Nambung National Park

Management Plan

1998 - 2008

Management Plan No. 37

Department of Conservation and Land Management

National Parks and Nature Conservation Authority

MANAGEMENT PLAN

Nambung National Park
Wanagarren Nature Reserve
Nilgen Nature Reserve
Southern Beekeeper's Nature Reserve

1998 - 2008

Department of Conservation and Land Management
for the
National Parks and Nature Conservation Authority
Perth, Western Australia, 1998

PREFACE

All national parks, conservation parks and nature reserves in Western Australia are vested in the National Parks and Nature Conservation Authority (NPNCA), and managed by the Department of Conservation and Land Management (CALM).

The NPNCA is responsible for preparing management plans for all lands that are vested in it. CALM prepares the plans on a regional and area basis, and prepares plans for individual areas on a priority basis. The NPNCA issues draft plans for public comment and provides a final plan for approval by the Minister for the Environment.

This area management plan is for the Nambung National Park and Wanagarren, Nilgen and Southern Beekeeper's Nature Reserves.

Changes of purpose have been proposed for several of the areas covered in this management plan and these will have to be approved before strategies requiring this change in status are able to be implemented.

According to the CALM Act (1984), management plans must contain:

- a statement of the policies or guidelines proposed to be followed; and
- a summary of operations proposed to be undertaken,

for a specified period not exceeding 10 years.

In accordance with Section 55 of the Act, the term of this plan will be 10 years but a review may take place within the term of the plan.

ACKNOWLEDGEMENTS

This plan was prepared by the Nambung, Nilgen, Wanagarren, Southern Beekeeper's planning team comprising Jacqueline Pontré and Matt Cavana - Coordinators, David Rose - District Manager, Keith Hockey - Senior Ranger, and Allan Burbidge - Senior Research Scientist. The contributions of Sue Hancock and Wayne Schmidt to the final plan, and Andrew Hill, Aminya Koch and Kate Orr to the early drafts of the plan are acknowledged.

Many people have provided valuable assistance in the preparation of this plan, particularly:

- Staff of the Department's Midwest Region, Moora District and Information Management Branch;
- Members of the Lesueur-Nambung Advisory Committee:
  Mr John Baas, Mr John Browne, Mr Ron Crane, Mrs Andrea Endacott, Mr Ted Griffin, Mr Ted Emery, Mr Greg Leaman (Chairman), Mr Kevin McMenemy, Mr David Ottaway, Mr Jim Sharp, Mr Don Williams and Mr Iain Wilson.

The Western Australian Museum is gratefully acknowledged for its information on vertebrate fauna.

NOMENCLATURE

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

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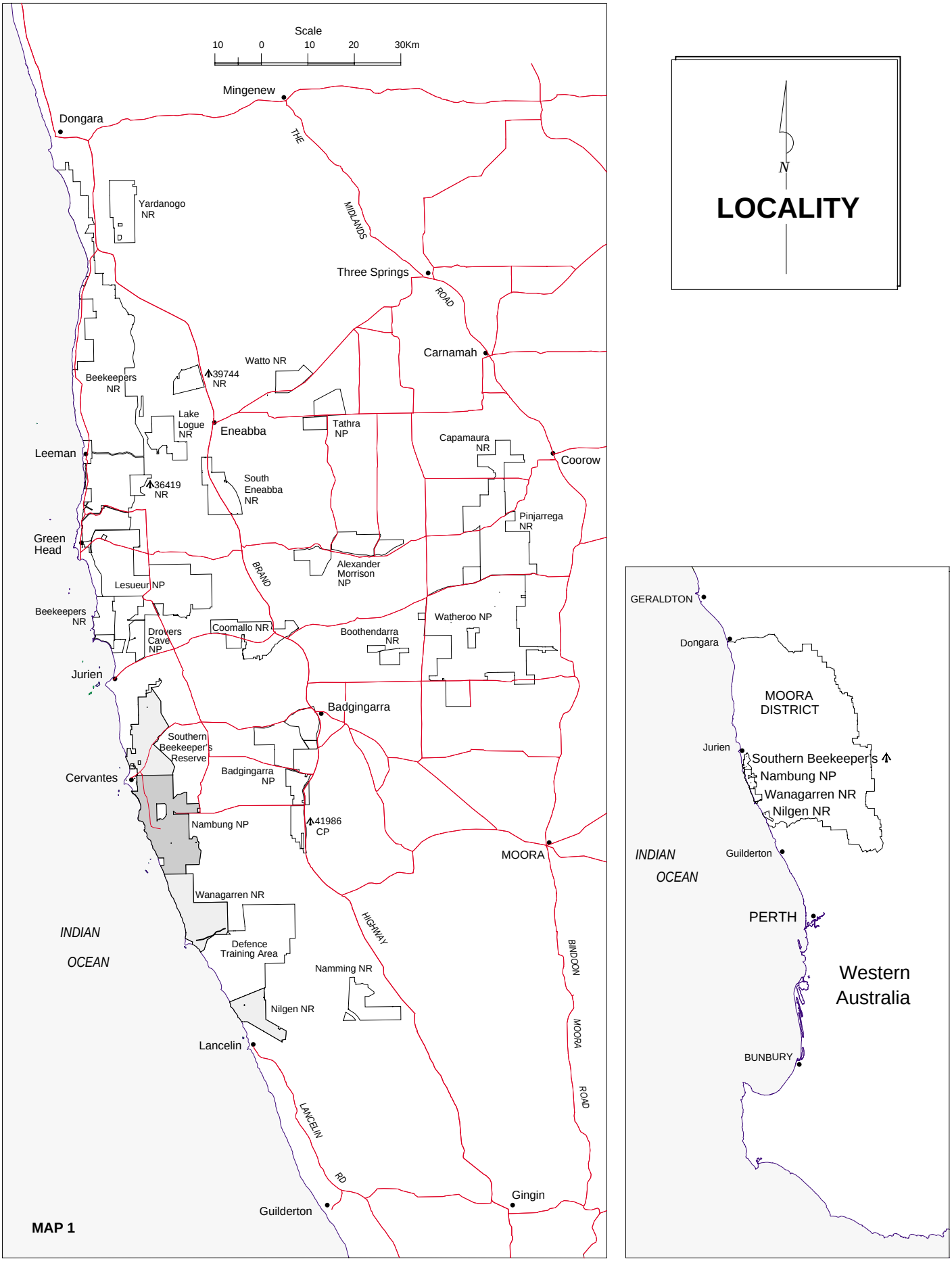

Scale
10 0 10 20 30Km
Mingenew
Dongara
THE MIDLANDS ROAD
Yardanogo NR
Three Springs
Carnamah
Watto NR
39744 NR
Beekeepers NR
Lake Logue NR
Eneabba
Tathra NP
Capamaura NR
Coorow
Leeman
36419 NR
South Eneabba NR
Pinjarrega NR
Green Head
BRAND
Alexander Morrison NP
Lesueur NP
Beekeepers NR
Drovers Cave NP
Coomallo NR
Boothendarra NR
Watheroo NP
Jurien
Badgingarra
Southern Beekeeper's Reserve
Cervantes
Badgingarra NP
Nambung NP
41986 CP
MOORA
Wanagarren NR
INDIAN OCEAN
HIGHWAY
Defence Training Area
Namming NR
BINDOON MOORA ROAD
Nilgen NR
Lancelin
LANCELIN RD
Guilderton
Gingin
MAP 1
N
LOCALITY
GERALDTON
Dongara
MOORA DISTRICT
Jurien
Southern Beekeeper's
Nambung NP
Wanagarren NR
Nilgen NR
INDIAN OCEAN
Guilderton
PERTH
Western Australia
BUNBURY

INTRODUCTION

1.0 OVERVIEW

1.1 Brief Description

Nambung National Park (18 319 ha) and Wanagarren (11 069 ha), Nilgen (5 507 ha) and Southern Beekeeper's (10 841 ha) Nature Reserves are located near the coastal towns of Cervantes and Lancelin, about 240 km north of Perth, Western Australia. The Park and Reserves are part of CALM's Moora District, which extends from Dongara in the north to Lancelin in the south and inland to about 150 km to the east (see Map 1).

The area experiences a Mediterranean climate of hot, dry summers and cool, wet winters with a moderately reliable rainfall. Most of the average annual 600 mm of rain falls between May and September. Mean maximum temperatures vary from 30.5 ˚C near the coast to 32.5 ˚C inland, while the mean minimum varies from 9 ˚C to 10 ˚C.

The Park and Reserves have a diverse range of landforms. These include three old systems of sand dunes that run parallel to the coast, significant limestone cave systems and important geological features including the unique Pinnacles. The area also has a diverse flora of several hundred species. Low exposed heaths of mainly acacia and myrtles dominate the landscape, with tuart woodlands occurring in the valleys.

The area's fauna is also representative of the region with at least eight native mammal, 103 bird, 17 reptile and three frog species. Carnaby's Black Cockatoo (*Calyptorhynchus latirostris*) is gazetted as rare or likely to become extinct, and the Carpet Python (*Morelia spilota imbricata*) and Peregrine Falcon (*Falco peregrinus*) are gazetted as in need of special protection under the Wildlife Conservation Act.

The coast and hinterland between Jurien and Lancelin are of considerable biogeographic interest, as some species (e.g. Pied Butcher-bird *Cracticus nigrogularis*, Blue-breasted Fairy-wren *Malurus pulcherrimus*, Long-billed Corella *Cacatua pastinator butleri*) do not occur further south. Several south-western species (e.g. the Varied Sittella *Daphoenositta chrysoptera* and Restless Flycatcher *Myiagra inquieta*) do not extend their geographical range north of the Hill or Nambung Rivers. In addition, the area is the stronghold of a disjunct coastal population of White-breasted Robin *Eopsaltria georgiana*.

The cultural heritage of the Park and Reserves is important as evidence of Aboriginal occupation and early European exploration.

The Pinnacles Desert remained relatively unknown until the late 1960s when the Department of Lands and Surveys agreed to establish a national park over the area. Three separate reserves, making up Nambung National Park, were gazetted. These were amalgamated into one 'A' class reserve in July 1994. Wanagarren was gazetted as a 'C' class reserve in 1972, Nilgen was gazetted as a 'C' class reserve in 1973 and Southern Beekeeper's was gazetted as a 'C' class reserve in 1979.

In recent years, the Pinnacles have attracted increasing numbers of tourists from all over the world. Past management has mainly focussed on protecting the Pinnacles by managing visitor access to the area. Other attractions in the Park and Reserves include the annual displays of wildflowers and the spectacular coastal scenery. Opportunities for sightseeing, bushwalking, nature appreciation, picnicking, coastal camping and four-wheel driving, all within a couple of hours drive from Perth, have meant large increases in visitor activity and commercial tourism in the area.

Under their current tenure, many activities taking place in the nature reserves are not consistent with their primary purpose. These include camping, lighting of campfires, and off-road driving which causes a proliferation of tracks and degradation of dune vegetation. These problems are exacerbated by the presence of squatters' shacks at Wedge and Grey.

This management plan has been prepared to resolve present conflicts, to plan for future needs and to ensure the Park's and Reserves' values are protected and maintained.

National Estate Register
Nambung National Park and Wanagarren and Nilgen Nature Reserves are listed on the National Estate Register in recognition of their significance for conservation. Nambung National Park is listed for its high aesthetic value in its range of landforms including the dune systems, caves and particularly the Pinnacles. Wanagarren and Nilgen Nature Reserves are listed for their diversity of heath flora. Southern Beekeeper's Reserve is not listed, but this may be due to its comparatively recent vesting in the NPNCA.

1.2 Public Participation

Public participation in the preparation of this management plan has been extensive and included specifically forming and seeking advice from an advisory committee, arranging meetings as required, seeking pre-draft public submissions and conducting

recreation surveys. Much of the main direction for the future of the Park and Reserves is based on the views expressed by the many people who have become involved during the preparation of this management plan.

Advisory Committee
The Advisory Committee was formed in February 1993 to provide advice on the preparation of management plans for Lesueur National Park and Coomallo Nature Reserve (CALM, 1994a) and for Nambung National Park and Wanagarren, Southern Beekeeper's and Nilgen Nature Reserves (this document). Four meetings were subsequently held as part of the preparation of this management plan.

Meetings
A number of meetings were held with interested groups and individuals, including the Shires of Gingin, Dandaragan and Coorow.

Pre-draft Submissions
Thirteen submissions were received after a call for comment was advertised in local and Statewide newspapers, and after a pamphlet was circulated to the community, organisations and other Government departments announcing the commencement of the management plan. Access, fire protection, recreation and squatters were the main focus of these submissions.

Recreation Surveys
CALM conducted a survey of visitors to the Park and Reserves between December 1992 and November 1993 to determine the levels and types of recreation occurring in the area, and what perceptions visitors have for future management of the area. Site observations of recreation activities were also undertaken. These included an aerial survey over Easter 1993. A 'Comment Card' survey was carried out at Nambung National Park during April 1994. The cards included questions on the provision of facilities and services and the level of enjoyment experienced by visitors. Survey results indicated that the main users of the Park and Reserves are family groups. People visiting the Park do so mainly to see the Pinnacles and view the unique scenery and landscapes that are found along the coast.

Commercial Operators Survey
CALM conducted a survey of commercial operators in the Park and Reserves in November 1993. The survey included questions on the routes travelled on tours, frequency of tours, major features of interest and origin of tour passengers. Results of the survey indicated that commercial operators carried the greatest number of visitors in the months of August, September, October and November. Major features of interest to passengers on tours include the Pinnacles, the wildflowers, the coastline and sand dunes.

Visitor Numbers
Traffic counters are used at Nambung National Park to determine visitor numbers and patterns. The data form part of CALM's visitor information statistics (VISTAT) program. Ticket collectors at Nambung National Park also carry out daily surveys of types of vehicles and vehicle occupancy. Based on traffic counter records, car occupancy surveys and bus/coach numbers Nambung National Park had an estimated 134,000 visitors for the 1996/1997 financial year.

Submissions to the Draft Management Plan
Twenty-eight public submissions were received during the public comment period of the draft management plan. All comments have been given careful consideration and incorporated into this plan where appropriate.

2.0 MANAGEMENT GOALS AND OBJECTIVES

2.1 Primary Objectives

The statement of mission adopted in CALM's Strategic Plan is:

TO CONSERVE WESTERN AUSTRALIA'S WILDLIFE AND MANAGE LANDS AND WATERS ENTRUSTED TO THE DEPARTMENT FOR THE BENEFIT OF PRESENT AND FUTURE GENERATIONS.

CALM's primary objective in managing national parks and conservation parks, as defined in Section 56 of the CALM Act (1984), is to:

> fulfil so much of the demand for recreation by members of the public as is consistent with the proper maintenance and restoration of the natural environment, the protection of indigenous flora and fauna, and the preservation of any feature of archaeological, historic or scientific interest.

In the case of nature reserves, the primary objective is to:

> maintain and restore the natural environment, and to protect, care for, and promote the study of indigenous flora and fauna, and to preserve any feature of archaeological, historic or scientific interest.

Due to tenure changes proposed in this plan it is also necessary to consider any other land referred to in section 5(g) of the Act, the primary objective of which is to:

> achieve the purpose for which the land was vested in the controlling body.

Nambung National Park will be managed with these primary objectives. As discussed in section 3.0 Land Tenure, the actual activities that are taking place at Wanagarren, Nilgen and Southern Beekeeper's Nature Reserves are not consistent with CALM's primary objectives in managing these lands, as defined by the CALM Act (1984). Section 3.0 outlines the reasons for proposed changes to the purpose of these reserves to better reflect their current use and puts forward strategies accordingly.

2.2 NPNCA and CALM Management Policies

This management plan is based on National Parks and Nature Conservation Authority (NPNCA) and Department of Conservation and Land Management (CALM) policies. These policies are derived from legislation, principally the CALM Act (1984), the Wildlife Conservation Act (1950) and associated regulations. Policies are published and distributed throughout CALM as policy statements and are available to the public on request.

2.3 Management Goals

CALM's management goals and objectives for Nambung National Park and Wanagarren, Nilgen and Southern Beekeeper's Nature Reserves are:

Conservation
- Conserve biological, physical, cultural and landscape resources.

Recreation and Tourism
- Facilitate recreation and tourism in a manner compatible with conservation and other goals.

Community Relations
- Promote informed appreciation of the area's natural and cultural values, and facilitate liaison with the community about their management.

Commercial and Other Uses
- Manage commercial and other uses in a manner that minimises impact on other values.

Research and Monitoring
- Seek a better understanding of the natural and cultural environments, and the impacts of visitor use and management activities.

In 1996, the Western Australian Planning Commission released the Central Coast Regional Strategy document that provides a framework for future planning for all land along the central coast which includes the Park and Reserves. The strategies in this management plan compliment the goals and objectives of the Central Coast Regional Strategy.

2.4 Key Issues for Future Management

All issues relevant to management of the reserves are considered in this management plan, however, the following are considered to be key issues (which are not in order of priority).
- Tenure and purpose
- Fire risk and access for control
- *Phytophthora* dieback
- Recreation pressure on coastal lands
- Squatter shack removal
- Proposed coastal road connection between Jurien and Lancelin.

LAND USE MANAGEMENT

3.0 LAND TENURE

3.1 Boundaries and Land Tenure

The objective is to ensure that the gazetted purpose, vesting and tenure of the Park and Reserves reflect their values and use.

Nambung National Park
The Nambung National Park was named after the Nambung River. Prior to July 1994, it comprised three separate reserves:

- Reserve No. 24522 was gazetted in 1956 as an 'A' class reserve for the purpose of 'National Park and Water'.
- Reserve No. 28393 was gazetted in 1967 as a 'C' class reserve for the purpose of 'Preservation of Natural Formations - Pinnacles'.
- Reserve No. 29149 was gazetted in 1968 as a 'C' class reserve for the purpose of 'National Park'.

In July 1994, Reserve Nos 29149 and 28393 were cancelled and included into Reserve No. 24522. Its gazetted name is Nambung National Park with an area of 18 362 ha. It is an 'A' class reserve with the purpose of 'National Park and Water' and is vested in the NPNCA. The Park extends to low water mark (see Map 2).

Wanagarren Nature Reserve
Wanagarren Nature Reserve was named after an abandoned homestead in the area. It comprises Reserve No. 31675 which was gazetted in 1972 as a 'C' class reserve for the purpose of 'Conservation of Flora and Fauna'. It has an area of 11 069 ha and is vested in the NPNCA. Its gazetted name is Wanagarren Nature Reserve and it extends to low water mark (see Map 2).

It is proposed that Wanagarren Nature Reserve be incorporated into Nambung National Park and that its security of tenure be upgraded to 'A' class. As the reserve is contiguous with Nambung National Park, it would be best managed as one larger unit. Recreation has occurred on the coast of the reserve for many decades, though such use was not acknowledged when the nature reserve was originally gazetted. The tenure change recognises that recreation is one of the primary values of this area and that visitor use must be properly managed to protect the natural values. The reserve is representative of the coastal heath ecosystem but contains no known rare species or specially protected communities.

Nilgen Nature Reserve
Nilgen Nature Reserve was named after a swamp that was originally named after a well on Location 942. (The well was first noted on lease plan 1897 and has since been filled in). It comprises Reserve No. 31781 which was gazetted in 1973 as a 'C' class reserve for the purpose of 'Conservation of Flora and Fauna'. It has an area of 5 507 ha and is vested in the NPNCA. Its gazetted name is Nilgen Nature Reserve and it extends to low water mark.

This reserve's close proximity to Lancelin (and both the off-road vehicle area and defence training area) has resulted in heavy vehicle use causing a proliferation of tracks, and the consequent degradation of the vegetation and dune system along the coast.

It is proposed that Nilgen Nature Reserve be changed to a Conservation Park and that its security of tenure be upgraded to 'A' class. The tenure change recognises that recreation is one of the primary values of this area and that visitor use must be properly managed to protect the natural values.

Southern Beekeeper's Nature Reserve
Southern Beekeeper's Nature Reserve has no official name but is locally known as such. It comprises Reserve No. 36053 which was gazetted in 1979 as a 'C' class reserve for the purpose of 'Apiculture and Conservation of Flora'. It has an area of 10 841 ha and extends to high water mark. It was an unvested reserve until the proclamation of the CALM Amendment Act (1991) which stipulated that any unvested lands which had 'conservation' in their purpose be vested in the NPNCA as nature reserves and managed by CALM.

The reserve's current purpose of 'Apiculture and Conservation of Flora' varies from the normal nature reserve definition. It is proposed that Southern Beekeeper's Nature Reserve be changed to a miscellaneous reserve under section 5(g) of the CALM Act, that its purpose be amended to 'Conservation, Recreation and Apiculture', and that its security of tenure be upgraded to 'A' class. Miscellaneous reserves have a wide variety of purposes and may accommodate a range of land uses, but are normally related to wildlife conservation, recreation and historical features. This change will secure the use of the reserve for apiculture. Appropriate uses are determined by the purpose of the reserve.

DISCUSSION
The primary management objectives for nature reserves, national parks, conservation parks and 5(g)reserves as defined in Section 56 of the CALM Act (1984) are presented in section 2.1 Primary Objectives. Under their current tenure, many activities taking place in the Wanagarren, Nilgen and Southern Beekeeper's Nature Reserves are not consistent with their purpose. For example, camping and off-road driving are not normally allowed in

Table 1.
TENURE CHANGES - NATURE RESERVES

Map Ref.	Land/Reserve	Area (ha)	Actions
1	Reserve No. 31675 Wanagarren Nature Reserve	11 069	Amend to 'A' class national park and incorporate into Reserve No. 24522 Nambung National Park.
2	Reserve No. 31781 Nilgen Nature Reserve	5 507	Amend to 'A' class Conservation Park.
3	Reserve No. 36053 Southern Beekeeper's Reserve	10 841	Amend to 'A' class miscellaneous 5(g) reserve under the CALM Act (1984) for the purpose of 'Conservation, Recreation and Apiculture'. Formalise the name for the reserve.

nature reserves and these activities are currently taking place in Wanagarren and Nilgen Nature Reserves.

Attempts to restrict these types of activities have not been successful. Nature reserves do not normally have 'Apiculture' in their purpose and Southern Beekeeper's Nature Reserve has a number of registered apiary sites which will continue to operate in the area. It is proposed that management of these reserves and protection of their conservation values would be best achieved by managing for their use rather than attempting to restrict the activities. Table 1 includes a summary of these tenure proposals.

