Great Southern Towns
Millstream	490	Bridgetown

Data from Public Works Department (1984).

Regional Strategies

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

- (i) continue close liaison between regional and district officers of CALM and the Water Authority;
- (ii) as required, develop management plans for catchments jointly with the Water Authority;

- (iii) accord the Department's land use zoning in the region with gazetted catchment boundaries and the salination risk zoning. This zoning will form the basis of all operational plans and prescriptions and will ensure that water resources conservation is the priority objective;
- (iv) allow recreation on catchments to proceed as determined by the W.A. Water Resources Council;
- (v) ensure that the extension of water based recreations to other locations in catchments is consistent with the maintenance of water quality;
- (vi) maintain recreation developments on water reserves and gazetted catchments;
- (vii) ensure that logging and roading prescriptions contain erosion and pollution control measures;
- (viii) program prescribed burning to seasonally separate planned burns adjoining water resevoirs;
- (ix) continue to provide an afforestation service to the Water Authority on the Wellington catchment;
- (x) assist Research Branch with hydrological studies of catchments as required. Research findings concerning catchment management will be disseminated.

Hardwood Timber

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

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

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

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

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

The Resource

The hardwood forests of this region can be broadly categorized into jarrah, wandoo, tuart or exotic eucalypts. The areas of these forest types are indicated in Table 3.

The volume of first grade sawlogs harvested from Crown land in the region in recent years has averaged 250 000 m³/annum, almost exclusively jarrah. Seventeen sawmills have been supplied with logs. Three mills at Collie, Yarloop and Nannup cut over 20 000 m³/annum.

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

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

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

Regional Strategies

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

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

Softwood Timber

During the last five years an average of 1 500 ha of pine has been planted each year by CALM in this region.

Land for pine planting is obtained by:

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

The Resource

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

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

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

Regional Strategies

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

- (i) seek to obtain the necessary land and funds to establish pine forests as required in the timber strategy;
- (ii) review planting rates, establishment, tending and silvicultural techniques annually and implement appropriate changes;
- (iii) carry out research into silviculture, fertilising, and establishment of legumes to accelerate the production of pine sawlogs;

- (iv) develop cost effective methods for treating debris on areas for planting a second rotation;
- (v) maximise use of resource through the 'Code of Softwood Logging Practice';
- (vi) prepare five-year harvesting plans each year, with year one of the plan in detail;
- (vii) undertake education programs about softwood forestry by preparing brochures, holding information tours, developing demonstration forests and agroforestry trials.

Mining

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

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

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

The Resource

Map 12 shows approved mining leases and claims, bauxite conveyor lines and refineries and current and proposed mining operations. The known mineral resources of the region are discussed in the explanatory notes provided with the geological maps produced by Wilde et al. (1978,