STRATEGY

1. Implement the tenure changes proposed in Table 1.

3.2 Surrounding Land

The objectives are to:
1. *Seek to incorporate appropriate lands within the conservation estate.*
2. *Encourage owners of nearby lands to manage their properties in a way sympathetic with management of the Park and Reserves.*

Various land tenures surround the National Park and Reserves, including private property, leasehold land, vacant Crown land, town sites and other reserves (see Map 2). The management objectives for the Park and Reserves cannot be achieved in isolation but must be complementary to management of these surrounding areas. Disease and fire management, in particular, must be approached from the broader perspective in order to achieve specific protection objectives for the reserves. Ongoing liaison with neighbours and responsible authorities is essential for implementing mutually beneficial management arrangements. Of particular importance are:
- neighbouring land owners
- Shire of Gingin and Shire of Dandaragan
- Commonwealth Department of Defence
- Agriculture Western Australia
- Water and Rivers Commission
- Water Corporation
- Fisheries Western Australia
- Bush Fires Board
- Main Roads Western Australia

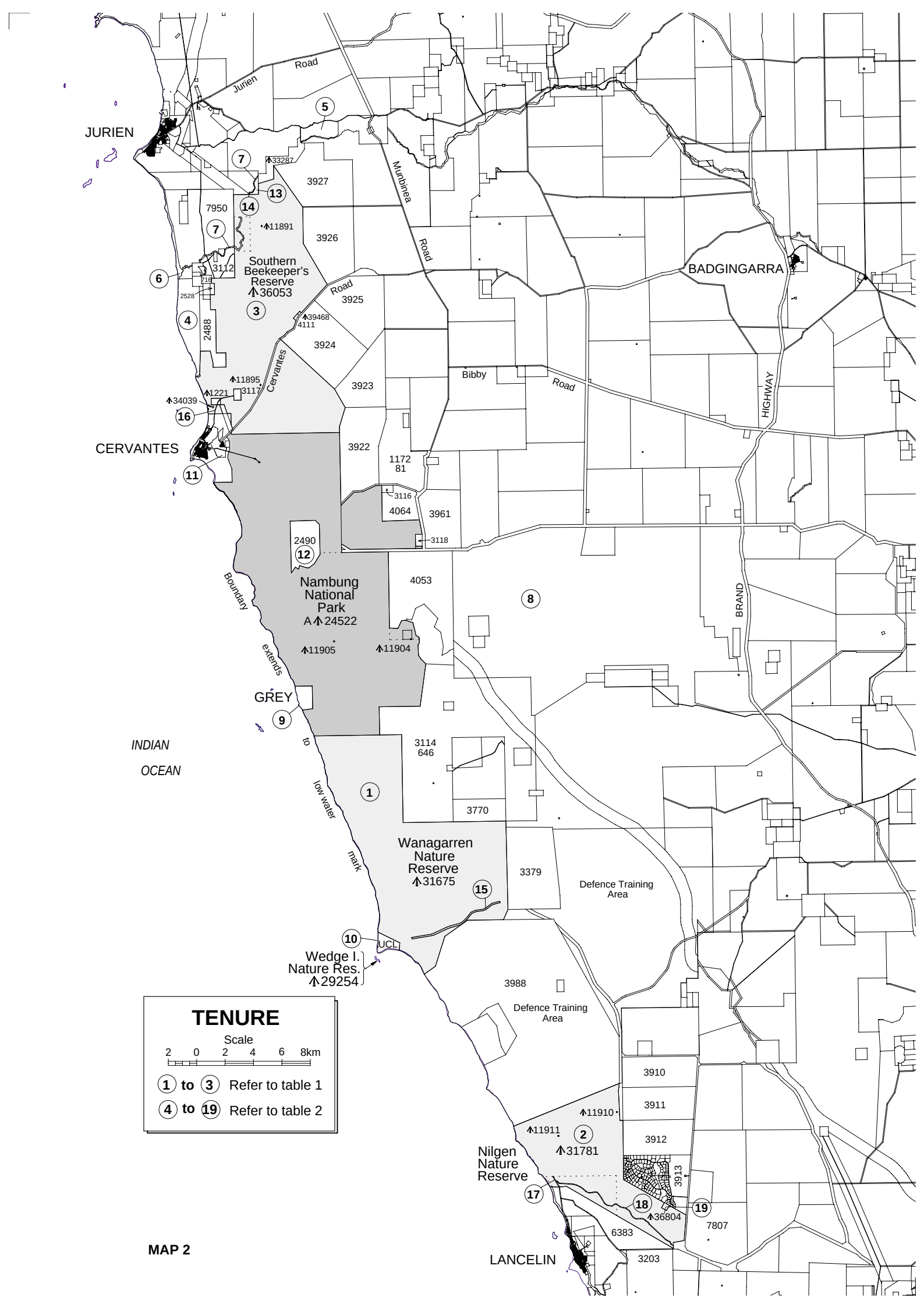
There are a number of 'A' class island nature reserves adjacent to the Park and Reserves. These islands are used by nesting coastal birds and are an important refuge for sea lions.

It is beyond the scope of this management plan to address in detail the management of surrounding lands, but some areas warrant special mention. Broader planning strategies for the central coast are contained in WA Planning Commission (1996), Crook *et al.* (1984) and Shire plans.

In order to maximise the reserves' protection, rationalise their administration and management, particularly through boundary changes, and minimise future land use conflicts, it may be appropriate to investigate possible reserve excisions or additions. Table 2 includes a summary of tenure proposals outlined below and Map 2 identifies the areas concerned.

- Reserve No. 19206 (Parkland, Recreation and the Letting of Cottages existing thereon) vested in the Shire of Dandaragan (717 ha) adjoins the Southern Beekeeper's Nature Reserve and private property between Black Point and the Hill River. The area contains an assemblage of wetlands and dune forms that are unique on the west coast, and is used for recreation and camping. Increasing use is degrading coastal dunes. The Shire has expressed an intention to manage the area for recreational use compatible with the protection of the area's conservation values. It is important that the gazetted purpose reflects this intent and that adequate planning and management of the area occurs. The Shire has resolved to implement the Government Squatter Shack Policy for this reserve, and the shacks are due to be removed by the year 2001.

- Reserve No. 33048 (Government Requirements), 264 ha, is unvested and protects a section of the Hill River between 'C' class Nature Reserve 33287 (293 ha) and 'A' class Nature Reserve 36093 (882 ha). These reserves, as well as vacant Crown land



TENURE

Scale

2 0 2 4 6 8km

(1) to (3) Refer to table 1

(4) to (19) Refer to table 2

MAP 2

Table 2.
TENURE CHANGES - OTHER LANDS

Map Ref.	Land/Reserve	Area (ha)	Actions
4	Reserve No. 19206 Parkland, Recreation and the Letting of Cottages existing thereon	717	Liaise with the Shire of Dandaragan in regard to vesting and management of the reserve.
5	Reserve No. 33048 Government Requirements	264	Amend to 'A' class nature reserve vested in NPNCA (portion of Reserve No. 36093 along Hill River).
6	Hill River Mouth	-	Vest in NPNCA as 'A' class reserve.
7	VCL - Hill River corridors	-	Vest in NPNCA as 'A' class reserve .
8	VCL - east of Nambung NP	-	Investigate conservation values and existing use to determine appropriate purpose and vesting.
9	Reserve 43284 - Grey	-	Incorporate into Nambung National Park on removal of squatter shacks.
10	Reserve 43283 - Wedge Point	-	Incorporate into Nambung National Park on removal of squatter shacks.
11	Reserve No. 35819 Lake Thetis	-	Incorporate into Reserve No. 24522 Nambung National Park.
12	CG 2490	654	Investigate the acquisition of the land for incorporation into Reserve No. 24522 Nambung National Park.
13	CG 3392 - Hill River	35.8	Investigate the acquisition of the portion of the block south of the Hill River for incorporation into Southern Beekeepers Nature Reserve.
14	Portion of Old North Road Stock Route	-	Incorporate into the Southern Beekeepers Nature Reserve.
15	Road Reserve No. 17252	-	Assess and cancel if not considered necessary.
16	Road Reserve No. 15599	-	Assess and cancel if not considered necessary.
17	Road Reserve No. 15441	-	Assess and cancel if not considered necessary.
18	Road Reserve No. 16638	-	Assess and cancel if not considered necessary.
19	Reserve No. 36804	-	Liaise with the Shire of Gingin to ensure mining operations do not impact on surrounding nature reserve.

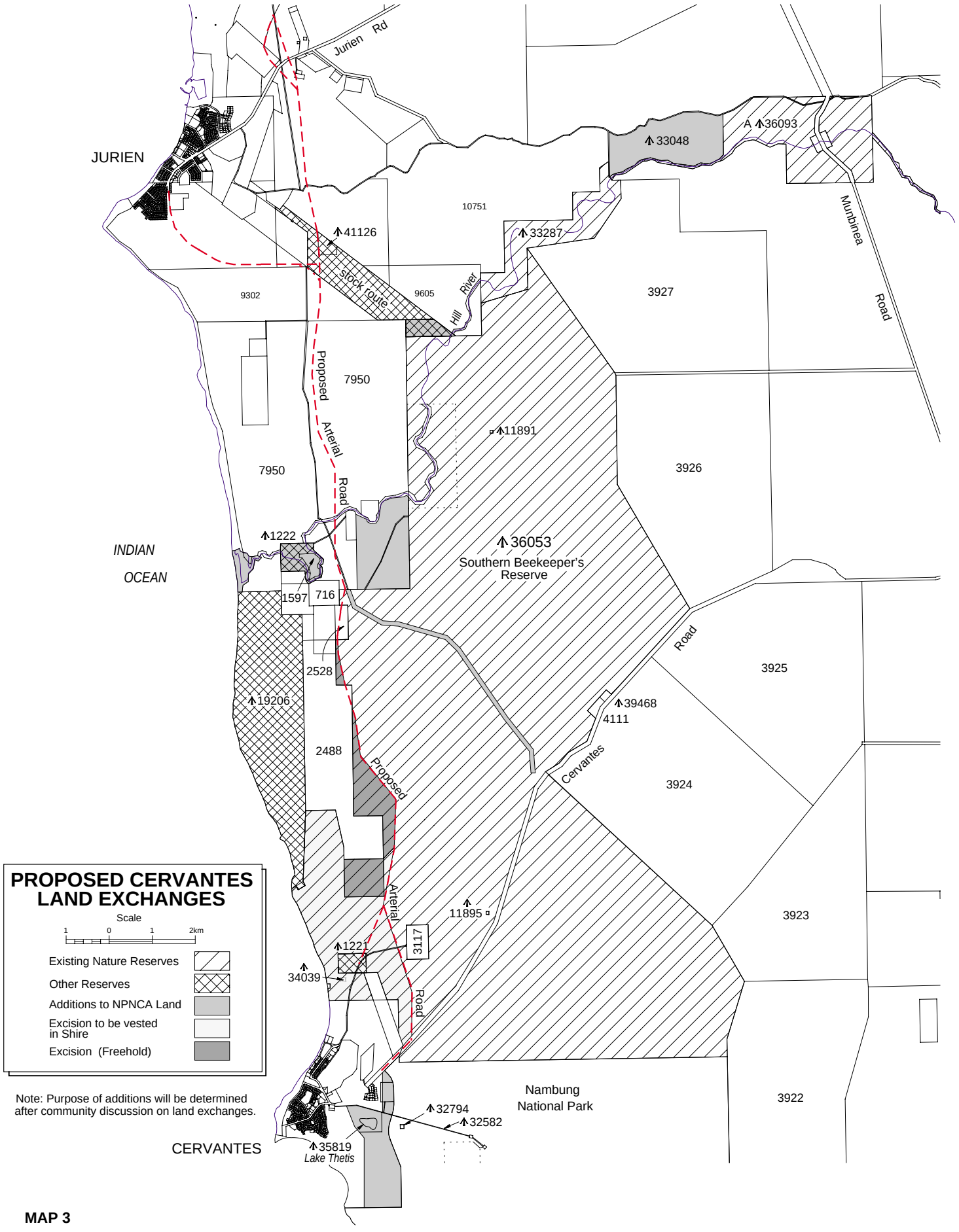
along the river, should form part of a reserve system to protect a corridor along the Hill River.

- Vacant Crown land east of Nambung National Park contains a number of brooks and drainage basins and an extensive system of wetlands. A review of the conservation values and existing use should be conducted to determine appropriate purpose and vesting.

- Reserve No. 35819 (Lake Thetis) is vested in the Shire of Dandaragan. It has very high conservation value due to the presence of stromatolites (see section 6.0 Hydrology) and should be added to Nambung National Park. These stromatolites are different from, and therefore complement, other stromatolite deposits elsewhere in W.A. such as Shark Bay and Lake Clifton (Grey *et al.*, 1990).

- Some private properties may be suitable additions to the conservation estate should they become available. Important areas include: CG 2490 (654 ha) in the middle of Nambung National Park which contains tuart woodlands not well represented in the other reserves, and the entrance to the underground section of the Nambung River, and CG 3392 (36 ha) which lies between the Hill River and the Southern Beekeeper's Reserve.

- Gazetted road reserves occur in Wanagarren Nature Reserve (No. 17252), Nilgen Nature Reserve (Nos. 15441 and 16638) and Southern Beekeeper's Reserve (No. 15599). These should be assessed and cancelled if they are not required.


JURIEN
Jurien Rd
33048
A 36093
10751
41126
33287
Munbinea Road
stock route
River
Hill
9302
9605
3927
Proposed
Arterial
Road
7950
7950
11891
3926
INDIAN
OCEAN
1222
36053
Southern Beekeeper's Reserve
1597
716
2528
Road
3925
19206
39468
4111
2488
Proposed
Cervantes
3924
Arterial
11895
3923
1221
3117
34039
Road
Nambung National Park
3922
32794
32582
CERVANTES
35819
Lake Thetis
PROPOSED CERVANTES LAND EXCHANGES
Scale
1 0 1 2km
Existing Nature Reserves
Other Reserves
Additions to NPNCA Land
Excision to be vested in Shire
Excision (Freehold)
Note: Purpose of additions will be determined after community discussion on land exchanges.

MAP 3

- Other areas worth assessing for inclusion in the conservation estate are Reserve No. 1221 and the Hill River mouth. The mouth of the Hill River and the cut off drainage channels between it and Cervantes are unique on the central west coast and warrant protection.

Several small reserves, such as quarries, are enclaved or semi-enclaved within the Park and Reserves and must be considered in view of their potential impacts. Where access is required to enclaved reserves,particularly to trigonometric stations, CALM should be notified and access conditions defined.

During the term of this plan other areas may become available as suitable additions to, or excisions from, the Park and Reserves. Proposed additions may be sought through vesting of public lands in the NPNCA, normal real estate transactions in the case of private property, or by other appropriate means. Their conservation values will be assessed as they become available.

Expansion of Cervantes

Proposals for a major subdivision north of Cervantes, the Cervantes-Jurien coast road and the need to identify land for the expansion of the Cervantes townsite have required an examination of land tenure north of Cervantes. The townsite itself is currently bordered by the Nambung National Park and the Southern Beekeeper's Nature Reserve. As such, there is insufficient land for future expansion of the townsite. In addition, expansion of the townsite to the south will impact on the landscape values of the National Park and could affect the conservation values of Lake Thetis. Given this it is considered more acceptable for the townsite to expand to the north-east. This will require an excision from the Southern Beekeeper's Nature Reserve and for the area to be vested in the Shire. The proposed area (Map 3) utilises the proposed coast road alignment as the eastern boundary. Concerns have been raised regarding wetlands which exist in the area to be excised from the Southern Beekeeper's Reserve. Most of these wetlands are actually in private property (Loc. 3117) and other reserves, however, before any excision occurs, this will be investigated to ensure no significant conservation values will be threatened as a result of this action.

A proposed subdivision of Locations 2488, 2528, 1597 and 716 presents an opportunity to obtain areas of freehold land of high conservation value adjoining the Hill River, and to rationalise management boundaries. In exchange for these freehold areas, which will be vested as nature reserve (Map 3), it is proposed that the developer will obtain freehold title for two areas currently within the Southern Beekeeper's Nature Reserve.

Map 3 shows the proposed changes in land tenure north of Cervantes. The final boundaries will be determined following a more detailed review of conservation values, townsite requirements and pending the final alignment adopted for the coast road.

Grey and Wedge Point Squatter Areas

The issue of squatters in the region is being addressed by all local Government authorities through the implementation of the Government's policy on squatters (Appendix 1). The policy provides for the prohibition of construction of new squatter shacks on coastal Crown land, leasing of existing shacks and the progressive removal of shacks after a six year leasing period.

A number of squatter shacks were removed from Wanagarren and Nilgen Nature Reserves some years ago. Settlements at Wedge Point (reserve 43283, Melbourne Location 4153) and Grey (reserve 43284, Melbourne Location 4152) number 366 and 135 shacks respectively. These areas have been proposed for inclusion into Nambung National Park and Wanagarren Nature Reserve subject to removal of squatters and rehabilitation of the sites.

The Government announced on the 14 January 1995 that the Government's policy would be implemented in the Dandaragan Shire. CALM will be responsible for the leasing, management and removal of shacks at Grey and Wedge in accordance with Government policy on squatter shacks. These locations have high recreation values and Grey in particular, is suited for recreation development. It is proposed that during the six year lease period recreation facilities will be progressively constructed. Following the removal of shacks in 2001 the area will be developed and managed for public recreation. Future recreational use of these two sites is addressed broadly in section 18.0, however, specific site assessment and planning will be required to determine the most appropriate form of recreation development and facilities for Grey and Wedge.

Some professional fishermen use Wedge Point and Grey as a base for their crayfishing operations. This is recognised in the squatter policy which provides a special case for professional fishermen. It is proposed to provide suitably located sites (not necessarily their existing sites) for fishermen who work from these sites which they could lease. This would be tied to fishing licenses and would transfer with the licenses if sold. Fishermens' shacks could be accommodated within recreational developments subject to identifying suitable sites and setting building standards. These matters will be resolved during the lease period of the squatters, and will be the subject of a separate recreation management plan for Wedge and Grey.

Defence Training Area

The Defence Training Area is the only location in W.A. used for heavy training, i.e. artillery, mortars, armoured vehicles. The area consists of freehold land, Crown leasehold land and vacant Crown land under agreement. The Army has sought Commonwealth acquisition of the leasehold Defence Training Area for several years and considers it the only viable training area in proximity to Perth. The Defence Training Area is expected to remain in use over the next ten years although long term use of the Defence Training Area for training purposes may not be appropriate. The area

has a significant impact on the planning of the coastal road connection from Lancelin to Cervantes.

STRATEGIES

1. **Implement the actions detailed in Table 2.**

2. **Excise an appropriate area from Southern Beekeepers Nature Reserve to allow for expansion of the Cervantes townsite. This excision is shown approximately on Map 3, however, final boundaries will be addressed following an examination of:**
   - **the area's conservation values;**
   - **the position of the proposed coastal road;**
   - **proposed land exchanges; and**
   - **land requirements for the Cervantes townsite.**

3. **Incorporate other adjoining land through purchase or exchange if identified as having high conservation values.**

4. **Continue liaison with Park and Reserve neighbours to establish cooperative management, particularly with regard to fire and dieback management, vermin control and landscape management.**

4.0 MANAGEMENT ZONES

The objective is to assist in protecting the Park's and Reserves' conservation values and providing for appropriate recreation and other uses by means of zoning where appropriate.

The concept of zoning to manage conservation areas in general, and people in particular, is based on the principle that uses or activities that share similar or compatible environmental and cultural requirements can be allocated to designated areas or 'zones'. Allocating specific uses and activities to areas can be either spatial, temporal or both. Typically, such allocation is determined on the basis of environmental and cultural values, land use capabilities, visitor needs and management considerations. A clear zoning scheme also helps to communicate management intentions to the public.

The proposed zoning plan reflects knowledge of the conservation significance of the area, the vegetation and its associated dieback hazard rating, the intensity and types of recreation uses, and future requirements for fire management. The zoning scheme will be used as a guide for future management (Map 4).

The management zones identified in Nambung National Park and Wanagarren, Nilgen and Southern Beekeeper's Nature Reserves are:

Natural Environment Zone
This zone comprises areas that can sustain a selected range of passive recreation activities while maintaining their natural state with a minimum of impairment. The management priority in these zones is to conserve the diversity of plant and animal species, and to protect landscape values and groundwater resource used for drinking water supply. Access under certain conditions by private vehicles will only be permitted in those areas that can sustain vehicle use and where it is safe from the viewpoint of dieback and visitor safety. Non-motorised public access will be preferred. Visible evidence of management will be minimal.

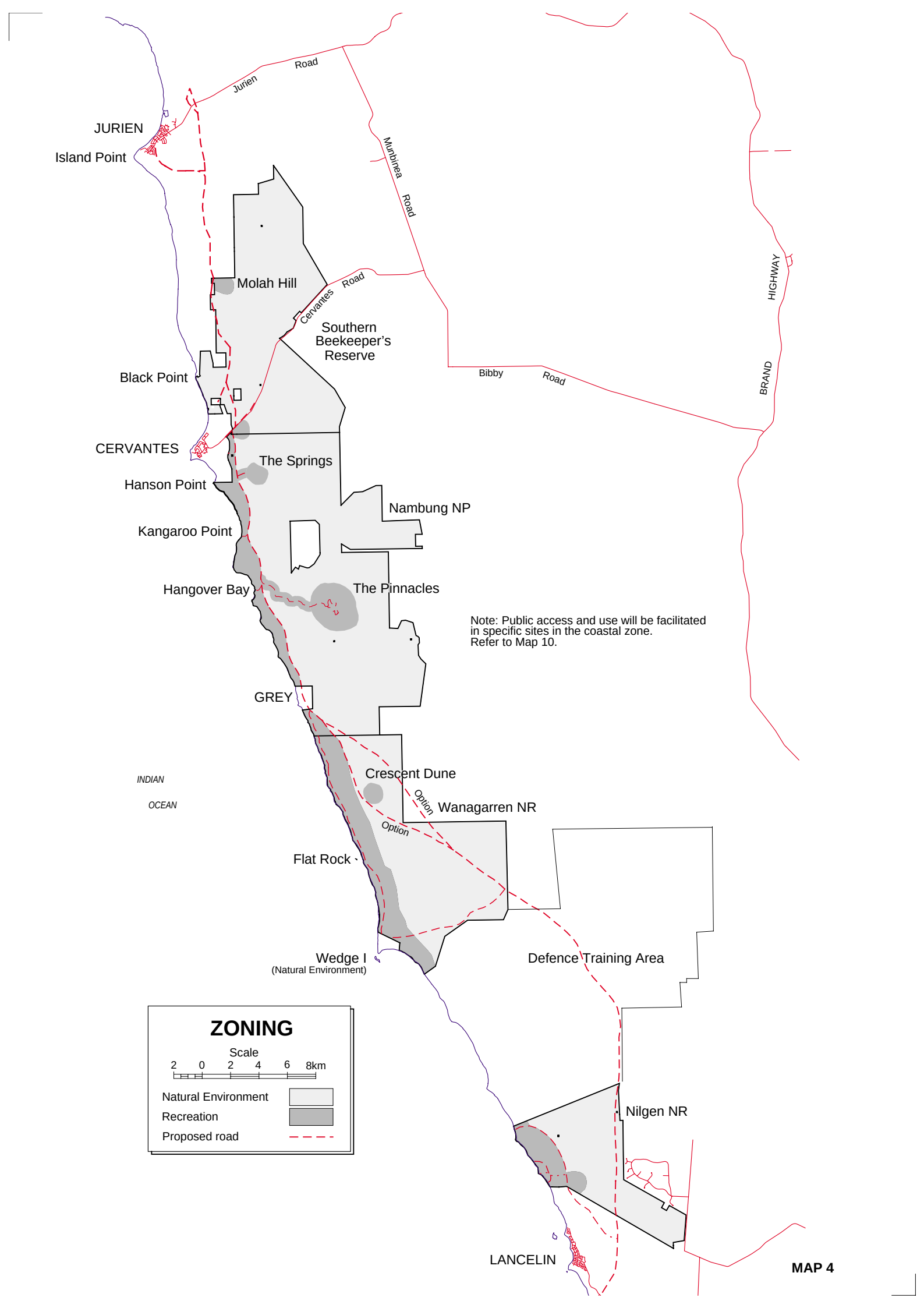
Recreation Zone
This zone comprises designated recreation nodes and public access ways. They will be managed jointly for appropriate public recreation and for the conservation of native plants and animals, and landscape values. Recreation zones comprise areas that can accommodate a range of recreation activities of moderate to high intensity. Management involves minimising the impact of visitor activities through the sensitive placement and provision of access and facilities. Motorised access will be permitted and separated from non-motorised access. Visible evidence of management may be moderate to high.

STRATEGIES

1. **Manage the Park and Reserves in accordance with the zoning scheme (Map 4).**

2. **Review the zoning scheme in response to improved knowledge of environmental values and visitor requirements.**

3. **Zone any additions to the Park and Reserves based on the criteria used to determine this zoning scheme.**


Jurien Road
JURIEN
Island Point
Munbinea Road
Molah Hill
Cervantes Road
Southern Beekeeper's Reserve
Black Point
Bibby Road
BRAND HIGHWAY
CERVANTES
The Springs
Hanson Point
Nambung NP
Kangaroo Point
Hangover Bay
The Pinnacles
Note: Public access and use will be facilitated in specific sites in the coastal zone. Refer to Map 10.
GREY
INDIAN OCEAN
Crescent Dune
Option
Wanagarren NR
Option
Flat Rock
Wedge I
(Natural Environment)
Defence Training Area
ZONING
Scale
2 0 2 4 6 8km
Natural Environment
Recreation
Proposed road
Nilgen NR
LANCELIN
MAP 4

MANAGEMENT FOR CONSERVATION

Conservation Goal

Conserve biological, physical, cultural and landscape resources.

5.0 GEOLOGY, SOILS, LANDFORMS AND COASTAL PROCESSES

The objective is to protect and conserve the geological features, landforms and soils.

Geology and Soils

The geology of the Central Coast has been mapped at the scale of 1:250 000 by Lowry (1974) and Wilde and Low (1978). The Dongara and Hill River 1:250 000 map sheets are being remapped at 1:100 000 by the Geological Survey of Western Australia (Griffin, 1993).

The region forms part of the Perth Sedimentary Basin. The central west coast is underlain by the Dandaragan sub-basin which is bounded along its eastern side by the Darling Fault and along its western side, from near Cliff Head down as far as Molah Hill, by the Beagle Fault System (Playford *et al.*, 1976).

The surface geology between Lancelin and Jurien is a mantle of mainly sandy Quaternary sediments (less than 2 million years old) which cover the whole coastal plain. The most significant units (Bassendean Sands, Tamala Limestone and Safety Bay Sands) represent progressively younger units each deposited seaward of, and partially overlying, former units. The Bassendean Sands are more inland and subdued while the coastal Safety Bay Sands have more relief. The mainly siliceous Bassendean Sands were deposited in the middle Pleistocene (1 500 000 years ago), the calcareous and siliceous Tamala Limestone were deposited in the middle to late Pleistocene (1 500 000 - 10 000 years ago) and the Safety Bay Sands were deposited in the Holocene (since 10 000 years ago). Each of these geological units have comparable soil/landform units: Bassendean Dunes, Spearwood Dunes and Quindalup Dunes respectively.

The more inland Bassendean Dunes consist of deflated low ridges of siliceous sand with intervening swampy depressions. The only relevant occurrence of this unit is in the eastern part of Nambung National Park. Ridges and hills have a grey surface layer with a yellow subsoil, while depressions contain grey siliceous sands and sometimes an organic or calcareous impeding layer within 2 m. Seasonal swamps with a grey, sandy surface often cover a mottled grey-brown and yellow-brown clay substrate that occurs less than 1 m beneath the surface. Some swamps have a dark loamy surface layer of diatomaceous earth.

The Spearwood Dunes have been modified by leaching and redistribution of calcium carbonate. Thus these dunes have a varying thickness of yellow and brown siliceous sands over secondary caprock (calcite) over softer sandy limestone. The weathering of limestone forms a type of topography called karst. Differential redistribution of the surface calcium carbonate has created subterranean features of this karst landscape such as caverns and tunnels, dolines and sinkholes and residual cone hills, pavements and depressions, solution pipes, limestone pillars and root concretions. Erosion of the covering sands has revealed many of these features including the pinnacles which occur mainly in the east of this unit.

The youngest Quindalup Dunes are a narrow band of low but often steep mainly calcareous sands. These beach deposits have been redistributed by the strong south (and south-westerly south of Lancelin) winds leaving a complex pattern of ridges loosely called parabolic dunes. These are mostly perched on the Spearwood Dunes. Their progress has commonly removed surface sand from the Spearwood Dunes revealing karst features such as pavements and pinnacles. There are many active sand sheets in various phases of advancement. The rate of advance varies between zero and 20 m per year depending on wind speed and consistent direction, characteristics of the sand sheet and the land over which the sheet passes (Griffin, 1993; Thomas *et al*, 1990).

Landforms and Coastal Stability

The reserves lie within the northern Swan Coastal Plain physiographic unit of Playford *et al.* (1976). The plain is between 12 km and 35 km broad and lies mostly below 50 m, rising gradually inland where it merges into the footslope of the Arrowsmith uplands. Lime cemented dunes occasionally rise to between 100 m and 160 m. The coastal plain is composed entirely of Quaternary sediments deposited by a receding sea some 6 000 years ago (Tinley, 1992).

Several geomorphic units occur along the plain, though some are overlain by dunes. These include the limestone topography comprising offshore reefs, limestone cliffs, bluffs and headlands, and beach ridge plains, deflation plains and lagoonal plains, which have all formed as the result of karst processes. A series of high level sea shores left by the receding sea contains deposits of heavy mineral sands, some of which are presently being mined in the area east of the reserves (Elliot, 1992).

Table 3.
SHORELINE STABILITY

Sector	Inshore Protection	Shoreline Stability	Dune Stability
Ledge Point to Flat Rock	Exposed	Highly variable	Unstable
Flat Rock to Black Point	Sheltered	Stable	Moderately Stable
Black Point to Island Point	Variable	Variable	Variable

Source: WA Planning Commission, 1996.

Inshore protection: Exposure of the inshore waters to the open ocean wave regime.
Shoreline stability: Rated from conditions of apparent shoreline retreat to stable, or slowly changing conditions, which may be undergoing accretion.
Dune stability: Incidence of active blowouts and mobile sand sheets.

Two types of sandy beach occur in the region: wave dominated beaches and surge dominated beaches. Wave dominated beaches are located between Lancelin and Flat Rock, and occur where offshore reefs are deep and close to shore resulting in high wave energy. Sand drift and shoreline movement are likely to cause major management problems on this part of the coast so there is a need to control vehicle access to the beach to protect frontal dunes (see section 17.0 Access).

Surge dominated beaches are located along the sheltered coast particularly north of Grey. These beaches may be cut back to the base of the foredunes during late winter, and storms may have a more lasting impact on coastal configuration than they do on wave dominated coast.

The cuspate foreland complex at Kangaroo Point in Nambung National Park is a significant feature of the coast between Grey and Black Point, and is the only landform of its general type that has not been affected by development. The morphology of the foreland is of scientific interest for the shoreline development that it represents. Activities that may interfere with sand movement in the vicinity need to be carefully assessed.

Reserve 19206 between Cervantes and Hill River is a complex mixture of deltaic and coastal morphology, with an assemblage of wetlands and dune forms that are unique on the west coast (Elliot, 1992).

Sandy and rocky sections of the shoreline provide contrasts in shoreline stability and configuration (Table 3). This diversity is important in the provision of development opportunities close to the shoreline. Most of the coastline between Lancelin and Jurien is soft coast, being held together by plant growth. Sandy shorelines are areas of instability that require special consideration in planning and management.

Caves
Less than 100 karst features of the Tamala Limestone are known within the Park and Reserves. These features are the result of karst processes and include subterranean drainage through caverns and tunnels, dolines and sinkholes, residual cone hills and circular depressions, limestone pillars and root concretions. The geomorphology of many of the karst features can be linked directly to the Nambung River.

Caves have also evolved in relation to the movement of the groundwater table which gradually dissolves the limestone. Percolation of weakly acidic water through limestone dissolves calcium carbonate. This is redeposited within caverns and results in the development of decorations or speleothems such as stalactites, stalagmites, helictites, shawls and columns (Bastian, 1964; DCE, 1978).

A detailed inventory of caves and karst features has not been conducted, however, known caves are generally small in size and are difficult to access. Their potential is limited for development as tourist attractions.

In biological terms, the caves have some highly specialised fauna. These include bat colonies and troglobitic crustaceans and insects. They may also provide windows into past fauna assemblages by the presence of bone material (see 8.0 Fauna).

The Pinnacles
The Pinnacles in Nambung National Park are the most popular tourist attraction in the region. Thousands of limestone pillars, up to 4 m tall, rise out of the yellow Spearwood sands in forms that resemble tombstones and jagged, sharp-edged columns.

The raw material for the limestone of the Pinnacles came from lime-rich sands which were carried inland by wind to form high, mobile dunes. Small hills of partially consolidated lime sand are particularly important as they contain within them fossil soil horizons that have been dated to about 8 000 years old. Rain leached the lime from these sands, cementing grains of sand together in the lower levels of the dunes. At the same time, an acidic layer of soil and humus developed over the remaining quartz sand. This acidic soil accelerated the leaching process, and a hard layer of calcrete formed over the softer limestone below. This calcrete can be seen as a distinct cap on many pinnacles which has helped protect the softer limestone underneath (McNamara, 1995).

Cracks later formed in the calcrete layer and were exploited by plant roots. Water seeped down along these channels to leach away the softer limestone beneath, and the channels gradually filled with quartz sand. This subsurface erosion continued until only the most resilient columns remained. The pinnacles seen today were exposed by prevailing winds blowing away the overlying quartz sand. Fossilized plant roots (rhizoliths) in the interpinnacle area are instructive in showing the first stage of pinnacle formation, and the importance of the secondary cementation of plant roots (McNamara, 1995).

The impacts of visitation on the Pinnacles environment need to be assessed and monitored, and increasing visitor pressure needs to be carefully managed and controlled. Though some of the pinnacles themselves are resilient to handling, many are not, and the softer limestone and some of the smaller structures are fragile and easily damaged by visitors climbing on the structures. The effects of pedestrian and vehicle traffic on the Pinnacles environment are largely unknown. Some of the small hills and rhizoliths have disappeared completely due to public access pressure.

STRATEGIES

1. **Consider the vulnerability of geological features, landforms and soils in all management operations, such as new access, firebreaks, fire management plans, catchment alterations and site developments (see also Strategies 3 and 4, p.35 and Strategies 2 and 3, p.36).**

2. **Provide opportunities for visitors to increase their knowledge and appreciation of the area's geological features, landforms and soils.**

3. **In consultation with speleological groups, complete a resource inventory, classification system and access policies for caves and karst features in the area.**

4. **Liaise with speleologist groups and other karst management specialists regarding management and other operations that are likely to impact on karst features.**

6.0 HYDROLOGY

The objectives are to:
1. *Ensure that abstraction of groundwater does not detrimentally impact on the Park.*
2. *Encourage nearby land managers to minimise their impacts on the surface and groundwater quality and quantity.*
3. *Protect groundwater resource used for drinking water supply.*

The surface water (wetlands) and groundwater resources of the area have important conservation values for the diversity of flora and fauna they support. In addition, these resources supply water to local communities and may have recreation and commercial value.

The hydrology and hydrogeology are the main factors to have influenced karst features and vegetation development in response to past drainage and run-off in Nambung National Park. The surface and groundwater system is closely interconnected so changes to natural regimes may have a wider affect than first implied. The system is also susceptible to pollution.

The Water and Rivers Commission (WRC) is responsible for monitoring water levels and sampling the groundwater. The Commission also has the opportunity to comment on significant land use proposals and objects or sets conditions as necessary to minimise any impacts on water resources in the area. The utilities role of town water supply, sewerage and drainage is the responsibility of the Water Corporation.

CALM has legal responsibility under section 33(1)(dc) of the CALM Act to promote the conservation of water quantity and quality on lands that it manages.

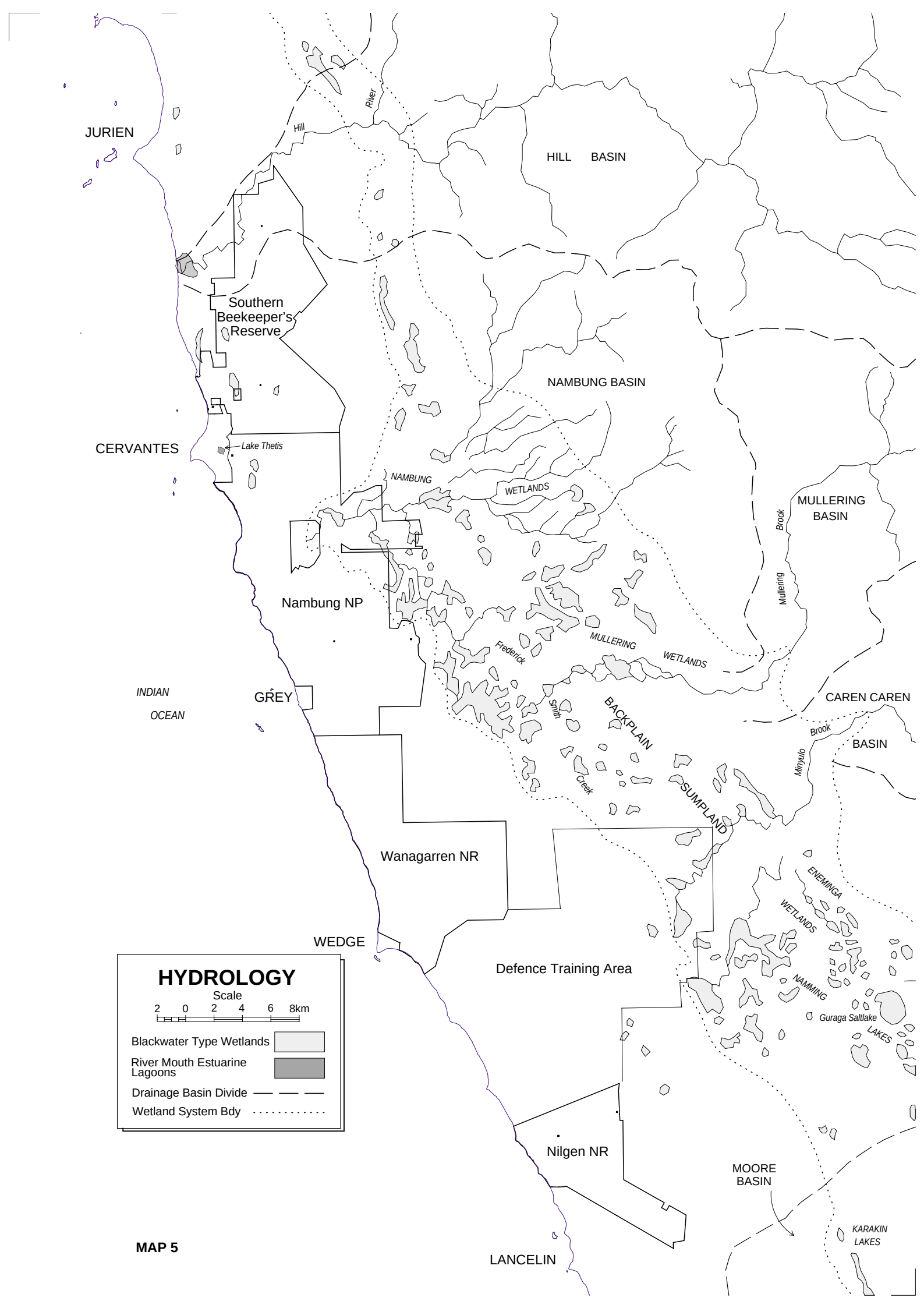
Groundwater

Large, shallow groundwater resources occur in the superficial sands and limestone between Gingin and Cervantes. Fresh groundwater occurs in deep aquifers along the coast from Guilderton north to the Lancelin-Wedge Island area, but farther north the deep groundwater along the coast is saline.

Investigations for unconfined groundwater in the Defence Training Area showed that the water table slopes uniformly from 60 m above datum to sea level. The depth to groundwater is only a few metres near the coast, about 10-15 m in the Bassendean Dunes but may be nearly 100 m in parts of the Spearwood Dunes. The groundwater here is fresh with generally less than 1 000 ppm salt concentration; some areas have less than 500 ppm (Thomas *et al.*, 1990).

Along the coastal plain where the water table is shallow, or where there is karst limestone, groundwater is vulnerable to contamination. Dune aquifers are in lateral contact over extensive areas interconnected by seepage.

The main carriers of pollutants from the interior are the Hill River with seasonal connection to the sea, and


JURIEN
River
Hill
HILL BASIN
Southern Beekeeper's Reserve
NAMBUNG BASIN
CERVANTES
Lake Thetis
NAMBUNG
WETLANDS
MULLERING BASIN
Brook
Mullering
Nambung NP
MULLERING
WETLANDS
Frederick
INDIAN
OCEAN
GREY
Smith
BACKPLAIN
CAREN CAREN
BASIN
Brook
Minyulo
Creek
SUMPLAND
Wanagarren NR
ENEMINGA
WETLANDS
WEDGE
Defence Training Area
NAMMING
Guraga Saltlake
LAKES
Nilgen NR
MOORE BASIN
KARAKIN LAKES
LANCELIN
HYDROLOGY
Scale
2 0 2 4 6 8km
Blackwater Type Wetlands
River Mouth Estuarine Lagoons
Drainage Basin Divide
Wetland System Bdy

MAP 5

the Nambung River basin which drains through the limestone belt. The shallow dune aquifers are also susceptible to contamination from sewerage, detergents, plastics and rubbish tip leakage in association with coastal settlements. Deep, unconfined aquifers are recharged directly from rainfall and surface runoff, and are therefore also open to contamination by pollutants (Tinley, 1992).

Groundwater is mainly used for domestic and stock purposes, and for agriculture in the Gingin area. Small supplies can usually be obtained, however, large supplies usually have to be piped from some distance inland.

Nambung National Park has the gazetted purpose of 'National Park and Water'. The present water supply to Cervantes townsite comes from a borefield within Nambung National Park. An improved water supply to Cervantes is being investigated by the Water Corporation in the Southern Beekeeper's Reserve. Test results have indicated that fresher water is available in the Reserve and this will be the most likely area for future groundwater supplies for the town (Kern, 1988).

To protect the quality of the Cervantes town water supply, the Water and Rivers Commission has proposed to proclaim the Cervantes Water Reserve (Boniecka, in prep). The Reserve will cover groundwater recharge areas for the existing wellfield and proposed extensions. The Reserve includes significant areas of the Southern Beekeeper's Nature Reserve and Nambung National Park.

Within the Cervantes Water Reserve, the Water and Rivers Commission will apply the by-laws of the Country Areas Water Supply Act (1947) to protect water quality. Because the water resource is vulnerable to groundwater contamination the Water and Rivers Commission recommends that areas of the reserve in public ownership should be assigned the highest level of protection (Priority 1). In Priority 1 areas land use is managed to avoid any risk of groundwater contamination. Development proposals in the water reserve should be assessed for their impact on water quality.

Surface Hydrology

Coastal drainage off the Gingin escarpment is generally collected in a series of wetlands over the coastal backplain of Bassendean sands. Only a minor proportion of these wetlands are protected in conservation reserves including the eastern part of Nambung National Park. A number of other wetlands, some being totally enclaved within the Reserves, are not reserved for conservation purposes.

Several types of wetland occur in the region including wetlands associated with the Hill and Nambung Rivers, salt lakes, swamps, lagoons and dunal damplands. When the backplain floods its waters are filtered into the karst aquifer and into the sea via underground channels. As a consequence of the percolation of surface water through the limestone substrate, the catchment boundaries of main drainage lines become undefined over the limestone topography (see Map 5).

Between Lancelin and Jurien only the Hill River is in seasonal contact with the sea when flood waters are sufficient to break through the sandbar across its mouth. It is one of only three rivers which do so in the 250 km of the central coast region. The river itself is perennial fresh water while shallow drainage channels south of the river mouth contain brackish or even fresh water. It is important that a corridor of natural vegetation is reserved for conservation purposes along as much of the Hill River as possible to maintain water quality and the stability of the river's banks.

The Nambung River flows into the underground karst system in private property enclaved in the National Park and seeps out along the coastline. This river system has important conservation value for the diversity of habitats it provides in the Park, and for the opportunities it provides for scientific study.

Most lagoons and lakelets in the area are isolated from the sea and from surface creek drainage, being fed by rainfall and groundwater flow from surrounding dunes and limestones. This makes them prone to contamination from urban, industrial and agricultural pollutants.

Stromatolites

Lake Thetis (Reserve No. 35819) is a permanent, saline lake just outside Nambung National Park. It is isolated from major surface drainage systems and is fed by groundwater flow. The lake is a sink for groundwater from which water is lost only by evaporation and not to the sea like other groundwater flows in the area (Kern, 1988). The lake waters are typically alkaline and nutrient poor and give rise to clear lake waters that are ideal for the growth of microbial mats and laminated structures known as stromatolitic microbialites (stromatolites). These stromatolites only develop in association with karst and are integral to the karst landscape.

Microbial communities incorporate sediment grains at a very slow rate and build structures that on average are about 2 000 years old when they reach a height of one metre. Stromatolites and fossilized structures represent the earliest record of life on Earth, dating from some 3 500 million years ago. The Lake Thetis stromatolites have been dated as 3370 ± 260 years old (Grey *et al.*, 1990). They are different from but complement other occurrences in Yalgorup National Park, Lake Richmond and Hamelin Pool Marine Nature Reserve.

The stromatolites of Lake Thetis are listed on CALM's Threatened Ecological Communities database and thus are considered to be in need of protection. It is proposed to protect the scientific values of Lake Thetis by incorporating the reserve into Nambung National Park (see 3.0 Land Tenure).

STRATEGIES

1. **Continue to liaise with the WRC regarding the use of surface and groundwater and its management, particularly monitoring of wetlands and cave hydrology in the vicinity of existing and possible new borefields.**

2. **Participate in catchment management with the local landcare district, the Shire, the Department of Environmental Protection and other Government agencies encouraging practices compatible with Reserve management.**

3. **Endeavour to protect hydrological systems with important conservation value by negotiating security of tenure with appropriate authorities and land owners (see section 3.2 Surrounding Land).**

4. **Provide information to the public on the values, significance and management of the Reserves' wetlands.**

5. **Consider potential impacts on surface and groundwater quality and quantity during all management activities.**

6. **Manage visitor activities and access to wetlands (see section 17.0 Access)**

7.0 VEGETATION AND FLORA

The objectives are to:
1. *Protect and conserve native plant communities.*
2. *Protect and conserve indigenous flora, especially threatened and other priority species.*

The reserves are near the northern end of the Drummond Sub-district of the Darling Phytogeographic District. Vegetation consists primarily of kwongan vegetation[1] and *Banksia* low woodlands, with tuart woodlands in the valleys. Vegetation of the area has been mapped at a scale of 1:250,000 by Beard (1979). It comprises *Acacia/Melaleuca* heath with patches of thicket (Guilderton System) on Recent dunes and sands near the coast, *Dryandra/Calothamnus* scrub-heath (Jurien System) on the older limestones and, furthest inland, *Banksia* low woodland (Bassendean System) on low ridges of bleached sand alternating with swampy flats underlain by a calcareous hardpan.

More detailed vegetation maps have been produced for Wanagarren Nature Reserve (Crook *et al*. 1984) and for the Southern Beekeeper's Reserve (Burbidge and Boscacci, 1989). The vegetation of Nambung and Nilgen have not been documented in any detail. Thomas *et al*. (1990) provide some notes on the vegetation of the defence training area.

Detailed floristic information is available for a number of plots on Holocene surfaces from each of the reserves (Griffin, 1993), but there has been no comprehensive study of the flora of the reserves as a whole. However, it is believed that several hundred species of flowering plants occur here. Griffin (1993), in a study of floristic variation between Perth and Dongara, found noticeable gradients in floristic composition in both a regional and successional sense. His analysis showed that the section of coast between Jurien and Lancelin (much of which is included in the reserves covered by this plan) is floristically distinct from areas to the north and south. However, because of the nature of the variation, there is great difficulty in defining discrete vegetation types on the Holocene surfaces.

No plants declared rare under the Wildlife Conservation Act are known from the reserves. One Priority 1 species (*Conospermum scaposum*) and two Priority 2 species[2] (*Macarthuria apetala* and *Hensmania stoniella*) have been found just outside the reserves. As similar habitats occur in the reserves, further survey may reveal the presence of these or other priority species inside the reserves. *Eucalyptus petrensis*, which has recently been removed from the Priority list, is at its northern coastal occurrence in the reserves. The occurrence of tuart in the Southern Beekeeper's Reserve is significant in being near the northern limit of its range.

STRATEGIES

1. **Encourage detailed mapping and research of flora and vegetation that may be rare, unique or in some way warranting special consideration, with emphasis on developing knowledge on the effects of fire and other factors affecting survival and regeneration.**

2. **Provide opportunities for visitors to increase their knowledge and appreciation of the area's vegetation and flora.**

3. **Design facilities and management practices that minimise adverse impacts on flora and vegetation values.**

4. **Protect populations of species that are vulnerable to particular fire regimes by implementing appropriate fire management strategies.**

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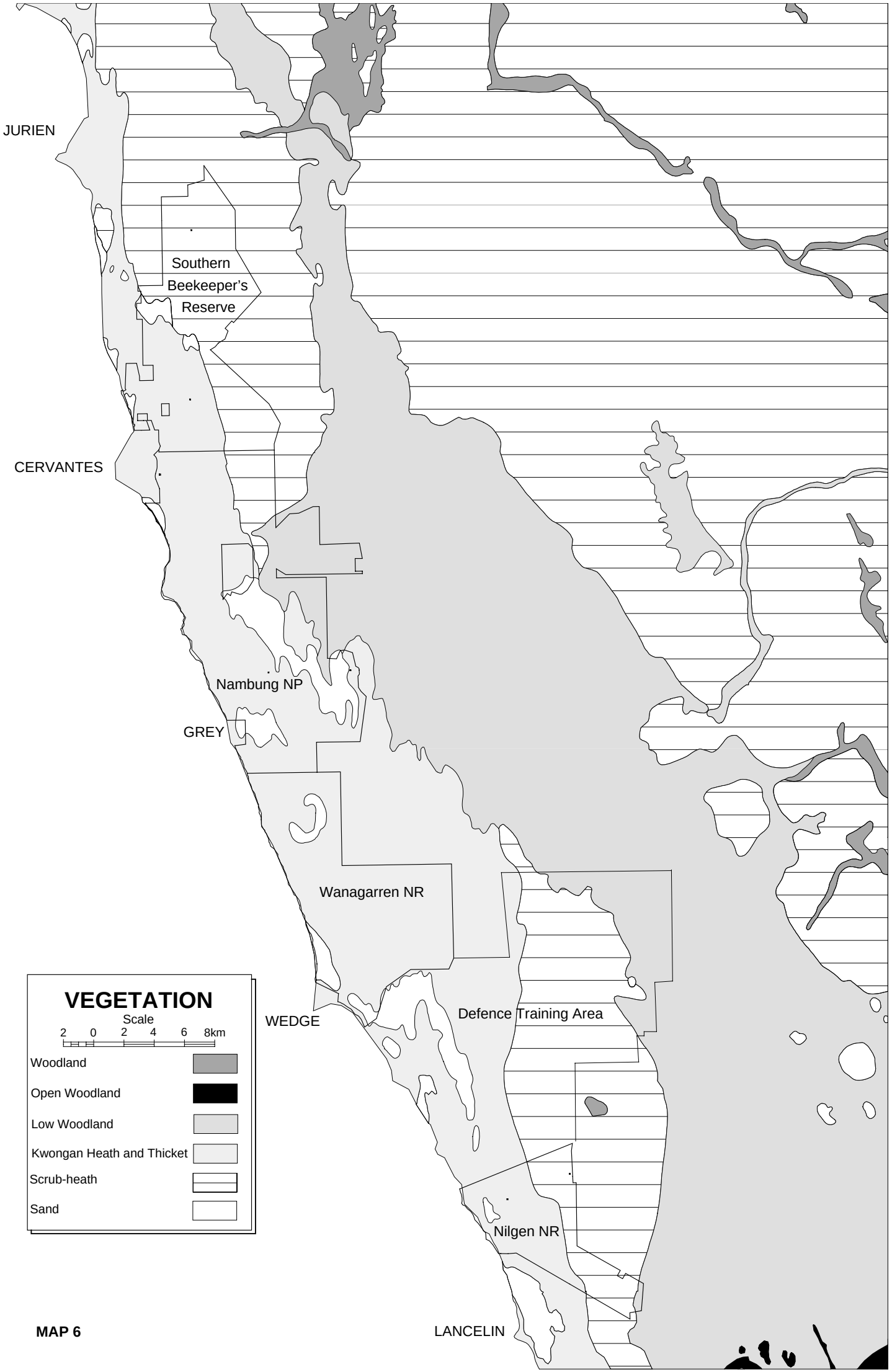
1 Kwongan vegetation refers to the mixed heath occurring on limestone in the northern sandplains.