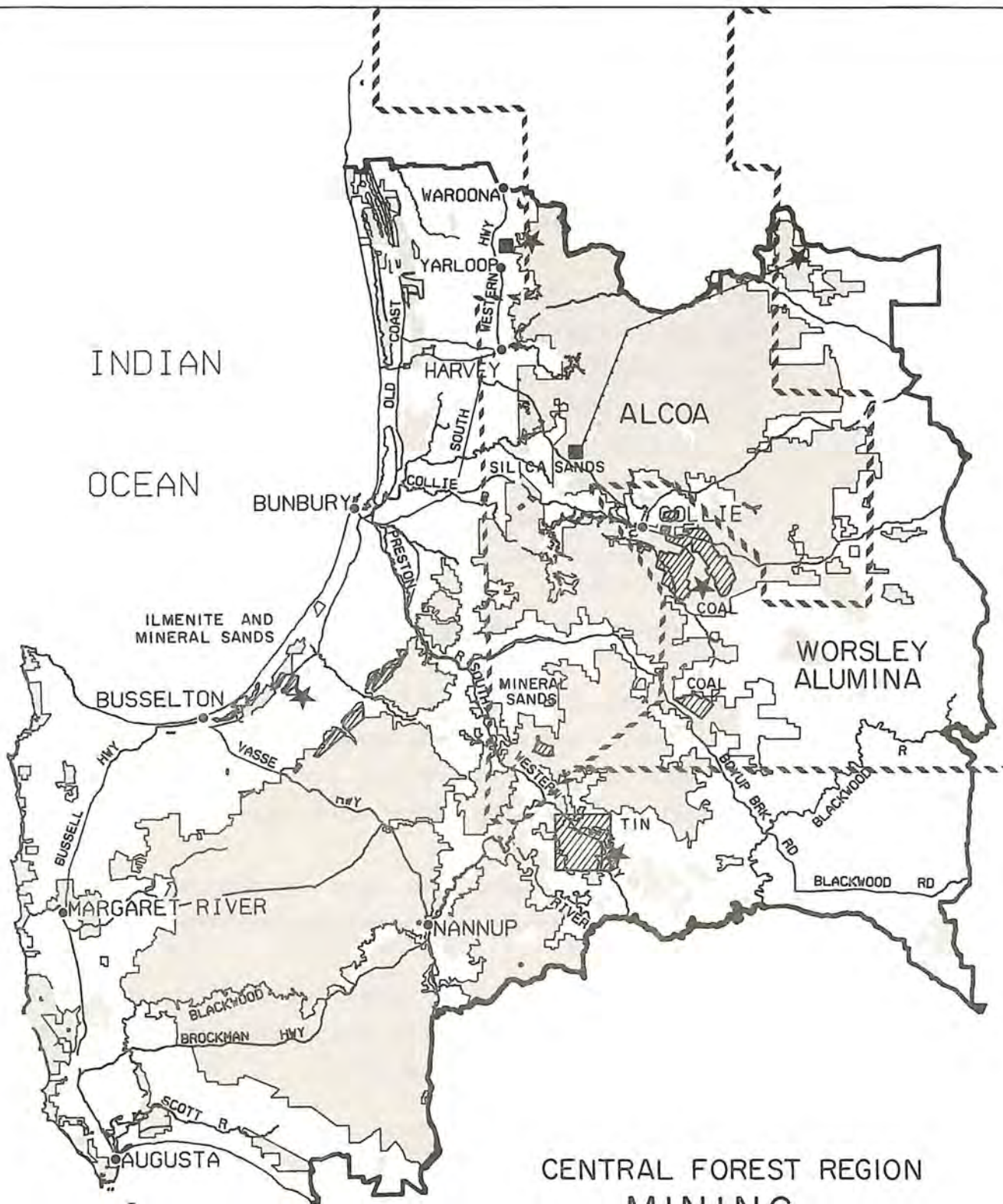
1983, 1984), Lowry (1967) and for the System 6 study (Biggs et al. 1980). Access to minerals is provided under Special Agreement Acts or the Mining Act.

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

Regional Strategies

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

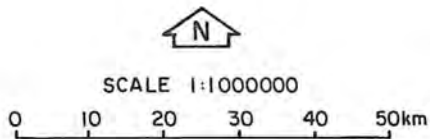
- (i) where exploitation and mining occur on CALM land, prepare (in conjunction with the companies), agreed working arrangements for planning, clearing, mining, rehabilitation, monitoring, maintenance and fire protection;
- (ii) consolidate mining operations with agreed long-term strategies, aiming to reduce the range of ages of rehabilitation, thus allowing more efficient protection and future management;
- (iii) prescribe and implement hygiene mining operations to protect adjacent unmined ecosystems from dieback;
- (iv) evaluate rehabilitation after mining. Where acceptable standards are not met, prepare a program of post-rehabilitation management;
- (v) maintain effective liaison with mining companies, either through regular and direct contact or through established committees such as the Mining Management Planning Liaison Group (MMPLG) and Mining Operations Group (MOG);



CENTRAL FOREST REGION MINING

KEY

- APPROVED BAUXITE MINING LEASES & CLAIMS
- OTHER APPROVED MINING LEASES & CLAIMS
- CONVEYOR LINES
- REFINERIES
- MINING IN PROGRESS
- MINING PROPOSED
- C.A.L.M. ESTATE



- (vi) ensure working arrangements with Alcoa and Worsley Alumina are updated frequently and liaise with Northern Forest Region to maintain a consistent approach;
- (vii) upgrade prescriptions as research develops;
- (viii) ensure, via the Collie Coal Mines Rehabilitation Committee, that detailed plans for future coal mining and rehabilitation are provided and implemented satisfactorily by both companies;
- (ix) obtain from tin and mineral sand mining companies operating on CALM land a long-term conceptual plan, and five-year plans to cover mining and rehabilitation proposals.

Basic Raw Materials (gravel, sand, stone)

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

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

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

Regional Strategies

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

- (i) develop basic raw material plans for CALM lands, to meet long-term needs;

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

Wildflowers

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

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

commercial purposes licences, which allow the sale of protected flora taken on Crown land;

commercial production licences, which allow the sale of protected flora taken on private land;

scientific or prescribed purposes licences, issued to those people intending to take native plants, but not to sell them.

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

Wildflower picking under licence is permitted on State forest areas apart from State park and forest park. Usually no picking is allowed within 50 m of public roads.

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

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

Regional Strategies

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

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

Nurseries

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

There are two Departmental nurseries in the region, a pine nursery near Nannup, and Hamel nursery near Waroona, which is controlled by the Northern Forest Region.