2 CALM's Priority list of flora contains species that are considered to be poorly known (Priority 1) or appear to be rare (Priority 2).


JURIEN
Southern
Beekeeper's
Reserve
CERVANTES
Nambung NP
GREY
Wanagarren NR
WEDGE
Defence Training Area
Nilgen NR
LANCELIN
VEGETATION
Scale
2 0 2 4 6 8km
Woodland
Open Woodland
Low Woodland
Kwongan Heath and Thicket
Scrub-heath
Sand

MAP 6

5. **Ensure that management actions do not impact on rare and priority flora if any of these species are found in the reserves.**

8.0 FAUNA

The objective is to conserve indigenous fauna with emphasis on threatened and other priority species.

Vertebrates

The vertebrate fauna of the reserves has not been studied in detail. The only published survey of vertebrate fauna is that of Burbidge and Boscacci (1989). Other records come from CALM files and WA Museum databases.

The reserves are known to contain eight native and five introduced mammals, 103 bird species, 15 reptile and three frog species. At least 17 more species of reptile are known to occur very close by and almost certainly occur in the reserves. Detailed survey would be likely to reveal additional species of mammal, birds, reptiles and frogs.

Under the Wildlife Conservation Act, Carnaby's Black-Cockatoo (*Calyptorhynchus latirostris*) is gazetted as rare or likely to become extinct, and the Carpet Python (*Morelia spilota imbricata*) and Peregrine Falcon (*Falco peregrinus*) are declared as in need of special protection. Carnaby's Black-Cockatoo breeds in the Coomallo area to the north, and possibly along the Hill River. The status of the Carpet Python in the reserves is unknown, but there is probably a small breeding population spread throughout the limestone areas. The Peregrine Falcon is probably only a visitor to the area, but one or two pairs may breed.

Mallee fowl have been recorded in Nambung National Park and Freckled duck have been recorded at Winja Lakes a few kilometres to the north-east. Both these species are gazetted as rare or likely to become extinct.

Owl pellets and other superficial bone deposits have been found in Brown Bone Cave and date at about 1000 years old. The mammal fauna of the region was formerly more diverse than current surveys indicate.

Bat guano has been mined from several caves in the Nambung area. The guano may have been deposited by more than one species including Ghost Bats.

Invertebrates

There has been no systematic study of the invertebrates of any of the reserves. However, a number of interesting troglobitic (cave dwelling) invertebrates are known to occur in the Nambung area. These include a planthopper (*Phaconeura pluto*) which was first described from Nambung and is one of only two species of troglobitic planthopper in Western Australia (the other is from Cape Range) (Hoch, 1993). Caves that have been used for guano extraction still support populations of pseudoscorpions. Various mites and beetles have also been collected from several caves in the area.

STRATEGIES

1. **Establish the status of threatened species in the reserves.**

2. **Identify and manage appropriately the habitats of significant vertebrate and invertebrate fauna.**

3. **Encourage research to identify terrestrial and aquatic invertebrate fauna, particularly cave dwelling species, with emphasis on those most likely to be rare or threatened.**

4. **Provide interpretive material to visitors on the fauna of the reserves.**

9.0 CULTURAL HERITAGE

The objectives are to:
1. *Protect and conserve the Park's and Reserves' significant cultural heritage.*
2. *Increase visitors' awareness, appreciation and understanding of the cultural heritage of the Park and Reserves.*

Aboriginal History

The south-west of Western Australia was occupied by a number of tribal groups collectively known as the Noongars. The Nambung area was frequented by the Whadjug and Yued tribes of the Noongar cultural group (Department of Aboriginal Sites, pers. comm. 1993; Tindale, 1975).

It was common for Aboriginal people from further inland to visit the coastal sandplain for a time each summer. In particular, the lakes and swamps which occur in lines through the interdunal valleys of the limestone belt attracted Aboriginal people for their freshwater tortoises, fish, waterfowl and shellfish. Wells were particularly important on the arid stretch of coast north of the Moore River, and native wells and paths marked the regular progress of Aboriginal people through and around their own country (Hallam, 1975).

Sites on sandhills adjacent to swamps in the Bassendean sands zone showed evidence of increasing resource usage up until the arrival of the first European settlers (Hallam, 1975).

The limestone belt has considerable significance in Aboriginal mythology, particularly in association with caves and underground caverns. Several examples of Aboriginal usage of caves occur between Yanchep and Jurien (Hallam, 1971, 1975; Merrilees *et al.*, 1973). The mythical Wagyl serpent is associated with

blowholes, pools and springs that lead into underground caverns through which the Wagyl passes to the sea.

Many place names in the area have Aboriginal origins, although not necessarily local to the area. For example, Wyip and Warrup Pools in Nambung National Park were named after two Aboriginal people who accompanied Grey's party. The origins of most other Aboriginal place names in the area are unknown.

The descendants of the traditional Aboriginal owners now live in Perth, Geraldton, Moora, Mingenew, Three Springs, Mogumber and other nearby towns. A number of people maintain links to their traditional areas for fishing and there may be camps in the area from the pre-war period which could be considered significant to Aboriginal people (Department of Aboriginal Sites, pers. comm. 1993).

At least fifteen Aboriginal sites occur in the general vicinity of the reserves. However, as limited investigations have been conducted, it is possible that other sites exist (Department of Aboriginal Sites, pers.comm. 1993). Sites may include archaeological sites such as camp sites, artefact scatters and shell middens, and ethnographic sites such as ceremonial places and sites with mythical associations (ethnographic sites may also be archaeological sites) (Tinley, 1992).

All sites are protected by the provisions of the Aboriginal Heritage Act (1972) regardless of whether they are known to the Aboriginal Affairs Department or not. Section 17 of the Act makes it an offence to excavate, destroy, damage, conceal or in any way alter an Aboriginal site without the written permission of the Minister for Aboriginal Affairs.

European History

The first known European recording of the Nambung area dates back to 1658 when the North and South Hummocks appeared on Dutch maps. The Pinnacles may have been mistaken for 'a small city a short distance inland' by the Dutch mariners but they could not be investigated further because of the treacherous reefs. The Hummocks were also mentioned in navigator P.P. King's journal written in about 1820 (Turner, in Poulter, 1973).

In 1839, George Grey (later Governor of South Australia) was shipwrecked in Gantheaume Bay about 480 km north of Perth. On his walk back to Perth he discovered a watercourse in the Nambung area and named it the Smith River after a member of his group who perished nearby.

Explorer A.C. Gregory passed through the area in 1848, and during 1874-75 the region was surveyed by J.S. Brooking who renamed the Smith River the Nambung River. The River was recorded as the Namban River by W.E. Archdeacon, R.N. on Admiralty Charts in 1875. The spelling 'Nambung' was adopted for the River in 1938, the name being derived from an Aboriginal word possibly meaning crooked or winding (Passfield, 1988).

From 1889 a stock route ran between Dongara and Perth, passing through the area now known as Nambung National Park and Southern Beekeeper's Reserve. The route was soon abandoned but was not officially closed until 1971. The Nambung area gained further attention in the early 1900s when phosphate was discovered in the caves of the Nambung River valley. Local farmers mined the phosphate on an intermittent basis from 1906.

During the early part of 1908, a Hungarian geologist named Goeczel was sent by the Government to look for commercial quantities of the natural phosphate to combat the high cost of imported phosphate which was used as a fertiliser in newly opened agricultural areas. The phosphate mining was not commercially viable and the operation ceased after a couple of years. Evidence of the mining operation still exists.

The then Minister for Agriculture, James Mitchell (later Lt. Governor of Western Australia), impressed by Geoczel's report, visited the area and initiated the protection of caves having abundant displays of speleothems. A temporary reserve was placed over the Nambung River valley in 1927.

Despite this early period of activity at Nambung, it appears the Pinnacles remained undiscovered. The first recorded mention of the Pinnacles seems to have come from a Geological Survey report in 1934 (Poulter, 1973).

Brockman's Tree

Government Surveyor E. Manning, who surveyed the area in 1921, showed on his maps the location of a large tuart tree near the Nambung River marked with a survey blaze 'B'. The survey pegs marking the area were discovered burnt and it was thought the tree had suffered the same fate.

In 1971 ranger Alf Passfield rediscovered the tree which had a large white ants' nest covering the letter B. The letter B is believed to have been carved by Robert Brockman in 1854 as a reference point on the eastern boundary of his lease (Passfield, 1988).

Old North Road Stock Route

The Old North Road Stock Route is a significant part of the region's heritage. It is believed that until 1894 the Stock Route offered 'a safe, comfortable, easy way to travel between districts, with stops for refreshments on the way' (WA Planning Commission, 1996). During World War II the Stock Route was a major movement corridor for the army. After the war, sections of the Stock Route were still in use by apiarists, hunters and trappers and holiday makers, until a network of better roads to farms and coastal towns gradually superseded it. In 1984 the Stock Route journey was re-enacted by representatives of the Australian Stockmen's Hall of Fame and Outback Heritage Centre.

The Stock Route originally passed through areas now part of Nambung National Park and the Southern Beekeeper's Reserve. A survey of historic watering holes along the Stock Route was conducted by the National Trust. Development of the route as a Heritage Trail will be investigated.

Townsites and Squatters

Early European settlement in the Shires of Gingin and Dandaragan were based on agriculture. The coastal towns of Lancelin, Cervantes and Jurien were later pioneered by the fishing industry.

The fishing industry was first established at Lancelin in 1928-29 when roads were upgraded. At the same time, the location became a popular holiday resort and was proclaimed a camping reserve in 1935 before being proclaimed a town in 1954.

The expansion of the rock lobster industry in the 1950s, and the growth of tourism in more recent years brought about significant coastal development in the Shire of Dandaragan. The coastal towns of Jurien and Cervantes were established in 1956 and 1962 respectively.

Mining for mineral sands became a significant activity in the area in the 1970s. Tourism is rapidly increasing in importance to the local economy (see 16.0 Recreation and Tourism).

Squatters' shacks currently occupy vacant Crown land at Wedge Point adjacent to Wanagarren Nature Reserve, and at Grey (also known as Green Islands) adjacent to Nambung National Park. This issue is discussed in section 3.0 Land Tenure.

STRATEGIES

1. **Liaise with the local Aboriginal community and the Aboriginal Affairs Department concerning the protection of significant Aboriginal sites in the Reserves. Ensure that visitor and management activities do not detrimentally impact upon these sites.**

2. **Train CALM staff to recognise sites of cultural significance to both Aboriginal and non-Aboriginal people in liaison with the Aboriginal Affairs Department and the local community.**

3. **Ensure that visitor and management activities do not adversely impact upon significant historical and cultural sites.**

4. **Where appropriate, incorporate material on historical and cultural sites in interpretive displays and community education programs.**

5. **Develop the Old North Road Stock Route as a Heritage Trail in consultation with local Government and the National Trust as recommended in the Central Coast Regional Strategy (WA Planning Commission, 1996).**

10.0 LANDSCAPE MANAGEMENT

The objective is to protect and restore the Park's and Reserves' landscape qualities.

Landscape management is based on the premise that the visual quality of any landscape is a resource in its own right that can be assessed and managed in much the same way as other resource values, such as flora, fauna, water and recreation. In this context, the term 'landscape' refers to the appearance or visual quality of an area determined by its geology, soils, landforms, vegetation, water features and land use history.

The identification and description of Landscape Character Types (LCTs) is central to the methodology employed by CALM in assessing visual landscape values. Descriptive criteria called 'frames of reference' have been established to help in assessing the scenic quality components of each LCT. While all landscapes have some value, some are of greater scenic attraction and importance than others. To assess such differences, three classes of relative scenic quality are recognised - High, Moderate and Low. These three classes for various landscape components - landform, vegetation, waterform and land use - are described in Appendix 2.

The Park and Reserves are representative of two landscape character types: the Swan Coastal Plain which extends to just north of Lancelin, and the Geraldton Plains, situated from Cervantes to north of Geraldton (CALM, 1994b).

Landscape management involves maintaining, restoring or enhancing natural (including landform, vegetation, waterform) and cultural landscape values, and planning and designing land-use activities and developments so as to provide diverse views in a natural setting and minimise negative impacts. Human-imposed changes to the landscape should be subordinate to the established natural visual character. The desired outcome is a positive response and sense of place for visitors and local residents.

Landscape management ranges from broad scale to site specific analysis, and includes sensitive planning, design and construction. A broad scale visual landscape analysis was carried out for the Park and Reserves as part of the preparation of this management plan. Table 4 sets out specific guidelines that should be implemented.

Table 4.
GUIDELINES FOR LANDSCAPE MANAGEMENT

Landscape Management Guidelines
• Alterations to the natural landscape should be subtle, remaining subordinate to natural elements by borrowing extensively from form, line, colour, texture and scale found commonly in the surrounding landscape; • A site development plan and prescriptions, at an appropriate scale, should be completed and approved before any development, maintenance or rehabilitation works are implemented; • Degraded landscapes, e.g. gravel pits and disused vehicular access tracks, should be rehabilitated after use; • Essential management tracks and firebreaks should follow natural landform, vegetation or landuse patterns/breaks; • Protection burning, if required, should be done before periods of high vegetation growth (where possible) and incorporate minimal visual impact prescriptions and techniques; • Previously disturbed areas within areas of high scenic quality should be given the highest priority for rehabilitation until the desired standard of scenic quality is attained; and • Where environmental or visually destabilising facilities or activities are essential, the degree of resource value lost should be recognised, controlled by management and carefully monitored.

STRATEGIES

1. **Implement CALM Policy No. 34 (Landscape Management of CALM's Lands and Waters) in all aspects of land management of the Park and Reserves.**

2. **Apply the landscape management guidelines set out in Table 4.**

3. **Encourage neighbours to recognise the importance of landscape management by the sensitive siting of facilities and signs, selection of site-compatible materials and colours, and careful planning and siting of utilities and roads to minimise impacts on the Park's and Reserves' landscape values.**

MANAGEMENT FOR PROTECTION

11.0 FIRE PROTECTION

The objectives are to:

1. *Protect visitors, neighbours, departmental staff, fire fighters and property from wildfire.*
2. *Protect plant communities, ecosystems and physical and landscape values from the effects of frequent uncontrolled fires and from inappropriate burning regimes and damaging suppression techniques.*
3. *Prevent large areas of the reserves from being burnt in any one wildfire, and enable the between-fire interval of most of the vegetation on the reserves to exceed 15 years.*
4. *Reduce the risk and frequency of unplanned fire starting near or within the reserves as a result of human activities.*

Factors Affecting Fire Management

Values which are potentially threatened by fire on or near the reserves include people living near or visiting the areas; the agricultural industry with its homesteads, pasture, crops, stock, buildings and fences; and the many nectar-producing plant species of the kwongan vegetation, and the indigenous fauna, such as honey possums, which require between-fire intervals of greater than 13 years for maximum honey production (Wills, 1989).

The adjoining coastal towns and settlements of Cervantes, Lancelin and Ocean Farms also represent highly vulnerable assets.

Protection of all these values and assets must be considered in the development of fire prevention and management strategies.

Fire History

Apart from some areas in Nambung National Park, most of the reserves have been burnt at least once in the past 15 years. Most of the areas burnt during this period have been by fires started by people including escapes from adjoining private properties, squatter settlements and those deliberately lit. Two large fires have occurred in the plan area in recent years as a result of escapes from private property burns. The two areas most affected by these fires are Wanagarren and Nilgen Nature Reserves.

Lightning is a significant cause of fire in the general area. In summer 1992/93, dozens of lightning-caused fires burnt up to 100 000 ha of Crown land and private property along the central west coast. These included a lightning-caused fire in Nambung National Park in January 1993 that burnt about 8 000 ha. Besides this there have been relatively few lightning-caused fires that have affected the reserves in question over the past 15 years, however, this source is still considered to be a major threat (see Map 7).

Fire Behaviour

The vegetation is usually dry enough to burn from August through to May each year. The kwongan of the northern sandplains consisting of heath shrublands is extremely flammable, and will burn rapidly and with high intensity.

Wind speed and direction is probably the major factor influencing the spread of wildfires in these central coast reserves. Generally, the wind patterns are predictable during the fire season with light to moderate offshore easterly winds in the morning and moderate to strong south to south-westerly sea breezes in the middle of the day, which abate in the evening when they turn back to blow from the south-east and easterly direction. The predictability of these wind patterns assists greatly in planning prescribed buffer burns.

The presence of large mobile sand dunes represent natural fire barriers. These areas can be linked by narrow burn buffers providing a highly desirable break-up of the reserves into fire management zones.

The discontinuous nature of fuels within the heath vegetation provides difficulty in confining prescribed fire to narrow buffer strips between parallel tracks unless the vegetation has first been scrub-rolled. The more continuous fuels of scrub heath vegetation allow for a greater range in weather conditions under which fire spread is possible, and fires may be sustained under mild conditions.

In the northern sandplains vegetation, experience has shown that under severe conditions a low fuel buffer of four years or less with a minimum of 400 metres width is effective in assisting to bring wildfires under control.

Fire Ecology

Vegetation in the heathland (kwongan) vegetation of the northern sandheaths is rich in plant species, and the small amount of available data suggest that this is the case in the Nambung area. Plant species composition in vegetation community types in the northern sandheaths is influenced primarily by soil type but fire is also an important determinant of both species composition and vegetation structure (Wills 1989).

Plant species most vulnerable to fire are those that are killed by fire and regenerate only from seed (obligate seeders). Those relying on seed retained on the plant appear to be particularly vulnerable, although some obligate seeders with soil-stored seed are also vulnerable. The critical issue is how quickly these species regenerate and produce adequate seed to replace themselves.

Many of the vulnerable species in the Nambung area are dominant or structurally important in some vegetation types. Frequent fires would result in a reduction in abundance of these species as well as structural modification of the vegetation types in which these species are dominant.

Perimeter areas adjacent to cleared land are vulnerable to weed invasion which can be exacerbated by fire.

Effects of fire on fauna in the Nambung area are unknown, but are likely to be related to changes in vegetation composition and structure. Studies elsewhere indicate that too frequent fires could result in a reduction in abundance of obligate seeders such as *Hakea trifurcata* and *Dryandra sessilis* which are important producers of nectar and pollen as well as being dominant structural elements in some vegetation types in the reserves. Such a reduction would have obvious implications for nectar and pollen foragers, including native bees, various honeyeaters and the honey possum (*Tarsipes rostratus*), as well as for commercial colonies of the European honey bee. This, taken together with any vegetation structural changes which may occur, is likely to have implications for other plants and animals.

Different animals have different responses to fire, but these different requirements would be best met by retaining most vegetation unburnt, with some areas having a variety of fire ages.

Other Considerations

Preventing dieback disease from being introduced into the reserves is a major management concern. In the longer term, dieback disease has the potential to degrade the ecosystems of these areas more than fire. Construction and maintenance of mineral earth breaks must only be done under dry soil conditions through application of strict hygiene measures.

The effects of fire on karst landforms is not well documented but spalling (splintering), calcination and subsequent erosion can occur after fire. Underground drainage channels may be affected by increased sedimentation as a result of erosional processes independent to the intensity of fire on the surface. Cave microclimates can also be changed following fire (Holland, 1993).

The mobile sand dunes within several of the reserves are fragile and vulnerable to movement as a result of the removal of vegetation following fires. The fire prevention strategy must minimise the disturbance of vegetation adjacent to sand dunes.

Another consideration in developing the fire management plan is the limited resources available within CALM's Moora District, and the high reliance on assistance provided by volunteer bushfire brigades, Shire Councils, beekeepers and neighbouring landholders to achieve the burning programs and to suppress wildfires.

The fire management strategies can only be achieved if sufficient resources and funds are made available. If sufficient resources are not available, fire protection and management will need to be confined to those areas with highest priorities as determined by CALM in consultation with the local community. The Regional Fire Prevention Committee coordinated by the Bush Fires Board with representation from local bushfire organisations, Shires and CALM has been established in the Midwest Region to assist with fire protection decision making and fire management arrangements.

FIRE MANAGEMENT STRATEGY

General

The reserves currently contain vegetation with a relatively wide range of fire ages and fuel structures. Existing roads, tracks and sand dunes divide the reserves into a system of small to moderately large zones ranging from 1 500 ha to 5 000 ha. The basic strategy proposed for these reserves is to provide for a network of buffer strips in which burning for fuel reduction is undertaken. The aim is to reduce the likelihood of large tracts of mature vegetation communities being burnt at the one time, whilst minimising the risk of wildfires entering or leaving the reserves. The existing network of roads, tracks, sand dunes, buffers and recently burnt areas will be used to provide zone boundaries in these reserves. The aim is to restrict the fires to the zone in which they start.

Burning Regimes

Three primary burning regimes are to be applied in varying degrees in each of the four reserves in the plan (see Map 8).

1. **No Planned Burn (NPB)**
   Sections of the reserves are to be designated 'No Planned Burn'. These areas will not be deliberately burnt for the life of the plan, and some may be retained for reference in the long term. If wildfires should occur in the NPB areas, they will either be immediately attacked to contain them to small size, or they will be allowed to burn to surrounding low fuel buffers or back burning from existing management tracks will be used.

2. **Vegetation Management Regime**
   It is proposed to patch burn these areas using techniques which include aerial ignition. The aim is to leave between 40 to 60 percent of the zone area unburnt in order to provide a mosaic of vegetation structural development and a variety of fauna habitats.

3. **Prescribed Burning Buffers**
   Burnt buffers will play a major role in protecting the reserves and the adjoining community assets. To be effective in limiting the spread of intense wildfires, the buffers should be at least 400 metres wide with less than five year old fuels. These may

comprise open edge burns, wind driven buffers and scrub rolled buffers.

Within the kwongan heath vegetation with discontinuous fuels, the buffers will comprise burnt scrub-rolled strips up to 100 metres wide. To provide for the extra width (approximately 400 m) edge burns will be run into scrub-rolled low fuel buffers. Where good access tracks and buffers already exist, 'open edge' burns will be applied. Open edge burning can be safely achieved with judicious application of fire under predictable, mild conditions.

Where access tracks are absent or where it is desirable to link existing burn buffers with other low fuel areas, such as sand dunes, wind-driven buffers will be applied. These may be ignited either by ground crews (for short buffers) or by aircraft in large zones. Wind-driven buffers will only be established under favourable weather conditions in which winds are highly predictable, and where in most instances cool moist nights extinguish the burn overnight.

Both the open edge buffers and wind-driven buffers do carry a risk of escape if weather conditions change unexpectedly. However, these techniques have the advantage of eliminating the need to construct new mineral earth breaks which may result in dieback spread or soil erosion.

In order to be effective the buffers should contain fuel ages of less than five years. To avoid the need to reburn the same vegetation every five years, it will be necessary to maintain two parallel buffers which need only be burnt approximately every 10 years. The older buffer strip will be burnt into the low fuels of the younger strip. In some instances and with some vegetation types, scrub-rolling may be required to ensure a safe and effective burn.