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

Regional Strategies

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

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

Apiculture

In recent years annual production from apiary sites in this State has been of the order of 2 600 t of honey and 50 t of beeswax with a gross value of over \$2 million (1980/81). Much of this production was from apiary sites on CALM lands. The Department acts as the central registration authority for apiary sites on all Crown lands.

The number of sites available on CALM lands is limited by management constraints such as the 3 km minimum spacing between sites, dieback hygiene requirements and forest regeneration activities. Honey, beeswax and pollen may be removed from national parks and nature reserves under Section 99 of the CALM Act.

Currently apiarists hold over 370 registered sites within this region, most of which are on CALM land.

In addition, there are numerous sites on adjoining private property with the bees using CALM land. Feral bees are present throughout the region (Moore et al. 1983). The environmental effects of bees are the subject of current research.

Regional Strategies

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

- (i) improve the administration of the honey production industry on CALM lands by the promotion of self regulation e.g. for notification, site security, hygiene;

- (ii) continue research into environmental effects;
- (iii) maintain the existing number of apiary sites by arranging relocation whenever existing sites are disturbed by e.g. mining, logging.

Fishing

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

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

Amateur fishing in, or requiring access through, areas managed by CALM includes inland fishing for marron and trout as well as ocean and estuary fishing. The rules for amateur fishermen are summarised in 'Recreational Fishing. A Guide to the Rules', Fisheries Department (1985).

Regional Strategies

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

- (i) summarise data on amateur and professional fishing on CALM lands and waters in the region e.g. locations fished, target species, fishing effort, with a view to minimising impacts;
- (ii) summarise information about constraints on fishing e.g. Fisheries Regulations, restrictions on access - DRA, catchment;

- (iii) maintain liaison with the Fisheries Department and if necessary seek changes in fishing regulations and/or access.

PUBLIC UTILITIES

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

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

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

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

Regional Strategies

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

- (i) meet with Regional officers in charge of key public utilities once a year to obtain information on any proposals likely to affect CALM land and negotiate relocation, timing of operations etc. to minimise impact on CALM land;
- (ii) seek involvement in public utility maintenance programs affecting CALM land to ensure that harmful effects are minimised;

- (iii) maintain an inventory of existing damage on areas of public utilities and implement rehabilitation programs. Ensure that where new damage occurs the utility involved is aware of its obligation to fund and undertake rehabilitation.

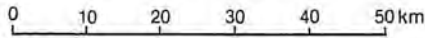
CENTRAL FOREST REGION

LEGEND

PUBLIC UTILITIES



SCALE 1:1 000 000



- The C.A.L.M. Estate
- Transmission Lines 66 kV, 132 kV and 330 kV
- Conveyor Lines
- Railways
- Major Water Supply Pipelines
- Microwave Transmission Towers—S.E.C.
- Microwave Transmission Towers—Telecom
- T.V. and Radio Towers
- Landing Grounds—Public
- Landing Grounds— C.A.L.M.
- Landing Grounds— C.A.L.M. (Agricultural Standard Only)
- Natural Gas Pipeline



5. DURATION AND PLAN REVIEW

The proposed duration of this plan is ten years (1987-1997) but the need for revision will be considered after five years (in 1992).

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7. GLOSSARY

Active recreation: Recreation which has a significant effect on one or more of the following: native flora, fauna, the environment, or other people.

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

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.

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

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

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

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

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

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

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

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

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

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.

Fauna: Animal life

Flora: Plant Life

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

Geomorphology: The description and interpretation of landforms.

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

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

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

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

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

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

Multiple use management: The use of 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.

Quaternary: The most recent period of geological time, from the present to about 1 million years ago.

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

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

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

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

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).

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

Strategy: Explains how policy is intended to be achieved.

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

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

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

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

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

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

GLOSSARY OF ABBREVIATIONS

A.	<u>Acacia</u>
B.	<u>Banksia</u>
CALM	(Department of) Conservation and Land Management
CSIRO	Commonwealth Scientific and Industrial Research organisation
CTRC	Conservation Through Reserves Committee
DRA	Disease Risk Area
E.	<u>Eucalyptus</u>
EPA	Environmental Protection Authority
ERMP	Environmental Review and Management Program
<u>et al.</u>	and others
ha	hectares
km	kilometre
LFC	Lands and Forests Commission (A controlling body established under Section 20 of the CALM Act, 1984)
M.	<u>Melaleuca</u>
MPA	Management Priority Area
P.	<u>Pinus</u>
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)
SEC	State Energy Commission
TDS	Total dissolved solids
VCL	Vacant Crown land
WAWA	Water Authority of Western Australia
10 ³	1 000
10 ⁶	1 000 000