Prescriptions will be prepared for all proposed burns in accordance with CALM's Policy No. 19 (Fire Management), No. 9 (Conservation of Threatened Flora in the Wild) and No. 33 (Conservation of Endangered and Specially Protected Fauna in the Wild). This will also involve the completion of a pre-burn checklist which takes into consideration all potential environmental impacts, especially the need to control dieback, and minimise impacts on landscape and visual resources. All burns carried out by external agencies, i.e. local brigades, will be carried out according to CALM prepared prescriptions. All details will be recorded to check that objectives are achieved and to increase the knowledge and experience available.

Multi-agency Fire Response Plan

A wildfire response plan for all Crown lands and private property on the northern sandplain has been developed by the Bush Fires Board in conjunction with local authorities, bushfire brigades and CALM. The wildfire response plan is part of an interagency agreement between these parties. There is a CALM Moora District Fire Control Working Plan which includes fire standby and response arrangements, fire detection provisions and public warning arrangements.

STRATEGIES

Prescribed Burning

1. Implement the Fire Management Plan (Map 8) which zones the four reserves into 'No Planned Burn', 'Vegetation Management' and 'Prescribed Burning' zones.

2. Monitor the Fire Management Plan annually to take into account major wildfires and completed burning programs. Major modifications to the burn plans must be approved by the Director of Nature Conservation or National Parks.

Pre-suppression

3. Maintain a network of fire management access tracks and firebreaks using methods that minimise soil erosion and do not increase the risk of, or contribute to, introducing, spreading and intensifying dieback disease.

4. Provide water supply points at strategic locations within or near the reserves.

5. Permit the use of gas fires only.

Suppression

6. Endeavour to contain wildfires that enter or start in the reserves within a management zone.

7. Fire suppression arrangements will be conducted in accordance with the Central West Coast Fire Protection Plan or its successor, and the Moora District Fire Control Working Plan.

Liaison

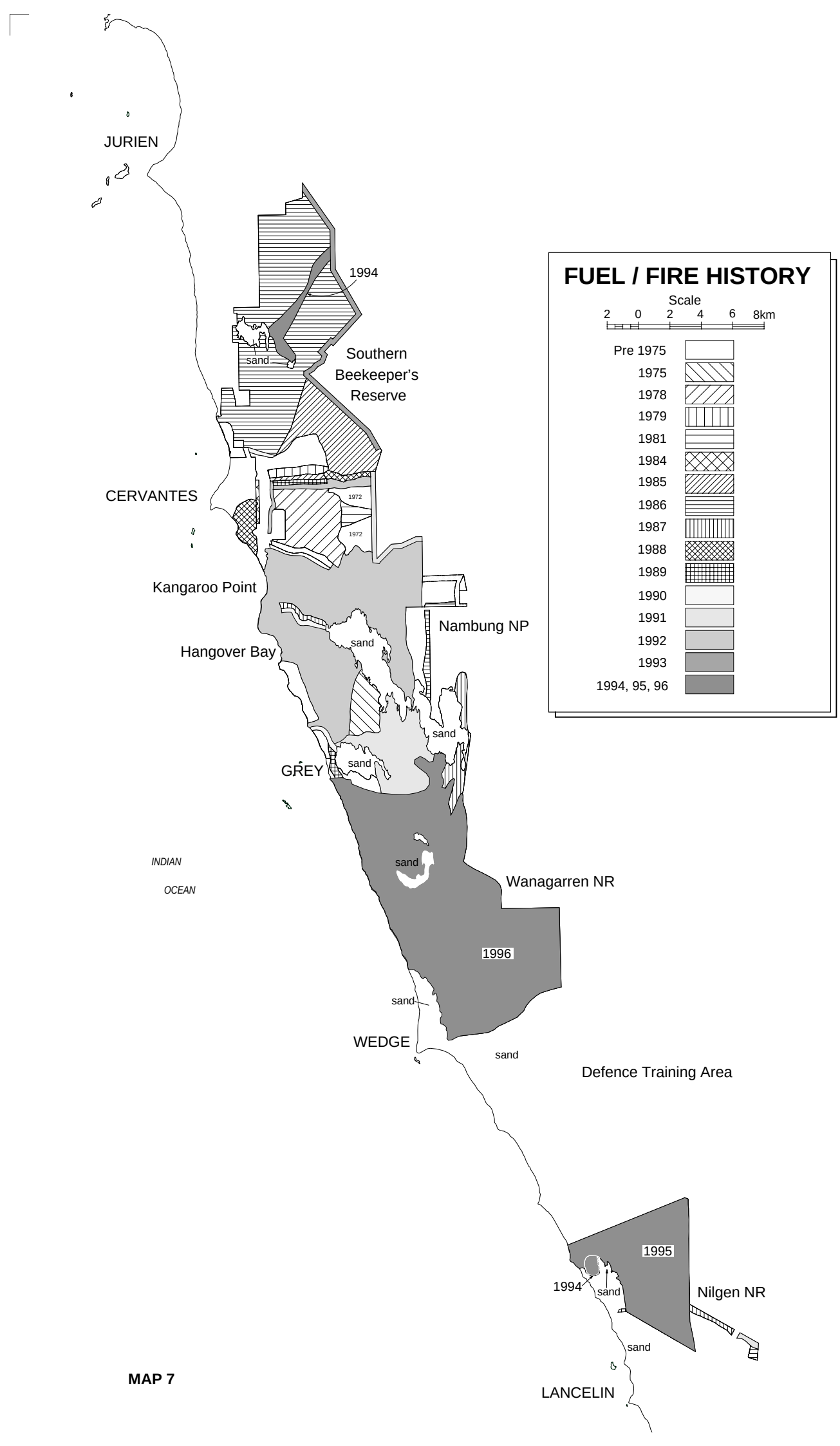
8. Seek input on fire program priorities through continuing CALM's representation on the relevant BFB Regional Fire Prevention Committee and the Central West Coast Fire Prevention Plan (or its successor).

Information and Education

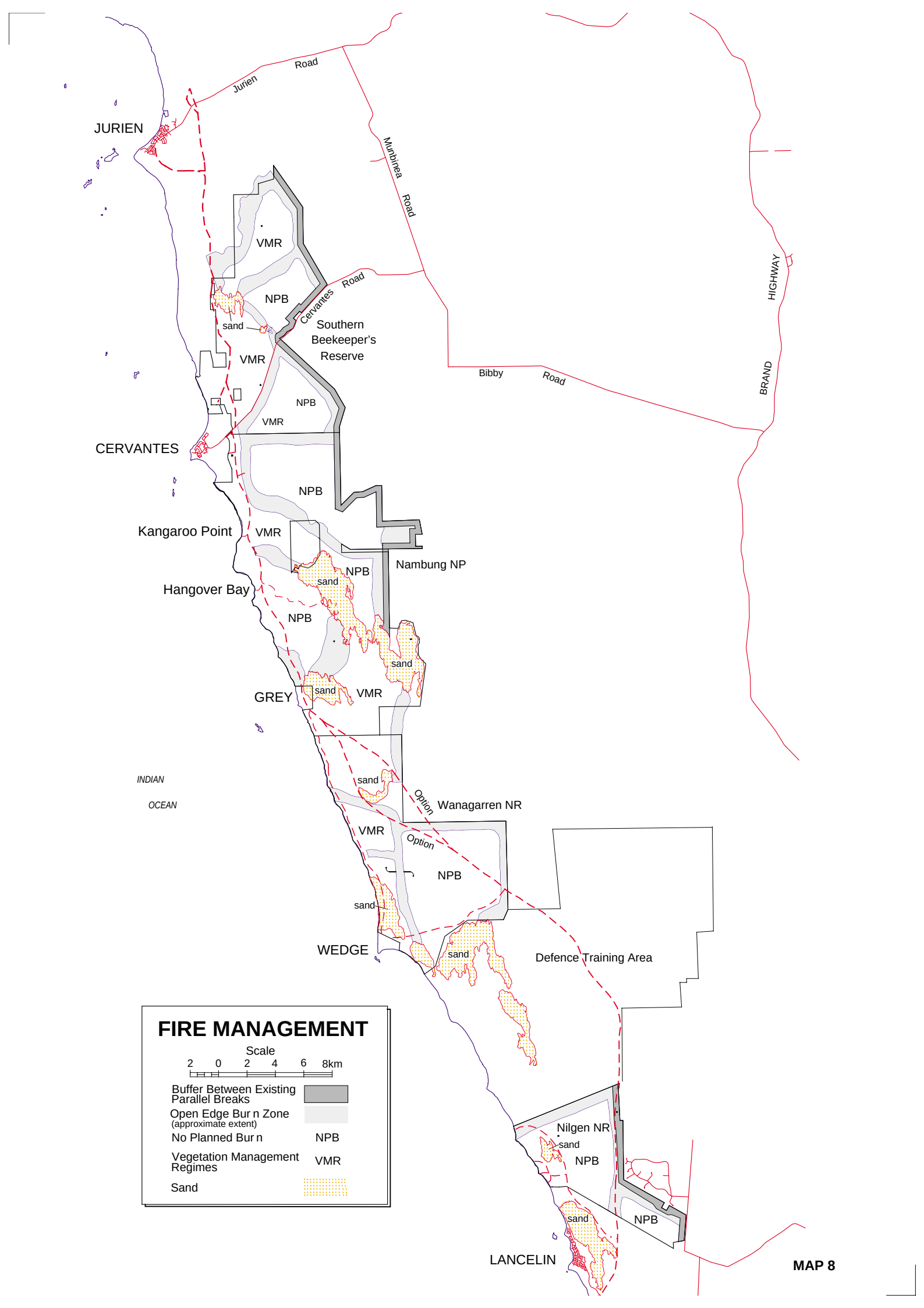
9. Provide information on the reserves' values and fire risks in order to improve visitors' appreciation and support for fire management programs, and fire safety and survival.

Research and Monitoring

10. Monitor fire behaviour in different vegetation fuel types particularly where new techniques are being tested.


JURIEN
1994
sand
Southern
Beekeeper's
Reserve
CERVANTES
1972
1972
Kangaroo Point
Nambung NP
Hangover Bay
sand
sand
sand
GREY
INDIAN
OCEAN
sand
Wanagarren NR
1996
sand
WEDGE
sand
Defence Training Area
1995
1994
sand
Nilgen NR
sand
LANCELIN
FUEL / FIRE HISTORY
Scale
2 0 2 4 6 8km
Pre 1975
1975
1978
1979
1981
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994, 95, 96

MAP 7


Jurien Road
JURIEN
Munbinea Road
HIGHWAY
VMR
NPB
sand
Cervantes Road
Southern Beekeeper's Reserve
VMR
Bibby Road
BRAND
NPB
VMR
CERVANTES
NPB
Kangaroo Point
VMR
Nambung NP
NPB
sand
Hangover Bay
NPB
sand
sand
VMR
GREY
INDIAN OCEAN
sand
Option
Wanagarren NR
VMR
Option
NPB
sand
WEDGE
sand
Defence Training Area
Nilgen NR
sand
NPB
sand
NPB
LANCELIN
FIRE MANAGEMENT
Scale
2 0 2 4 6 8km
Buffer Between Existing Parallel Breaks
Open Edge Bur n Zone (approximate extent)
No Planned Bur n
NPB
Vegetation Management Regimes
VMR
Sand

MAP 8

11. Undertake research on fire ecology.

12.0 PLANT DISEASES

The objective is to prevent introducing plant diseases into disease-free areas and to control their spread where they are already present.

Phytophthora Dieback

Dieback disease is caused by microscopic soil-borne fungi belonging to the genus *Phytophthora*. It survives in soil and plant material and produces small motile spores which are spread in water and moist soil. The fungus infects plant roots and, as it establishes, rots the roots and stem tissue causing death due to water stress. Dieback is spread by the movement of infected soil during earthworks, or on the wheels and underbodies of vehicles. It may also spread by other means, such as in mud on shoes or in flowing water.

Cost effective techniques to eradicate the fungus once it is established are not yet available and therefore, every effort must be made to protect dieback-free areas. The only effective measure is to strictly control access in hazardous areas, and to apply stringent disease hygiene to all Park operations.

The most susceptible plant species belong to the families Proteaceae (e.g. *Banksia*, *Grevillea*, *Hakea* families), Epacridaceae (southern heath family), Fabaceae (pea family, including genera such as *Daviesia* and *Jacksonia*) and some Myrtaceae (including genera such as *Darwinia* and *Verticordia*).

The area around the Nambung River has a high dieback hazard rating. The soils are a mixture of yellow and grey sands of the Bassendean System, and the vegetation is comprised of a low *Banksia* woodland with a significant component of susceptible species (see Map 6). There are already infections in this drainage system and the impact associated with periodic flooding events has been significant in the past. Any operations in this area need to be planned and executed with the most up to date hygiene methods possible. Uncontrolled access to this area is deemed inappropriate.

Four species of *Phytophthora* were identified along the Nambung River in a survey commissioned by the Northern Sandplains Dieback Working Party in 1990 (Hart *et al*, 1992). *P. cinnamomi* and *P. megasperma* var. *megasperma* prefer wet sites and cause high impacts. *P. megasperma* var. *sojae* is less common but exhibits moderate impacts and *P. citricola* may have variable impacts.

Infections of *P. megasperma* var. *megasperma* also occur on Wongonderrah, Munbinea, Bibby and Cadda Roads (see Map 9).

Further inland, vegetation of the Jurien Vegetation System (see 7.0 Vegetation and Flora) has a large component of susceptible plant species (Proteaceae and Epacridaceae) on deep yellow sands. It has a moderate hazard rating as disease could become established in moisture gaining sites forming foci for continued infection upslope into the drier uplands. The impact of the disease on the vegetation is uncertain but could be significant. Operations in this area should be cognisant of hygiene requirements and the need to avoid creating micro-environments that favour the disease becoming established. In particular, the construction and maintenance of roads and tracks should ensure adequate drainage.

Most of the limestone area has a low dieback hazard rating. This is due to the presence of very few susceptible species, the vegetation being dominated by *Acacia*, underlain by limestone with extensive areas of yellow soils. The impact of disease is likely to be low, however, there are moisture gaining sites that have some susceptible species associated with them. Four-wheel drive access in these parts should avoid areas prone to inundation.

The coastal strip has very few susceptible plant species and a very low dieback hazard rating owing to the unconsolidated, calcareous sands (see 5.0 Geology, Soils, Landforms and Coastal Processes). The possibility of establishment or survival of an infection in this hostile environment is remote.

Intensive monitoring of known infections and further surveys are required to determine the extent of *Phytophthora* dieback in the Park and Reserves. Management of the disease will be carried out according to CALM's Policy Statement No. 3 (*Phytophthora* Dieback) and the Moora District Dieback Protection Plan (1990).

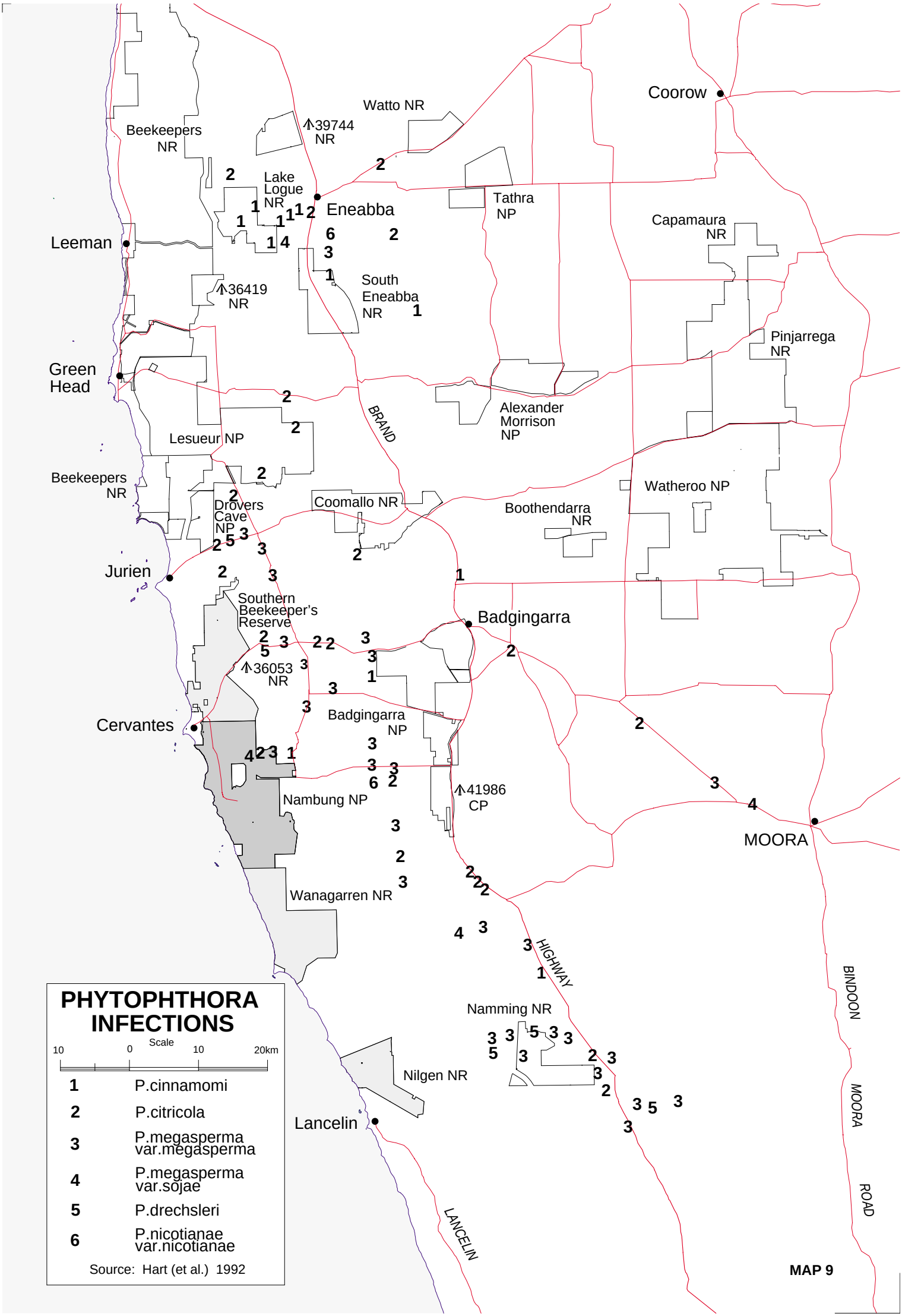
Armillaria and Stem Canker

Armillaria luteobubalina is an indigenous species of mushroom-producing pathogen which causes infection through aerial dispersed spores or root contact. In the Nambung area it centres on coastal vegetation of the Quindalup and Spearwood dune systems and is known to occur at Grey and Wedge Island. Species of Proteaceae, Myrtaceae, Papilionaceae, Epacridaceae and Mimosaceae are most susceptible (Shearer, 1994).

Canker fungi kill the aerial parts of plants as compared to *Phytophthora* and *Armillaria* which kill plants from the roots up. Hosts affected by canker fungi occur mainly in the Proteaceae and Myrtaceae. The *Cryptodiaporthe* pathogen is a relatively new species and is an aggressive canker of *Dryandra sessilis* in the Cervantes area. It causes severe branch and stem cankering and is known to cause high mortality of *Banksia coccinea* on the south coast (Shearer, 1994).

STRATEGIES

1. Implement CALM's Policy Statement No. 3 (*Phytophthora* Dieback) and the Moora District Dieback Protection Plan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Watto NR
39744 NR
Beekeepers NR
Lake Logue NR
Eneabba
Tathra NP
Capamaura NR
Leeman
South Eneabba NR
36419 NR
Pinjarrega NR
Green Head
Alexander Morrison NP
BRAND
Lesueur NP
Beekeepers NR
Drovers Cave NP
Coomallo NR
Boothendarra NR
Watheroo NP
Jurien
Southern Beekeeper's Reserve
Badgingarra
36053 NR
Badgingarra NP
Cervantes
41986 CP
Nambung NP
MOORA
Wanagarren NR
HIGHWAY
Namming NR
Nilgen NR
Lancelin
BINDOON
MOORA
ROAD
LANCELIN
PHYTOPHTHORA INFECTIONS
Scale
10 0 10 20km
1 P.cinnamomi
2 P.citricola
3 P.megasperma var.megasperma
4 P.megasperma var.sojae
5 P.drechsleri
6 P.nicotianae var.nicotianae
Source: Hart (et al.) 1992
MAP 9

2. **Continue to investigate, and regularly monitor, known infections to determine their impact and extent.**

3. **Implement a program of opportunistic survey of the Park and Reserves to determine whether other infections occur.**

4. **Inform Park users about plant diseases and their management, and why it is important to prevent their introduction and spread.**

5. **Instigate control and eradication procedures while ensuring that they do not place other areas or values at risk. Eradicating isolated infections should be of the highest priority.**

6. **Train staff associated with the area to recognise *Phytophthora* dieback, *Armillaria* and canker, and in sampling and management techniques.**

7. **Include disease management specifications in contract documents (including scientific flora collecting licences) and job prescriptions, where appropriate.**

8. **Close or restrict access to particular areas, roads, tracks and walks if the presence of dieback is suspected or confirmed, or if a high risk of introducing dieback is identified.**

13.0 INTRODUCED PLANTS AND ANIMALS

The objective is to minimise the impacts of introduced plants and animals on ecosystem values.

Introduced Plants

A bushland or environmental weed can be defined as an unwanted plant species growing in bushland. Weeds displace indigenous plants, particularly in disturbed sites, by competing with them for light, nutrients and water. Some exotic grasses provide a significant fuel source to support fire. They can also have a significant adverse impact on other conservation values by altering animal habitats and harbouring pests and diseases.

Data from Griffin (1993) and CALM files indicate 18 alien plant species have been recorded in the Southern Beekeeper's Reserve, 15 in Nambung National Park, 8 in Wanagarren Nature Reserve and 18 in Nilgen Nature Reserve. This compares with a total of 64 species recorded for the Central Coast. The distribution of most alien taxa is influenced by their proximity to squatters' areas and Lancelin and Cervantes.

The most common weed species on the coastal dunes are *Dischisma arenarium*, *Tetragonia decumbens*, Great Brome *Bromus diandrus*, *Crassula glomerata*, Rat's Tail Fescue *Vulpia myuros*, *Heliophila pusilla*, *Ehrharta brevifolia* (or annual Veldtgrass *E. longifolia*) and Rose Pelargonium *Pelargonium capitatum.*

Isolated outbreaks of Double Gee, Cape Tulip and more recently Paterson's Curse are occasionally discovered during opportunistic monitoring by departmental staff. These species, which are declared under the Agriculture and Related Resources Protection Act (1976), are usually found in areas of disturbance such as firebreaks and road verges. These outbreaks are sprayed or removed by hand and the area monitored for effectiveness of control methods and any requirement for further attention.

Methods of weed control must comply with CALM's Policy Statement No. 14 (CALM's Role in the Management of Bushland Weeds). Priority should be given to controlling Cape Tulip because of its detrimental effects on ecosystem values. Plants declared under the Agriculture and Related Resources Protection Act (1976) must also be given high priority for eradication or control.

The efficiency of control on target species and any effects on non-target species should continue to be assessed, and changes made to procedures if required. Information should be provided to the public on the impacts and control of introduced plants and animals.

Introduced Animals

Introduced animals known to occur in the Park and Reserves include foxes, rabbits, feral dogs and cats, feral birds (e.g. feral pigeons), house mice and feral bees. Foxes and cats are known to prey on indigenous mammals and birds, as well as reptiles and invertebrates, and are the major threats to their long term survival.

Control of these animals is implemented by CALM and in some cases Agriculture W.A.. Methods of control include baiting and trapping programs, opportunistic shooting of foxes, rabbits, feral cats and dogs, and spraying of feral bees.

STRATEGIES

1. **Maintain an inventory of introduced plants and animals and monitor these populations.**

2. **In conjunction with Agriculture W.A. and nearby landholders, develop and implement programs to prevent introduction and control existing populations of exotic plants and animals as resources allow.**

14.0 REHABILITATION

The objective is to rehabilitate degraded areas to a stable condition resembling the natural environment as closely as possible.

Most areas requiring rehabilitation result from human-induced disturbance of the natural environment. These include vehicle tracks that are not considered essential for recreation access, fire management or for reserve management in general, borrow pits, squatter shack areas, and poorly sited camping nodes. Some sections of track may require stabilising to minimise erosion and promote natural rehabilitation. Appropriate methods of stabilisation will be utilised.

Degraded sites will be rehabilitated in accordance with CALM Policy Statement No. 10 (Rehabilitation of Disturbed Land) and guidelines. Wherever possible the seeds and cuttings from species in the immediate location will be used and landforms will be rehabilitated to resemble as closely as possible the natural landforms in the vicinity. Rehabilitation will be ongoing and periodically monitored.

STRATEGY

1. **Rehabilitate degraded areas in accordance with a rehabilitation program which defines priorities.**

RECREATION AND TOURISM

Recreation and Tourism Goal

Facilitate recreation and tourism in a manner compatible with conservation and other goals.

15.0 RECREATION STRATEGY

Popular features of the Park and Reserves are the coastal landscapes and seascapes in general and the Pinnacles Desert in particular. Visitors enjoy the area's natural and undeveloped qualities. It is important that these qualities be retained for present and future generations to enjoy.

Low impact activities and those that increase awareness, appreciation and understanding of the natural environment will be encouraged. This will be achieved by acknowledging visitor needs and providing access, where practicable, to quality recreation facilities and experiences for the widest range of visitors. Recreation activities will be managed to protect conservation values and maintain the natural environment and social values of recreation settings in perpetuity.

PRINCIPLES

Preservation of the Values of the Land Itself

The natural systems (including landscapes, particular sites, biota) should be able to sustain the recreation which is occurring or is proposed. The intensity of recreational activities may need to be controlled to ensure it does not destroy the value and nature of the activity.

Consistency of Recreation with Purpose of Vesting

Recreational activities should be compatible with the vested purpose of the Park and Reserves. The goals for national parks and nature reserves are outlined in section 2.3 Management Goals. The vested purpose of nature reserve normally only provides for conservation and education purposes with minimal access and does not normally allow for camping. Proposed purpose changes to Nilgen and Wanagarren will allow for a wider range of recreational opportunities and ensure protection of natural values (section 3.0 Land Tenure).

Equity

A range of activities, consistent with purpose, should be allowed in the Reserves. However, uses which impair other forms of use or jeopardise safety of other users should be controlled or eliminated. Priority will be given to low impact activities and those that increase awareness, appreciation and understanding of the natural environment.

Management

Activities and facilities should be supervised and maintained, particularly where land values may be impaired. If effective management cannot be provided the activity or facility should be restricted, relocated or eliminated.

16.0 RECREATION OPPORTUNITIES

The objective is to provide a range of nature-based recreation opportunities while minimising environmental impacts and conflicts between user groups.

The Region

Nambung National Park and Nilgen, Wanagarren and Southern Beekeeper's Nature Reserves are located in CALM's Moora District. The Moora District encompasses seven national parks, one conservation park, 90 nature reserves ranging in size from 0.5 ha to many thousands of hectares, and includes 30 offshore islands which are 'A' and 'C' class nature reserves.

Recreation and tourism in the Moora District are primarily coastal related activities undertaken by family groups, although inland features such as the national parks and wildflowers contribute to the leisure experience. The natural attributes of the area are the principal qualities that attract visitors, and the unspoiled environment, clean air and water are elements that enhance the quality of life in the region. A range of recreation opportunities are available owing to both coastal and inland features of the area. The most popular pursuits in the Park and Reserves are visiting the Pinnacles, photography, viewing scenery, pleasure driving, swimming and fishing (1992/93 Visitor Survey).

A regional perspective is essential when planning for recreational opportunities in the Park and Reserves in order to complement existing opportunities in the region. The integration of recreation opportunities in the reserves with those of the surrounding area will become increasingly significant as greater numbers of people come to the area either to live or to recreate.

CALM-managed lands within the Moora District include Badgingarra and Lesueur National Parks. These inland parks are visited by fewer people than Nambung National Park and the Reserves. Badgingarra and Lesueur provide different opportunities for visitors and are particularly attractive for nature appreciation, wildflower viewing and research.

Recreational use of the many nature reserves in the region is not encouraged but special consideration for camping has been given in this management plan as there are no opportunities for camping on CALM-managed lands between Perth and Shark Bay.

Non-CALM managed lands in the area include the off-road vehicle area provided in the dunes adjoining Lancelin which is managed by the Shire of Gingin. Other areas include beaches and picnic areas with toilets that are Shire managed. Lancelin and Cervantes are major visitor focal points providing a range of visitor services such as shops, fuel, picnic areas and accommodation (e.g. caravan park and chalets).

Visitors will be informed of opportunities on both CALM and non-CALM managed lands in the area. Continued liaison with the Shires of Gingin and Dandaragan and other relevant authorities managing similar visitor attractions will encourage an integrated approach to the provision and management of recreation opportunities.

The Park and Reserves

About 134 000 people visited the Pinnacles in 1996-1997. Visitation for the previous year (1995-1996) was 112 000, 120 000 for 1994-1995, 150 000 for 1993-1994, and 138 000 for 1992-1993. Despite the trend over the past few years, it is anticipated that the number of visitors seeking recreation opportunities in the Park and Reserves will continue to increase, particularly once the coast road between Lancelin and Green Head is completed.

At present there are developed day use sites at Kangaroo Point, Hangover Bay and the Pinnacles. Current use of Nambung National Park focuses on the Pinnacles Desert which is accessible by 2WD.

A survey of visitors to Nambung National Park and Wanagarren, Nilgen and Southern Beekeepers Nature Reserves was conducted between December 1992 and November 1993. The survey showed that the most popular activities in Nambung National Park were visiting the Pinnacles (82%)[3], viewing scenery (81%), filming/photography (71%), pleasure driving (44%) and wildflower appreciation (33%). The most popular activities in Nilgen, Wanagarren and Southern Beekeeper's Nature Reserves were swimming (74%), viewing scenery (67%), pleasure driving (65%) and fishing (56%). To facilitate this visitor use the purpose of the nature reserves needs to be reviewed, as outlined in section 3.0 Land Tenure.

While the majority of visitors to the area visit the Pinnacles, other recreation opportunities such as viewing wildflowers are also popular in the area during late winter and spring. The visitor survey revealed that most people visiting Nambung National Park were with their partners or families and tended to stay less than three hours. A much higher proportion of visitors to the other reserves stayed for longer periods. The Park and Reserves provide for a broad spectrum of uses and so attract a variety of user groups. Located 240 km north of Perth they attract day visitors as well as visitors that stay overnight or longer. People visit the area in 2WD and 4WD private vehicles and in vehicles that are part of commercial tours.

An increase in the number of people seeking recreation opportunities in the Park and Reserves has the potential to degrade those values that attract them in the first place. For this reason recreational use of Nambung National Park and Nilgen, Wanagarren and Southern Beekeeper's Nature Reserves will be managed according to a zoning plan (see section 4.0 Management Zones) which aims to protect conservation values by allocating recreation facilities and activities to those areas most capable of sustaining use. Recreation opportunities will be provided that:

- enhance visitor appreciation of natural and cultural values;
- do not impair recreation experiences due to conflicting uses;
- maintain the natural qualities of recreation settings;
- meet the needs of all ages where this can be practically achieved; and
- provide for basic needs and safety of all visitors, i.e. toilets, shelters, information.

Nambung National Park and Nilgen, Wanagarren and Southern Beekeeper's Nature Reserves will be developed and managed to facilitate sustainable recreational pursuits (depending on proposed purpose changes to the Reserves as outlined in section 3.0 Land Tenure).

Future Developments

The proposed coast road between Lancelin and Green Head will affect the provision and management of future recreational opportunities in the Park and Reserves (see 17.0 Access). Visitor numbers will increase due to increased 2WD access through the area. The type of visitors through the Park and Reserves and the recreational opportunities that these visitors want is also likely to change. Visitors travelling along the coast road may seek a greater number of services and facilities (see 18.0 Recreation Areas).

A visitor centre is proposed in the Park to meet the needs of visitors, to promote the region's tourism attractions and to interpret the region's natural features.

New toilets are urgently required in the Park as the existing Pinnacles toilets cannot adequately meet visitor demands. It is envisaged that new toilets will be designed as part of the staged development of a visitor centre.

[3] The percentages do not add up to 100 as survey participants had the opportunity to provide multiple responses to the question.

STRATEGIES

1. **Ensure that Site Development Plans are produced before development works are undertaken.**

2. **Ensure recreation opportunities that are provided in the Park and Reserves complement opportunities available elsewhere in the region.**

3. **Inform visitors of the recreation opportunities and facilities available elsewhere in the area, particularly those not available in the Park and Reserves.**

4. **Encourage an integrated approach to the provision of recreational facilities in the Region. Liaise with the Shires of Dandaragan and Gingin and other relevant management authorities.**

5. **Work with State and local authorities in promoting visitor use which is appropriate to the Park and Reserves.**

6. **Preserve the unique opportunities and features that attract visitors to the area.**

7. **Provide and maintain facilities at feature sites compatible with the minimum impact objectives and needs of visitors.**

8. **Monitor changes in the patterns and levels of visitor use, and predicted trends. Alter recreation and tourism management accordingly.**

9. **Actively solicit support of relevant agencies and stakeholders for the establishment of a visitor centre in the Park.**

17.0 ACCESS

The objective is to provide and maintain a structured access system while ensuring the Park and Reserves values are not adversely affected.

The access road to the Pinnacles, Hangover Bay and Kangaroo Point is the only 2WD vehicle access in the Park and Reserves. The remainder of the routes in the Park and Reserves have developed on an unplanned basis over many years. This has led to an uncoordinated network of tracks (some poorly located) throughout the Park and Reserves. The majority of tracks have originated from uncontrolled off-road vehicle use in the past. A number of tracks in the Reserves are in place to service apiary sites.

The access system in the Park and Reserves will be rationalised by stabilising and realigning designated tracks and closing and rehabilitating the remainder. Track closures are necessary due to factors such as unnecessary duplication, detraction from the scenic quality of the landscape, severe erosion in some areas, the risk of disease spread and visitor safety.

Rationalisation of access tracks in the Park and Reserves needs to consider:
- safety of visitors;
- access requirements for fire management;
- access requirements by beekeepers;
- the results of the 1992/93 visitor survey in Nambung National Park and Nilgen, Wanagarren and Southern Beekeepers Nature Reserves;
- the coast road between Lancelin and Green Head;
- dieback;
- location of feature sites;
- susceptibility to erosion; and
- ongoing cost of road maintenance.

2WD access will be provided to recreational areas in the Park and Reserves in the form of spur roads off the proposed coast road (see below). 4WD access will be provided between the northern boundary of the Park and Hangover Bay, sections of the coast between Grey and the southern boundary of Wanagarren Nature Reserve, and Nilgen Nature Reserve (see Map 10). A code of ethics will be promoted to ensure that activities associated with vehicles licensed under the Road Traffic Act do not adversely impact on conservation and landscape values. Only vehicles licensed under the Road Traffic Act are allowed access in the reserved area. Off-road vehicles are only permitted in designated areas such as the Lancelin off-road vehicle area.

There are numerous tracks that provide access directly onto the non-vegetated beach areas. A number of these tracks at proposed recreational sites will be retained with the remainder closed and rehabilitated. Some of the sites along the beach are only accessible when the tide is low due to natural rock barriers. This provides an opportunity to designate a portion of beach as vehicle free, utilising natural barriers present. Some designated beach areas will be closed to vehicle access (see Map 11).

A network of foot access providing for a range of interests and fitness levels, will be developed in the Park and Reserves (see section 19.2 Bushwalking).

Proposed Coast Road

The towns of Lancelin, Cervantes and Jurien are not linked by direct north-south roads and traffic must travel on inland four wheel drive tracks, secondary roads or the Brand Highway to gain access to an adjacent coastal settlement. The Central Coast Regional Strategy (1996) proposed the construction of a coastal road between Lancelin and Greenhead. The proposed road alignment traverses through the Park and Reserves and may have negative impacts on conservation values (see Map 10). The 30 km section between Jurien and Green Head has already been opened, and the link between Lancelin and Cervantes is likely to proceed during the life of this plan.

The location and characteristics (design and quality) of a coastal road should:

- minimise impact on the natural environment and provide planned access to and views of this environment;
- prevent unmanaged intensive use of the coast and discourage pressure for ad hoc settlement and development;
- encourage inter-regional traffic, with an interest in the scenic and recreational characteristics of the region or the facilities of the coastal towns rather than heavy haulage traffic;
- encourage intra-regional and local traffic including tourists travelling between towns; and
- increase opportunity for management of the conservation estate.

The coast road may become the major north-south highway, and is likely to pass within 6 km of the Pinnacles Desert. Visitor numbers to the Pinnacles are expected to increase substantially and could easily double when the coast road is built (see 18.0 Recreation Areas).

STRATEGIES

1. **Rationalise the access system in the Park and Reserves.**

2. **Design and maintain access to minimise the risk of spreading dieback disease and causing erosion.**

3. **Restrict or prohibit, if necessary, visitor access to specific areas for wildlife conservation, protection of geological formations, safety or other reasons.**

4. **Investigate future scenarios for access management and the provision of visitor services and facilities in the vicinity of the Pinnacles Desert.**

5. **Maintain and improve roads in keeping with the development of facilities, CALM's roading standards and zoning plan.**

6. **Provide some vehicle-free beaches in the Park and Reserves as indicated on Map 11.**

7. **Provide appropriate speed limits and vehicle size limits for use of the Park and Reserves' roads.**

8. **Monitor the condition of access in the Park and Reserves and maintain and upgrade as funds permit.**

9. **Develop new roads in keeping with the concept plan shown in Map 10.**

10. **Continue to liaise with local authorities and encourage support from Main Roads WA concerning coast road tourism developments.**

11. **Include protective clauses in road construction contracts.**

18.0 RECREATION AREAS

The objective is to provide and maintain a range of sensitively designed and located recreation areas.

Pinnacles Desert

Most visitors to the area go to the Pinnacles. Facilities at this area include toilets, an information shelter, a defined scenic drive through the Pinnacles Desert and defined parking.

Parking is currently available for approximately ten coaches and 30 cars. Toilet facilities at the Pinnacles carpark are of insufficient capacity to cater for the number of visitors at the site during peak periods. New toilets will be developed as part of a visitor centre. The existing toilets will remain to cater for small numbers of visitors.

Visitors pay an entry fee and are given a Park brochure as they enter the Pinnacles Desert. It is proposed to locate a lookout near the carpark area.

A limestone outcrop along the scenic drive through the Pinnacles is currently being utilised by visitors as a vista point. The outcrop is being steadily eroded from the impact of this use. It is proposed to direct visitors to an adjacent hill that is stable and vegetated. A second boardwalk lookout will be developed at this preferred site to direct the impact away from the limestone outcrop.

Visitor numbers to the Pinnacles are expected to increase enormously when the coast road is built (see 17.0 Access). The type and/or expectations of people visiting the area may also change.

This level of increased visitation may:

- place substantial pressures on the geological formations;
- have a significant impact on the visitors' experience (congestion is already a concern at peak times);
- require a major redevelopment of facilities including roads, carparks, toilets and interpretation.

The impacts of visitation on the geological and social values of the Pinnacles Desert need to be measured, particularly the effects of vehicle and pedestrian use. To protect the Pinnacles and the visitors' experience from increased visitation, changes will likely be needed to the provisions for access through the fragile formations. It could even become necessary to allow only guided access amongst the Pinnacles via some sort of shuttle service. This prospect would create

excellent opportunities for interpretation and enhancing the visitors' experience and understanding of the area's values while affording greater protection of the site. This prospect could require commercial partnerships to be established to provide infrastructure and visitor services.

Visitor Centre
A visitor centre is proposed in the Park to meet visitor needs for services and facilities, and to promote and interpret the region's natural attractions.

Hangover Bay
A majority of the visitors to the Pinnacles also visit Hangover Bay. Facilities at this area include toilets, barbecues, picnic area with shelters, information and beach boat launching area (four wheel drive vehicle required).

Kangaroo Point
Facilities at Kangaroo Point include toilets, picnic sites and beach access.

Grey and Wedge
After the Government's Squatter Shack Policy is implemented and the squatter settlements removed, potential exists at the Grey and Wedge sites for multi-faceted developments which could include a range of accommodation, food services, day use activities, fishing excursions and other recreational tours and commercial pursuits.

The Springs
The Springs area will be developed as a day use site. Facilities could include gas barbecues, shelters, picnic tables, toilets and a nature study walk.

The Crescent Dune
Subject to the final alignment of the coast road the Crescent Dune site may be developed as a vista and nature study point. Car parking will be provided at the base of the dune with a walk taking visitors to the viewing area. A small interpretive display could provide information for visitors to the site.

Lake Thetis
Pending proposed tenure changes outlined in section 3.0 Tenure, Lake Thetis will be developed as a special interest site. Facilities could include a nature study walk.

Molah Hill
Pending proposed tenure changes outlined in section 3.0 Tenure, the Molah Hill site will be developed as a vista point.

Coastal Camping Area (4WD)
4WD access will be provided between the northern boundary of the Park and Hangover Bay, sections of the coast between Grey and the southern boundary of Wanagarren Nature Reserve, and Nilgen Nature Reserve. A number of camping sites will also be designated along this area of coast.

STRATEGIES

1. **Design, develop and maintain recreation areas and facilities to departmental standards. Site development plans will be required.**

2. **Assess and monitor existing and potential visitor impacts on the natural and social values of the Pinnacles Desert.**

3. **Investigate future scenarios for access management and the provision of visitor services and facilities in the vicinity of the Pinnacles Desert.**

4. **Provide facilities suitable for use by visitors with disabilities where practicable when new facilities are designed.**

5. **Monitor visitor numbers and the impact of visitor use on recreation areas and facilities.**

19.0 RECREATION ACTIVITIES

The objective is to promote and facilitate recreation activities that are compatible with the goals of this plan.

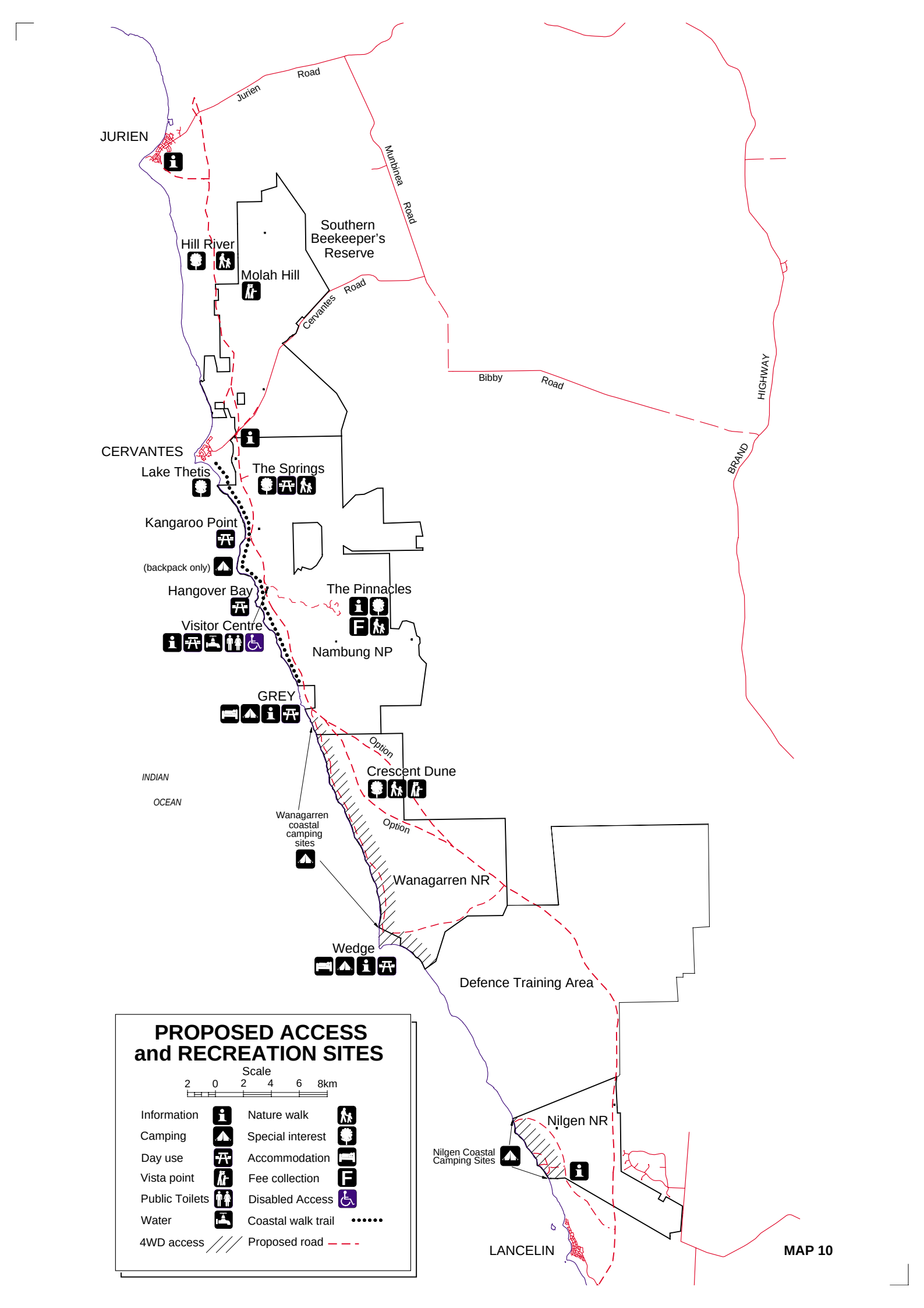
Given that recreational pursuits should be dependent on the values of the area and consistent with maintaining the natural character of Nambung National Park and Nilgen, Wanagarren and Southern Beekeeper's Nature Reserves, the following criteria have been applied to determine the acceptability of recreation activities:

- Activities will be based on the values of the area. The participation in, or enjoyment of, the activity will be in some way dependent on the natural features and resources.
- Activities will be compatible with other recreational uses of the area and will not diminish the enjoyment of other users.
- Activities will depend on the availability of resources.

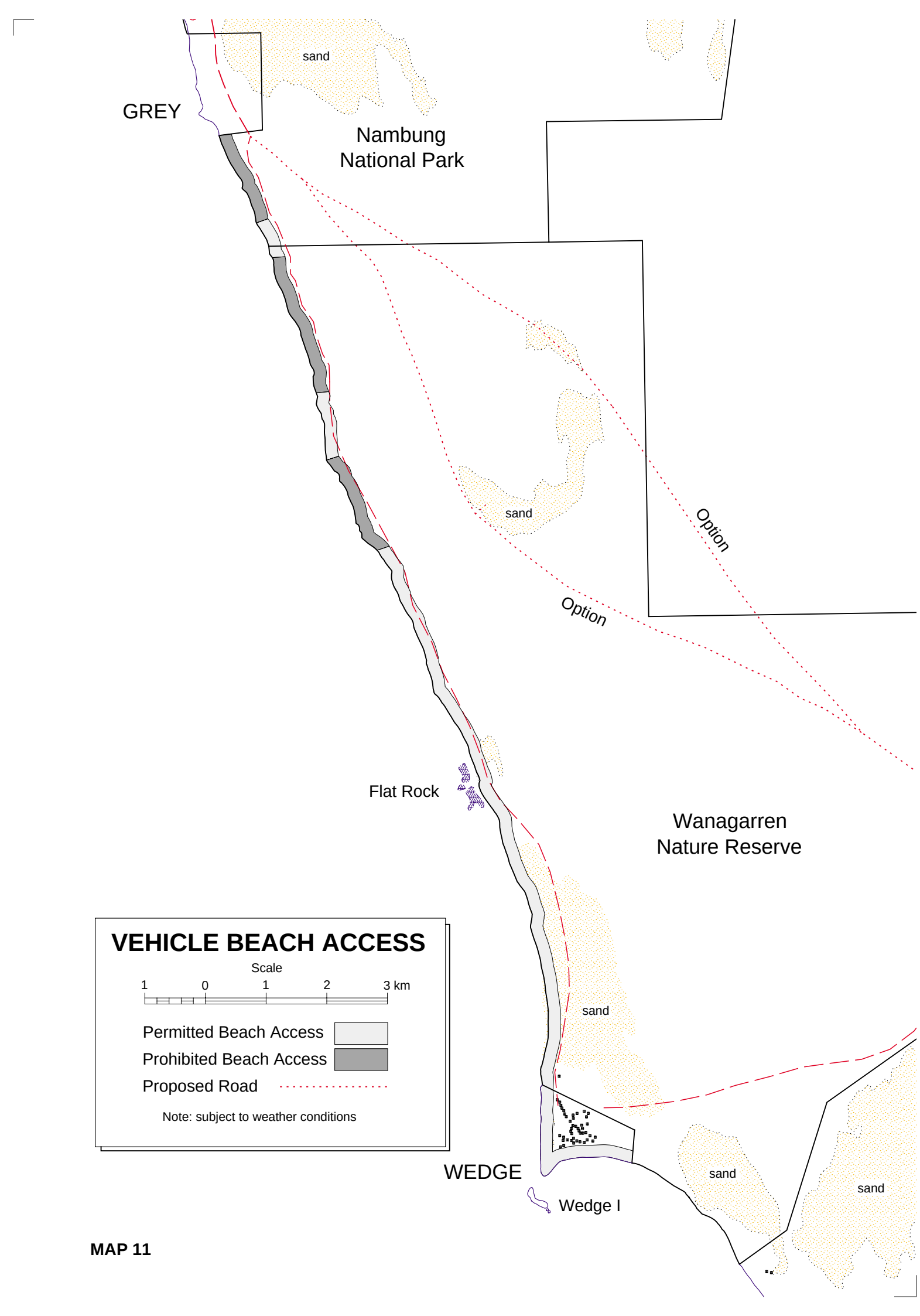
STRATEGIES

1. **Give priority to those activities that do not degrade the area or reduce its conservation values.**

2. **Control the intensity of activities, if necessary, to ensure that they do not degrade the conservation values of the Park or Reserves.**


JURIEN
Jurien Road
Munbinea Road
Southern Beekeeper's Reserve
Hill River
Molah Hill
Cervantes Road
Bibby Road
HIGHWAY
BRAND
CERVANTES
Lake Thetis
The Springs
Kangaroo Point
(backpack only)
Hangover Bay
Visitor Centre
The Pinnacles
Nambung NP
GREY
INDIAN
OCEAN
Option
Crescent Dune
Option
Wanagarren coastal camping sites
Wanagarren NR
Wedge
Defence Training Area
Nilgen NR
Nilgen Coastal Camping Sites
LANCELIN
PROPOSED ACCESS and RECREATION SITES
Scale
2 0 2 4 6 8km
Information
Camping
Day use
Vista point
Public Toilets
Water
4WD access
Nature walk
Special interest
Accommodation
Fee collection
Disabled Access
Coastal walk trail
Proposed road

MAP 10


GREY
Nambung
National Park
sand
sand
Option
Option
Flat Rock
Wanagarren
Nature Reserve
sand
WEDGE
Wedge I
sand
sand
VEHICLE BEACH ACCESS
Scale
1 0 1 2 3 km
Permitted Beach Access
Prohibited Beach Access
Proposed Road
Note: subject to weather conditions

MAP 11

19.1 Nature Appreciation

The Park and Reserves are popular areas for wildflower enthusiasts throughout the year, with interest peaking over the spring months. The attractions of the area's wildflowers are the diversity of species and the restricted distribution of many of the species.

The 1992/93 visitor survey indicated that nature appreciation is one of the most popular activities undertaken by visitors. The survey also showed that one of the most liked features of the area was the natural environment.

Through greater awareness and understanding of the natural environment, visitors are likely to gain a greater appreciation of the conservation values of the Park and Reserves as well as the social values that the natural environment inspires. Opportunities are available to enhance visitors' appreciation of the environment through interpretive programs (see section 22.0). These programs could be based on particular themes such as the Pinnacles and coastal landforms, vegetation patterns and fauna.

Nature study walks are proposed at Lake Thetis, The Springs, the Crescent Dune, Hill River and the Pinnacles.

STRATEGY

1. **Provide visitors with a variety of opportunities to appreciate the Park's and Reserves' natural features.**

19.2 Bushwalking

Bushwalking is an activity that is enjoyed by people of all ages, interests and levels of fitness. A range of opportunities is necessary to meet the needs of this diverse user group. The 1992/93 visitor survey showed that 80% of visitors surveyed in Nambung National Park considered the provision of walk tracks to be important/very important. Walks may be short self-guided paths or long distance walking tracks.

The impact of walking on the physical environment, while generally low, is variable depending on soil conditions, vegetation type and intensity of use. Where use levels are high, walking can lead to the loss of vegetation as well as localised soil compaction and erosion problems. These problems must be minimised effectively through the sensitive location and design of walks and suitable education.

A number of opportunities to explore the Park and Reserves by foot will be developed, incorporating a range of experiences, landscapes and lengths of walks.

A selection of bushwalks will be developed using the following guidelines:

- walks should provide a variety of opportunities in alignment (including loops and linear), length and level of difficulty;
- beginnings of walks should be relatively accessible to vehicles to facilitate visitor and management use, and provide information about the path;
- walks should, where possible, link main areas of development which include facilities such as accommodation (eg. Lancelin, Cervantes, Jurien, Grey and Wedge).
- walk alignments should take advantage of unusual and different views, landforms and soil and vegetation communities; and
- walks should be in locations that are capable of sustaining them.

A coastal walk track will link Cervantes and Grey with a single bush camp between the two destinations. Walks that are related to nature study will be developed at Lake Thetis, The Springs, the Crescent Dune and the Pinnacles. A loop walk could also be developed from Grey (see Map 10).

STRATEGIES

1. **Develop a network of foot access in the Park and Reserves according to the guidelines set out above.**

2. **Restrict or prohibit, if necessary, foot access to specific areas for wildlife conservation, protection of geological formations, safety or other reasons.**

3. **Monitor the environmental impacts of bushwalking and whether bushwalking opportunities are meeting visitor needs.**

4. **Provide interpretive and educational material for walkers with emphasis on the Park's and Reserves' conservation values.**

5. **Provide adequate information from which visitors can choose walking opportunities that best suit their needs.**

19.3 Picnicking and Barbecuing

Picnicking and barbecuing are popular activities in the Park and Reserves. Currently the only facilities provided for picnicking and barbecuing are at Hangover Bay and Kangaroo Point. Picnicking occurs at many other sites in the Park and Reserves in conjunction with activities such as fishing and swimming.

Wood fires are not permitted in the area because of the risk of wildfire and the impacts of firewood gathering on native vegetation.

Sites suitable for picnicking will be identified in the Park and Reserves. Facilities such as picnic tables and

gas barbecues will be located at these sites. A number of these potential sites will also be suitable for designated camping. These sites could have a combination of picnic and camping facilities.

Proposed sites suitable for picnicking and barbecuing include The Springs and designated camping sites identified along the coast. Potential also exists at Grey and Wedge for picnicking and camping once the Government's Squatter Shack Policy has been implemented.

STRATEGIES

1. **Provide low key facilities for picnicking and gas barbecuing in the Park and Reserves.**

2. **Prohibit wood fires in the Park and Reserves.**

19.4 Camping

There are currently no designated overnight use sites in the Park or Reserves. Nearly 70% of respondents to the visitor survey for Nilgen, Wanagarren and Southern Beekeeper's Nature Reserves considered the provision of basic camping areas to be important/very important.

According to CALM's policy, camping may be permitted in nature reserves only in special circumstances where no other options are available and the activities are consistent with the reserve purpose. The proposed purpose changes to Nilgen, Wanagarren and Southern Beekeeper's Nature Reserves (section 3.0 Land Tenure) will allow for the designation of camping areas.

Camping occurs regularly at several coastal locations within the Park and Reserves. Camping is popular at Nilgen, Wanagarren and Southern Beekeepers and occurs in connection with fishing, swimming and walking. Wood fires are not permitted in the area because of the risk of wildfire and the impacts of firewood gathering on native vegetation.

Camping will be permitted only in designated areas in the Park and Reserves. Camping areas will include basic facilities such as toilets and walk tracks. Development of sites will adhere to a minimum facility - minimum impact philosophy.

Four sites are designated for camping along the coast of Nilgen (see Map 10). Vehicle access will be provided to the beach from these sites. The capacity of the four sites will range from four to six camping pods each. A number of possible designated camping sites have also been identified along the coast between Grey and Wedge (see Map 10). This area will be divided into 2WD and 4WD camping sites. Capacity of these sites will range from one to six camping pods each. Some vehicle beach access will be provided from these sites. Potential also exists at Grey and Wedge for camping areas when the squatter settlements have been removed.

A site between Cervantes and Grey will be designated for backpack camping. A coastal walk track will link Cervantes and Grey with a single bush camping site between the two destinations.

All proposed sites will be subject to a detailed site development plan before they are developed.

Sites currently utilised for camping will be rationalised. Areas in the Reserves that are designated for camping must be able to sustain the activity with minimal environmental impact. Current sites that are not identified as suitable for designated camping will be closed.

STRATEGIES

1. **Design and develop camping sites and facilities in accordance with Policy Statement No. 18 Recreation, Tourism and Visitor Services.**

2. **Allow camping in designated areas (see Map 10) in the Park and Reserves (pending the proposed purpose changes to the Reserves as outlined in section 3.0 Land Tenure).**

3. **Monitor the environmental impacts associated with camping. Use the results to refine management policies and practices.**

4. **Liaise with individuals and organisations who provide camping opportunities elsewhere in the Region to ensure developments are complementary.**

19.5 Group and Club-Based Activities

The Park and Reserves are used by bushwalking and naturalist clubs, four wheel drive clubs, caving and school groups and various community groups. The Pinnacles Desert is frequently visited by many groups.

Management strategies will ensure that visitors are given the opportunities to fully appreciate the Park and Reserves and at the same time protect and preserve the natural and cultural values of these areas in perpetuity. The provision of facilities for community groups with special needs will be investigated.

STRATEGIES

1. **Provide for group and club-based activities in a manner consistent with the goals for the Park and Reserves.**

2. **Liaise with representatives of groups to discuss their needs and how these needs might be met.**

3. **Endeavour to meet the special needs of community groups where this does not compromise the natural environment or other visitors' enjoyment.**

4. **Set charges for activities consistent with Government policy and the Department's application of the user pays principle.**

19.6 Recreational Fishing

Recreational fishing is a popular activity from the Reserves. Fishing occurs along the extensive coastline, with species caught including tailor and herring. Fishing is managed by Fisheries WA under the Fish Resources Management Act 1994.

Vehicle access to fishing spots may have adverse impacts on the environment. Coastal areas of the Park and Reserves are fragile and access has resulted in erosion, a proliferation of tracks and damage to vegetation. As the number of 4WD vehicles entering the Reserves' increases so do the impacts on coastal tracks. As these tracks deteriorate others are made.

Camping in areas with no facilities, as is the case in fishing spots, can create problems. Camping and resting overnight in vehicles will not be permitted outside designated sites in the Reserves.

STRATEGIES

1. **Rationalise vehicle access in the Park and Reserves as outlined in Section 17.0.**

2. **Allow camping in designated areas in the Park and Reserves (pending the proposed changes to the Reserves as outlined in section 3.0 Land Tenure).**

3. **Liaise with the local recreation fishing advisory committee regarding management of access.**

4. **Promote the responsible use of coastal areas and awareness of coastal safety risks.**

19.7 Boating

Use of boats in the Reserves is closely associated with fishing. Boat launching occurs at Lancelin, Grey, Wedge, Hangover Bay, Kangaroo Point and Cervantes. Beach launching of boats will continue to be permitted along the coast where vehicle beach access is designated. The Department of Transport is responsible for all regulations retaining to boating including safety, speed, anchoring and moorings.

STRATEGIES

1. **Continue to allow beach launching of boats where vehicle access is designated.**

2. **Investigate the future requirements and feasibility for the development of formal boat launching facilities (i.e. boat ramps) at Grey and Wedge.**

19.8 Horse-riding

There is no horse-riding or camel-riding occurring in the existing Reserves. Riding can adversely affect the natural environment. Possible impacts within the Reserves include the introduction and spreading of weeds through feed and droppings, the introduction or spread of disease, erosion of soil, and the trampling and browsing of vegetation. There is also potential for safety conflicts between vehicles, horses and bushwalkers within the Reserves.

STRATEGIES

1. **Prohibit riding in the Park and Reserves.**

2. **Inform visitors why riding is not allowed in the Park and Reserves.**

20.0 COMMERCIAL VISITOR SERVICES

The objective is to facilitate and encourage tour operations in a manner consistent with conservation and other goals.

To enhance visitor use and enjoyment of CALM-managed lands commercial concessions providing appropriate services may be granted. It is recognised that many CALM-managed reserves have the natural resources to provide for many facets of nature-based tourism. Through these activities potential exists to generate income to financially assist in the management of the reserves.

With the growing popularity of nature-based tourism, opportunities exist for partnerships between CALM and private sector tourist operators. CALM has a complementary role with the tourism industry in managing and presenting natural assets (Shea and Sharp, 1992). Management strategies, including conditions attached to commercial licences, will ensure that visitors are given the opportunity to appreciate the reserves and at the same time protect and preserve their natural and cultural values in perpetuity.

Many commercial operators are currently using Nambung National Park and the Reserves. In 1993 - 1994, about 67 000 of the 150 000 visitors to the area were on commercial tours. Over 70 tour companies visit either as a day tour from Perth or part of a longer tour. The primary attractions are the Pinnacles, wildflowers and the coastal four-wheel drive experience. The area is also utilised for commercial filming.

Existing commercial operations will continue to be monitored with special attention on their environmental impacts. License operating conditions will be regularly reviewed and modified to address specific problems, and if necessary licences can be cancelled. For example, a system of grading tracks in order to set size limits of commercial vehicles according to track condition will be investigated.

In addition to the existing two-wheel and four-wheel drive tours, interest has been expressed in other forms of commercial operations such as refreshments stands, motorcycle tours and tours by aircraft.

It is envisaged that the proposed visitor centre in the Park will become a major tourism facility and focus for the region. The range of services to be provided at the visitor centre should complement existing commercial operations in the region and provide opportunities for new tourism initiatives.

New applications for commercial concessions will be assessed as to their suitability by CALM, and all licences must be approved by the NPNCA and the Minister for Environment.

Expressions of interest or tenders to fill a specific need will be sought for new licences or leases. This process is required where there have been numerous applications and enquiries for only one or limited concessions. If approved, conditions will be established according to the potential environmental and social impacts on the Park and Reserves and the surrounding area.

Commercial operators deal with visitors on a regular basis and, therefore, play a significant role in disseminating information. Close liaison and training should be facilitated to improve commercial operators' understanding of the area's values and management issues, and to enhance visitors' experiences. Because there is a rapid turnover of drivers, and operators are usually not based locally, developing effective means of communication is difficult.

STRATEGIES

1. **Require all commercial tourist operators using the Park and Reserves to obtain a CALM Commercial Operators License and to pay necessary fees.**

2. **Regulate commercial activities through numbers of licences and licence conditions to ensure that they do not compromise the sustainability of the natural resource.**

3. **Require commercial operators to maintain appropriate safety standards with respect to their clients and Park and Reserve users.**

4. **Investigate a system of grading tracks in order to set size limits on commercial vehicles according to track conditions.**

5. **Liaise with tour operators, the WA Tourism Commission and local tourist bureaus so that they are aware of management initiatives, developments and road conditions and to ensure the promotion of the Park and Reserves is consistent with the management objectives.**

6. **Facilitate liaison with, and training of, commercial operators through appropriate means.**

7. **Encourage commercial operators to maintain appropriate standards with respect to information and quality of service provided.**

8. **Consider all commercial proposals consistent with this plan and the purpose of the Reserves.**

21.0 DOMESTIC ANIMALS

The objective is to protect the Park, Reserves and visitors from the impacts of domestic animals.

Opposing and often strongly held views exist in the community about the presence of domestic animals on public lands. Many people believe it is fair for them to be accompanied by or ride a domestic animal as part of their recreation. Many other people resent the nuisance (e.g. noise, personal injury, fouling) which is presented by other people's animals.

Domestic animals can have an impact on wildlife, can introduce disease and foul recreation sites. For example, the smell and general activity of domestic animals impedes activity of wildlife.

Dogs, cats, horses and other domestic animals are not permitted in nature reserves but may be permitted in national parks and conservation parks where specified areas are established. These areas are selected with consideration to the impacts on wildlife and visitors.

Currently many visitors illegally take their dogs into the Reserves. It is proposed that dogs will continue to be excluded from the Park and Reserves with the exception of designated zones along the coast of the Nilgen Nature Reserve once it has been changed to a

Conservation Park (section 3.0 Land Tenure). Nambung National Park and Nilgen, Wanagarren and Southern Beekeepers Nature Reserves comprise a large area of coast and often the type of visitors using the coast would like to be able to take their dogs with them. The designated zones in Nilgen Conservation Park will be subject to monitoring and periodic review. Based on the findings of the review others may be added or the established zones deleted.

STRATEGIES

1. **Prohibit domestic animals in the Park and Reserves. However, in certain designated zones along the coast of Nilgen Nature Reserve dogs may be permitted. Constantly monitor impacts and review after five years and modify as appropriate.**

2. **Inform visitors why domestic animals are not allowed in the Park and some of the Reserves.**

22.0 VISITOR SAFETY

The objective is to take all reasonable and practicable steps to ensure the safety of visitors to the Park and Reserves.

There is always an element of risk in all outdoor recreation activities. Nevertheless, all reasonable and practicable efforts will be taken to ensure that risks are minimised.

In addition to the dangers inherent in any natural area, the Park and Reserves pose some particular safety problems for visitors, including:

- dehydration and heat exhaustion from insufficient intake of water and over-exposure to the sun;
- accidents associated with bushwalking on rough tracks in remote areas, e.g. sprained ankles, cuts and bruises;
- accidents associated with four wheel drive use on tracks;
- accidents associated with fishing and other activities on beach rocks;
- possibility of being bitten by native animals, e.g. snakes, ticks and ants; and
- threats of wildfire, particularly to bushwalkers in remote areas.

The majority of reported injuries that occur in the Park and Reserves are due to vehicle related incidents on the dunes and tracks north of Lancelin. Accidents include private users of vehicles and occupants of four wheel drive tour buses. Meetings between the Health Department, CALM, Police Service, Shires, Department of Transport and Ambulance Service were held to address this issue. Recommendations from these meetings included:

- requiring all drivers to fix a tall aerial to their vehicles that is visible above the sides of the track cutting, so warning other vehicles of the approach of the vehicle.
- stipulating the direction in which buses are allowed to travel on tracks, so reducing the likelihood of collisions.
- signing of tracks in such a way that signs will not attract and be destroyed by vandals.
- training of tour bus drivers in four wheel driving to reduce the likelihood of accidents and rollovers.
- specifying a set area in which buses are allowed off the tracks.
- requiring bus drivers to have additional skills in first aid and each bus to carry a first aid kit including aids for the management of spinal injuries.
- realignment of any section of tracks which are deemed to be unsafe.
- ensuring CALM staff are trained in first aid.

The use of the Defence Training Area by the Defence Forces has resulted in the presence of unexploded ordnances (UXOs). Although effort is now taken to ensure UXOs are removed following training exercises this has not been the case during the life of the Defence Training Area, particularly during the war years. UXOs are commonly discovered within the Defence Training Area and it is possible that UXOs could be located in Nilgen or Wanagarren. Signs will be located to inform the public of this safety hazard both in the Reserves and in the Defence Training Area.

Visitor safety will be promoted through information and education about potential problems and dangers, and considered in design of access and recreation sites.

The Police, the State Emergency Service (SES) and CALM manage accidents and search and rescue operations in the area.

Management actions to reduce safety hazards should, if possible, be planned in sympathy with the purpose of the Park and Reserves and should not intrude unduly on the experience of visitors.

STRATEGIES

1. **Implement relevant recommendations arising from a review of vehicle use in the reserves.**

2. **Request the Australian Defence Forces to conduct a thorough field search for unexploded ordnances in the Reserves.**

3. **Actively promote visitor safety within the Park and Reserves.**

4. **Continue to liaise with the Health Department, Police Service, Shires, Department of Transport, Ambulance Service and SES in accordance with**

plans for dealing with accidents and search and rescue operations.

5. **Develop a contingency plan in the event unexploded ordnances are discovered within the Park or Reserves.**

6. **Provide information for visitors that highlights potentially hazardous areas and activities.**

7. **Regularly inspect roads and recreation sites for potential hazards and initiate appropriate action.**

8. **Develop a wildfire contingency plan for the main visitor sites in the Park and Reserves. Address the need for evacuation procedures.**

COMMUNITY RELATIONS

Community Relations Goal

Promote informed appreciation of natural and cultural values, and facilitate liaison with the community about their management.

23.0 INFORMATION, INTERPRETATION AND EDUCATION

The objective is to increase awareness, appreciation and understanding of the Park's and Reserves' values.

An effective information, interpretation and education program is essential to achieve the goals and objectives for the management of the Park and Reserves. It informs the public of attractions, facilities and opportunities available and provides an avenue for an appreciation and a greater understanding of the natural environment. At the same time, it fosters appropriate behaviour so that adverse impacts on the environment are avoided.

The program has three parts:

- Information - providing an overview of opportunities and details of facilities, activities and regulations;
- Interpretation - explaining natural and cultural features; and
- Education - providing detailed materials and programs designed to facilitate learning, focussing on target groups (e.g. school groups, community groups).

An integrated information, interpretation and education program will be developed for Nambung National Park and the Reserves. Mechanisms for facilitating the program include signs, displays, publications (such as brochures and Park notes) and activities.

Information will be designed to enable visitors to become orientated, be aware of the access routes and opportunities available, and advise of the restrictions in the Park and Reserves and the reasons for these restrictions.

Interpretive stories should encourage exploration toward enhancing visitors' experiences and understanding of the area's values. Topics to be covered include dynamic coastal processes, the Pinnacles Desert, dunes and vegetation patterns, fauna, dieback, fire, and past and present human use. Important messages include minimising human impacts and care of the coast, particularly associated with activities such as four wheel driving, camping and campfires.

The major site for information, interpretation and education will be the proposed visitor centre. Other key sites for information are the northern end of Nambung National Park and the entrance to Nilgen through Lancelin. Locations for interpretation include the Pinnacles and Hangover Bay in Nambung National Park, Molah Hill and the Hill River in Southern Beekeeper's Nature Reserve, and the coastal lookout and Crescent Dune in Wanagarren Nature Reserve.

Sites at Nambung have already been developed and other sites will be developed as resources permit. All sites require ongoing maintenance and to be regularly reviewed and upgraded as necessary.

It is important that the information conveyed is integrated throughout the Reserves, the District, and the Region as part of a Communications Plan (key sites should provide a different thematic story and also reinforce recurring messages regarding minimising visitor impact). As the area is visited by non-English speaking tourists, consideration should be given to providing multi-lingual information.

STRATEGIES

1. **Develop a visitor information, interpretation and education program for the Park and Reserves within the Regional context.**

2. **Provide interpretive activity programs, including guided and self-guided walks for schools, community groups and other visitors, using volunteers where appropriate.**

3. **Support the establishment of a visitor centre in the Park.**

4. **Consider producing multi-lingual information (e.g. brochures) in close liaison with commercial operators.**

24.0 COMMUNITY INVOLVEMENT

The objective is to develop, encourage and facilitate effective involvement of the community and other relevant authorities in management.

Liaison toward effective communication, is an essential component of management, providing a forum for the community to contribute to the management of the area and be informed about their values and management issues. Communication with neighbours and other land managers also provides for integrated land management which is of particular importance when management issues go beyond the boundaries of the Park and Reserves such as fire, dieback, weeds and visual landscape management.

Community Involvement

Community involvement is an integral part of CALM's operations. The community is encouraged to be involved in planning and management at all levels of the organisation, including through volunteer programs. The principal benefits from community involvement are better informed decisions which will have greater public acceptance, better relationship between CALM and the public through the development of an appreciation for the department's role, responsibilities and actions, and the availability of additional resources, including information, labour, and financial support.

Input from visitors is discussed in section 29.0 Research and Monitoring, and input from commercial operators is specifically addressed in section 24.0 Commercial Visitor Services.

Advisory Committee

An Advisory Committee was established by CALM to provide advice on the management plan. Members of the Committee were selected following a call for expressions of interest advertised in local and State newspapers.

The Committee represented a wide range of experience, values and viewpoints including local Shires, volunteer bush fire brigades, conservation, scientific community, farming, recreation, commercial and apiary industries.

The structure and membership of the Committee will be reviewed, and a new Advisory Committee may be formed to advise CALM on the plan's implementation.

Government Agency Liaison

Liaison with the Shires of Gingin and Dandaragan is essential for:

- integrated fire and disease management;
- integrated management of the Shires' reserves within the Nambung area;
- provision of a valuable recreation and tourism resource to the local community.

Ongoing liaison with the Bush Fires Board, local Bush Fire Control Officers and volunteer brigades regarding fire protection is also essential. It is very important that CALM ensures that other Government agencies whose role overlaps with the Park and Reserves recognise the values of the area and the main issues of concern, and the part that they play in the protection of the environment of these areas.

It is of particular importance to maintain liaison with other agencies and groups such as the WA Tourism Commission, Water Corporation, Water and Rivers Commission, WA Museum, Western Power and Alinta Gas, Main Roads WA, the Department of Minerals and Energy, Telstra and the Northern Sandplains Dieback Working Party.

STRATEGIES

1. **Continue involvement with local individuals and organisations with an interest in conservation and land management in the Park and Reserve.**

2. **Maintain liaison between CALM and other Government agencies to ensure involvement and cooperation in the management and protection of the Park and Reserves.**

COMMERCIAL AND OTHER USES

Commercial and Other Uses Goal

Ensure that commercial and other uses are managed in a manner that minimises their impact on other values.

25.0 COMMERCIAL FISHING

The objective is to minimise the potential for conflict between the commercial fishery, which operates in nearby waters, and conservation and visitor management.

Commercial fishing is one of the major industries of Cervantes and occurs in the waters off Nambung National Park as well as other sections of the central coast. The majority of fishing vessels are operated from Cervantes. Rock lobster is the main species targeted by the industry.

The use of the squatter areas at Grey and Wedge Point by commercial fishermen is recognised in the Government's squatter shack policy (Appendix 1). As discussed in section 3.0 Land Tenure, these squatter areas will ultimately be incorporated into Nambung National Park. The Central Coast Regional Strategy (1996) proposes that fishermen should be allowed suitably located sites (not necessarily their existing sites) which fishermen could lease. These would be tied to fishing licenses and would transfer with the licenses if sold. Fishermen's shacks could be accommodated within recreational developments subject to identifying suitable sites and setting minimum building standards. Other conditions concerning the management of fishing operations in the Park, such as the use of access tracks, should be investigated and incorporated into license arrangements.

Aquaculture

The central coast region has potential for the development of certain forms of aquaculture. Aquaculture is still at a developmental stage but a pilot project between Cervantes and Jurien is being investigated.

Aquaculture development will not be permitted in the Park and Reserves as it is not consistent with the purpose of these reserves. Proposals for aquaculture adjacent to the Park and Reserves will be assessed to determine potential impacts on the Reserves' values.

All aquaculture proposals are subject to review by the Inter Departmental Committee on Aquaculture (IDCA). This Committee, comprising nine Government agencies, considers applications for new ventures and seeks advice from the local Shire, water authorities and affected industry and recreational groups, before making a recommendation to the Executive Director of Fisheries.

STRATEGIES

1. **Continue to liaise with commercial fishing organisations, Fisheries WA, Department of Transport, Shire councils and other relevant bodies regarding use of the Park and Reserves by commercial fishers.**

2. **Consult with Fisheries WA and commercial fishers to establish mutually beneficial lease agreements. Regularly review and amend lease conditions as necessary.**

3. **Liaise with commercial fishers regarding the impact of fishing operations on the reserves.**

4. **Contribute to a review of aquaculture proposals adjacent to the Park and Reserves to ensure they do not impact on their values.**

26.0 MINING, MINERAL AND PETROLEUM EXPLORATION

The objective is to minimise the impact of mining, mineral and petroleum exploration on the Park and Reserves.

Resources in the area include limestone, lime sand, gypsum and dolomite in the coastal foreplain, where the reserves occur, and gravel, sand and gas in the backplain. Deposits of lime sand and limestone of moderate to high quality grade are suitable for cement and lime manufacture. The area is also prospective for heavy mineral sands. Demands for these resources may increase in the near future.

Several exploration tenements occur over Nambung National Park and Wanagarren Nature Reserve, and mining tenements occur in the Southern Beekeeper's Reserve. Government policy on mineral and petroleum exploration and mining in national parks and nature reserves stipulates that the Mining, Petroleum and Wildlife Conservation Acts are

followed. They require that no tenements will be approved until the Minister for Minerals and Energy obtains the advice of the Minister for the Environment. The National Parks and Nature Conservation Authority provides advice to the Minister for the Environment. Proposals for exploration and mining may be referred to the Department of Environmental Protection (DEP) and the Environmental Protection Authority for assessment. All exploration activities are subject to stringent environmental controls.

Mining will not be permitted in national parks and 'A' Class nature reserves and conservation parks unless approved by both Houses of Parliament.

STRATEGIES

1. **Ensure that stringent conditions are in place in order to minimise the adverse impacts of mining and exploration should they be permitted in the Park and Reserves.**

2. **As far as possible, minimise the impact that any mining operations might have on the Park and Reserves, particularly with regard to introducing or spreading plant diseases, reducing landscape values, biological values and decreasing water quality.**

26.1 Basic Raw Material Extraction

The objective is to minimise the impact of the extraction of basic raw materials on ecosystem values.

Basic raw materials, including gravel, limestone, marl sand and rock aggregate, are needed for road construction and maintenance, and recreation site developments within the reserves. It is preferred that these materials are obtained from outside the Park and Reserves, or from areas that are already disturbed or which are of lower conservation value. However, transporting gravel and other industrial materials from areas outside the reserves increases the cost of road construction.

Gravel and other industrial materials may only be extracted from the Park and Reserves in accordance with NPNCA Policy Statement on Basic Raw Materials and the Central Coast Regional Strategy (WA Planning Commission, 1996). Extraction is regulated under the Local Government, CALM and Mining Acts. Good quality gravel is a limited resource in the Nambung region.

STRATEGIES

1. **Follow NPNCA's Policy Statement on Basic Raw Materials in regard to proposals for extracting raw materials from the Park and Reserves.**
2. **Follow the Central Coast Regional Strategy's actions for basic raw material protection and extraction.**

3. **Enforce *Phytophthora* dieback hygiene measures when extracting raw materials and maintain dieback-free pits in a dieback-free condition.**

4. **Rehabilitate all or parts of pits as material extraction is completed. Remove top-soil separately and store it for later rehabilitation work. Use seeds collected within the area for rehabilitation work wherever possible as specified in Guidelines for Planning, Operating and Rehabilitating Borrow Pits (Roadside Conservation Committee, 1994).**

27.0 UTILITIES AND SERVICES

The objective is to minimise the impact of utilities and services on the values of the Park and Reserves.

The reserves are largely free of any utility and service corridors. The infrastructure associated with the town of Cervantes and its communications, energy transmission, water use and community services is concentrated along the Cervantes Road which crosses the Southern Beekeeper's Reserve. The town's water supply is supplemented by Water Reserves No. 32582 and 32794 enclaved in Nambung National Park. An improved water supply is being investigated by the Water Corporation in the Southern Beekeeper's Reserve (see 6.0 Hydrology). The roads surrounding the Park show signs of *Phytophthora* dieback infections at various points (see 12.0 Plant Diseases).

The squatter areas at Grey and Wedge Point place burdens on public services and infrastructure in the area. The growth of these squatter areas has led to unacceptable environmental and social impacts (see section 3.0 Land Tenure).

Future proposals for utilities and services should be based on physical, biological, social and visual considerations, and their relationship with other land uses. These include development proposals for Grey, proposed road links between Cervantes and Jurien, and future town water supplies. All proposals that may have a significant adverse impact on the environment will be referred to the Department of Environmental Protection (DEP), and will be subject to environmental impact assessment in accordance with the Environmental Protection Act (1986). Other proposals for utilities and services considered to have minimal impact will be assessed by and determination made in line with current CALM and NPNCA policies.

STRATEGIES

1. **When the opportunity arises, negotiate to place new utility and service corridors outside the Park and Reserves.**

2. **If a utility or service corridor must go through the Park or Reserves, ensure that its placement and maintenance have minimal impact on the environment.**

3. **Control and monitor the effects of utility corridors and their maintenance upon conservation, landscape and recreation values.**

28.0 APICULTURE

The objective is to manage the impact of apiculture on ecosystem values.

The coastal heathlands between Wanneroo and Dongara are major areas for honey and pollen production in the State, and the breeding of bees, particularly during winter. This area contains many honey and pollen producing plants such as *Dryandra*, *Hakea*, *Leucopogon* and *Banksia* species. Beekeepers move their hives to a variety of honey flow regions during the year in order to maintain their hives in good condition and to sustain honey production. The normal migratory pattern worked by most beekeepers starts on the coastal plain during late spring, moving to other forage areas, such as forests, during summer.

About 32 registered apiary sites occur in the reserves. The purpose of the Southern Beekeeper's Reserve, as its name implies, is 'Apiculture and Conservation of Flora'. As beekeeping has occurred in the area for generations most of these sites were in place before the gazettal of the reserves. Not all sites are necessarily used every year.

The environmental implications associated with the presence of honey bees from commercial hives are not yet fully understood. Further research is required to fully understand the impact of the interaction of honey bees on native flora and fauna.

Under current policy (Policy Statement No. 41, 1992), CALM will continue to assist the apiculture industry in so far as it is consistent with the Department's responsibilities in conservation and land management. The policy provides for apiary sites to be relocated at acceptable intervals, taking account of constraints such as the need to avoid transferring disease, including dieback and diseases of honey bees, and the occurrence of declared rare flora. Until CALM's policy for apiculture is reviewed no new sites will be permitted in the National Park and Wanagarren and Nilgen Nature Reserves.

STRATEGIES

1. **Review hive locations and access to these sites subject to current CALM policy.**

2. **Cancel, or relocate, sites in the high dieback risk area of Nambung National Park in consultation with apiarists.**

3. **No additional sites will be permitted in Nambung National Park, Wanagarren and Nilgen Nature Reserves.**

4. **Foster research on impacts of apiculture on the reserves.**

RESEARCH AND MONITORING

Research and Monitoring Goal

Seek a better understanding of the natural and cultural environments, and the impacts of visitor use and management activities.

29.0 RESEARCH AND MONITORING

The objective is to plan and implement an integrated program of research and monitoring of natural environments and visitor use.

Research and monitoring of the natural environment and visitor use is an essential component to evaluate management and to provide sound information on which to base management.

Ongoing monitoring is important to evaluate the effectiveness of management practices. The gathering of new knowledge associated with research, both in the Reserves and elsewhere, also provides a scientific basis for improving management practices.

Monitoring projects should evaluate:
- the effectiveness of management practices;
- the social and environmental effects of management practices;
- the operation of management methodologies.

Environmental research and monitoring projects should give priority to those values identified as being most at risk (sensitive to disturbance) and to activities that are most likely to have adverse ecological impacts.

Social research and monitoring projects should determine whether recreation, environmental education and interpretation activities and facilities are meeting visitor needs and CALM's expectations.

Research projects and monitoring programs can benefit from involving volunteers, educational institutions and individual researchers as this can potentially reduce research and monitoring costs, and can help provide information to the broader community. CALM currently coordinates and promotes research undertaken within Nambung National Park and Nilgen, Wanagarren and Southern Beekeeper's Nature Reserves.

Research projects have potential to adversely impact on the reserves' values. Proposals for research should be assessed as to their suitability and appropriate conditions applied if considered acceptable.

STRATEGIES

1. **Encourage volunteers, educational institutions and other organisations to participate in research projects. Promote research programs and findings that address key issues.**

2. **Implement an integrated program of survey, research and monitoring, based on the strategies in the relevant sections of this plan.**

3. **Integrate research and monitoring in Nambung National Park and Wanagarren, Nilgen and Southern Beekeepers Nature Reserves.**

4. **Ensure that research activities do not impact on the Reserves' values.**

IMPLEMENTATION

30.0 MANAGEMENT STRUCTURE AND STAFF RESOURCES

The objective is to provide sufficient staff and funds to implement the plan.

Nambung National Park and Nilgen, Wanagarren and Southern Beekeeper's Nature Reserves are serviced by CALM officers stationed at the Moora District Office, which includes four rangers based at Cervantes and two operations officers based at Moora. In addition to commitments outlined in this plan, these officers are also responsible for implementation of management strategies outlined for other conservation estate in the Moora District. This includes the area covered by the Lesueur National Park and Coomallo Nature Reserve Management Plan. Implementing the strategies contained in the Nambung National Park and Nilgen, Wanagarren and Southern Beekeeper's Nature Reserves management plan over the next ten years will place considerable demands on existing staff. An increase in staff within the District is required due to the linear shape and size of the Reserves. Volunteer assistance in implementing the plan would alleviate some of these demands.

CALM provides funds to manage the Park and Reserves. External funding has also been provided for special research projects. Implementing this plan will require additional funding resources, particularly in planning, design, supervision and interpretation. Alternative means of funding will be investigated.

Fees are charged, whenever possible and appropriate to collect, to assist in managing reserves, especially as a means of providing facilities and services for visitors. Fees are set by the Minister for the Environment and are used to fund management of the Park.

Fees are currently charged for entry to the Pinnacles in Nambung National Park. Other opportunities for increasing revenue should be investigated particularly in association with upgrading and providing new facilities and services in the Reserves.

STRATEGIES

1. **Provide sufficient trained staff to implement the strategies contained in this plan.**

2. **Seek sufficient financial resources from both Government and private sources to implement this plan.**

3. **Investigate and implement revenue raising mechanisms to increase resources available for management.**

4. **Develop volunteer programs to assist in implementation of the plan.**

31.0 PRIORITIES AND REVIEW

The objective is to regularly review implementation of the plan according to priorities.

Many strategies are put forward in this plan. While some are guidelines for management, others prescribe specific actions and developments. These prescriptions require funding and will be implemented on a priority basis by CALM's Moora District, subject to the availability of staff and funds. Table 5 presents management priorities for all strategies in this plan.

Priorities will be reviewed on an annual basis or as circumstances change. Section 61 of the CALM Act provides for the plan to be amended as required. If major changes to the plan are proposed, the revised plan will be released for public comment.

The NPNCA is responsible for monitoring the implementation of this management plan. To facilitate review of the plan and its implementation CALM will report to the NPNCA as required.

The term of this plan is 10 years.

STRATEGIES

1. **Prepare an implementation program taking into account the priorities outlined in Table 5.**

2. **Review the implementation of this plan annually, prior to preparing the works program for the following year, or as circumstances change. The review should identify which strategies have been achieved and to what degree, and any new information that may affect management.**

3. **Review the plan within 10 years of its gazettal. Monitoring, in collaboration with the NPNCA, should identify the extent to which the objectives have been achieved and strategies implemented, the reason for the lack of achievement or implementation, and a summary of information that may affect future management.**

Table 5.
STRATEGIES BY LEVEL OF PRIORITY

ONGOING PRIORITY

Section

3.2 Surrounding Land

3. Incorporate other adjoining land through purchase or exchange if identified as having high conservation values.
4. Continue liaison with Park and Reserve neighbours to establish cooperative management, particularly with regard to fire and dieback management, vermin control and landscape management.

4.0 Management Zones

2. Review the zoning scheme in response to improved knowledge of environmental values and visitor requirements.
3. Zone any additions to the Park and Reserves based on the criteria used to determine this zoning scheme.

5.0 Geology, Soils, Landforms and Coastal Processes

1. Consider the vulnerability of geological features, landforms and soils in all management operations, such as new access, firebreaks, fire management plans, catchment alterations and site developments (see also Strategies 3 and 4, p.35 and Strategies 2 and 3, p.36).
2. Provide opportunities for visitors to increase their knowledge and appreciation of the area's geological features, landforms and soils.
4. Liaise with speleologist groups and other karst management specialists regarding management and other operations that are likely to impact on karst features.

6.0 Hydrology

1. Continue to liaise with the WRC regarding the use of surface and groundwater and its management, particularly monitoring of wetlands and cave hydrology in the vicinity of existing and possible new borefields.
2. Participate in catchment management with the local landcare district, the Shire, the Department of Environmental Protection and other Government agencies encouraging practices compatible with Reserve management.
5. Consider potential impacts on surface and groundwater quality and quantity during all management activities.
6. Manage visitor activities and access to wetlands (see section 17.0 Access)

7.0 Vegetation and Flora

2. Provide opportunities for visitors to increase their knowledge and appreciation of the area's vegetation and flora.
3. Design facilities and management practices that minimise adverse impacts on flora and vegetation values.
5. Ensure that management actions do not impact on rare and priority flora if any of these species are found in the reserves.

9.0 Cultural Heritage

1. Liaise with the local Aboriginal community and the Aboriginal Affairs Department concerning the protection of significant Aboriginal sites in the Reserves. Ensure that visitor and management activities do not detrimentally impact upon these sites.
3. Ensure that visitor and management activities do not adversely impact upon significant historical and cultural sites.
4. Where appropriate, incorporate material on historical and cultural sites in interpretive displays and community education programs.

10.0Landscape Management

1. Implement CALM Policy No. 34 (Landscape Management of CALM's Lands and Waters) in all aspects of land management of the Park and Reserves.
2. Apply the landscape management guidelines set out in Table 4.

11.0Fire Protection

Suppression

7. Fire suppression arrangements will be conducted in accordance with the Central West Coast Fire Protection Plan or its successor, and the Moora District Fire Control Working Plan.

Liaison

8. Seek input on fire program priorities through continuing CALM's representation on the relevant BFB Regional Fire Prevention Committee and the Central West Coast Fire Prevention Plan (or its successor).

ONGOING PRIORITY cont.

Section

12.0 Plant Diseases

1. Implement CALM's Policy Statement No. 3 (*Phytophthora* Dieback) and the Moora District Dieback Protection Plan (1990) to manage disease in the Park and Reserves.
2. Continue to investigate, and regularly monitor, known infections to determine their impact and extent.
7. Include disease management specifications in contract documents (including scientific flora collecting licences) and job prescriptions, where appropriate.

16.0 Recreation Opportunities

1. Ensure that Site Development Plans are produced before development works are undertaken.
2. Ensure recreation opportunities that are provided in the Park and Reserves complement opportunities available elsewhere in the region.
4. Encourage an integrated approach to the provision of recreational facilities in the Region. Liaise with the Shires of Dandaragan and Gingin and other relevant management authorities.
5. Work with State and local authorities in promoting visitor use which is appropriate to the Park and Reserves.

18.0 Recreation Areas

5. Monitor visitor numbers and the impact of visitor use on recreation areas and facilities.

19.0 Recreation Opportunities

1. Give priority to those activities that do not degrade the area or reduce its conservation values.
2. Control the intensity of activities, if necessary, to ensure that they do not degrade the conservation values of the Park or Reserves.

19.4 Camping

1. Design and develop camping sites and facilities in accordance with Policy Statement No. 18, Recreation, Tourism and Visitor Services.
4. Liaise with individuals and organisations who provide camping opportunities elsewhere in the Region to ensure developments are complementary.

19.5 Groups and Club-Based Activities

1. Provide for group and club-based activities in a manner consistent with the goals for the Park and Reserves.
2. Liaise with representatives of groups to discuss their needs and how these needs might be met.

19.7 Boating

1. Continue to allow beach launching of boats where vehicle access is designated.

20.0 Commercial Visitor Services

5. Liaise with tour operators, the WA Tourism Commission and local tourist bureaus so that they are aware of management initiatives, developments and road conditions and to ensure the promotion of the Park and Reserves is consistent with the management objectives.
8. Consider all commercial proposals consistent with this plan and the purpose of the Reserves.

22.0 Visitor Safety

4. Continue to liaise with the Health Department, Police Service, Shires, Department of Transport, Ambulance Service and SES in accordance with plans for dealing with accidents and search and rescue operations.

23.0 Information, Interpretation and Education

2. Provide interpretive activity programs, including guided and self-guided walks for schools, community groups and other visitors, using volunteers where appropriate.

24.0 Community Involvement

1. Continue involvement with local individuals and organisations with an interest in conservation and land management in the Park and Reserve.
2. Maintain liaison between CALM and other Government agencies to ensure involvement and cooperation in the management and protection of the Park and Reserves.

25.0 Commercial Fishing

1. Continue to liaise with commercial fishing organisations, Fisheries WA, Department of Transport, Shire councils and other relevant bodies regarding use of the Park and Reserves by commercial fishers.
3. Liaise with commercial fishers regarding the impact of fishing operations on the reserves.

ONGOING PRIORITY cont.

Section

4. Contribute to a review of aquaculture proposals adjacent to the Park and Reserves to ensure they do not impact on their values.

26.1 Basic Raw Material Extraction

1. Follow NPNCA's Policy Statement on Basic Raw Materials in regard to proposals for extracting raw materials from the Park and Reserves.

29.0 Research and Monitoring

3. Integrate research and monitoring in Nambung National Park and Wanagarren, Nilgen and Southern Beekeepers Nature Reserves.

HIGH PRIORITY

3.1 Boundaries and Land Tenure

1. Implement the tenure changes proposed in Table 1.

3.2 Surrounding Land

1. Implement the proposed actions detailed in Table 2.
2. Excise an appropriate area from Southern Beekeepers Nature Reserve to allow for expansion of the Cervantes townsite. This excision is shown approximately on Map 3, however, final boundaries will be addressed following an examination of:
   - the area's conservation values;
   - the position of the proposed coastal road;
   - proposed land exchanges; and
   - land requirements for the Cervantes townsite.

4.0 Management Zones

1. Manage the Park and Reserves in accordance with the zoning scheme (Map 4).

6.0 Hydrology

3. Endeavour to protect hydrological systems with important conservation value by negotiating security of tenure with appropriate authorities and land owners (see section 3.2 Surrounding Land).

7.0 Vegetation and Flora

4. Protect populations of species that are vulnerable to particular fire regimes by implementing appropriate fire management strategies.

8.0 Fauna

1. Establish the status of threatened species in the reserves.
2. Identify and manage appropriately the habitats of significant vertebrate and invertebrate fauna.

11.0 Fire Protection

Prescribed Burning

1. Implement the Fire Management Plan (Map 8) which zones the four reserves into 'No Planned Burn', 'Vegetation Management' and 'Prescribed Burning' zones.
2. Monitor the Fire Management Plan annually to take into account major wildfires and completed burning programs. Major modifications to the burn plans must be approved by the Director of Nature Conservation or National Parks.

Pre-suppression

3. Maintain a network of fire management access tracks and firebreaks using methods that minimise soil erosion and do not increase the risk of, or contribute to, introducing, spreading and intensifying dieback disease.
5. Permit the use of gas fires only.

Suppression

6. Endeavour to contain wildfires that enter or start in the reserves within a management zone.

Research and Monitoring

11. Undertake research on fire ecology.

12.0 Plant Diseases

3. Implement a program of opportunistic survey of the Park and Reserves to determine whether other infections occur.

HIGH PRIORITY cont.

Section

4. Inform Park users about plant diseases and their management, and why it is important to prevent their introduction and spread.
5. Instigate control and eradication procedures while ensuring that they do not place other areas or values at risk. Eradicating isolated infections should be of the highest priority.
6. Train staff associated with the area to recognise *Phytophthora* dieback, *Armillaria* and canker, and in sampling and management techniques.
8. Close or restrict access to particular areas, roads, tracks and walks if the presence of dieback is suspected or confirmed, or if a high risk of introducing dieback is identified.

13.0 Introduced Plants and Animals

2. In conjunction with Agriculture W.A. and nearby landholders, develop and implement programs to prevent introduction and control existing populations of exotic plants and animals as resources allow.

14.0 Rehabilitation

1. Rehabilitate degraded areas in accordance with a rehabilitation program which defines priorities.

16.0 Recreation Opportunities

6. Preserve the unique opportunities and features that attract visitors to the area.
7. Provide and maintain facilities at feature sites compatible with the minimum impact objectives and needs of visitors.
8. Monitor changes in the patterns and levels of visitor use, and predicted trends. Alter recreation and tourism management accordingly.
9. Actively solicit support of relevant agencies and stakeholders for the establishment of a visitor centre in the Park.

17.0 Access

1. Rationalise the access system in the Park and Reserves.
2. Design and maintain access to minimise the risk of spreading dieback disease and causing erosion.
3. Restrict or prohibit, if necessary, visitor access to specific areas for wildlife conservation, protection of geological formations, safety or other reasons.
4. Investigate future scenarios for access management and the provision of visitor services and facilities in the vicinity of the Pinnacles Desert.
6. Provide some vehicle free beaches in the Park and Reserves as indicated on Map 11.
7. Provide appropriate speed limits and vehicle size limits for use of the Park and Reserves' roads.
8. Monitor the condition of access in the Park and Reserves and maintain and upgrade as funds permit.
9. Develop new roads in keeping with the concept plan shown in Map 10.
10. Continue to liaise with local authorities and encourage support from Main Roads WA concerning coast road tourism developments.
11. Include protective clauses in road construction contracts.

18.0 Recreation Areas

1. Design, develop and maintain recreation areas and facilities to departmental standards. Site development plans will be required.
2. Assess and monitor existing and potential visitor impacts on the natural and social values of the Pinnacles Desert.
3. Investigate future scenarios for access management and the provision of visitor services and facilities in the vicinity of the Pinnacles Desert.
4. Provide facilities suitable for use by visitors with disabilities where practicable when new facilities are designed.

19.1 Nature Appreciation

1. Provide visitors with a variety of opportunities to appreciate the Park's and Reserves' natural features.

19.2 Bushwalking

2. Restrict or prohibit, if necessary, foot access to specific areas for wildlife conservation, protection of geological formations, safety or other reasons.

19.3 Picnicking and Barbecuing

1. Provide low key facilities for picnicking and gas barbecuing in the Park and Reserves.
2. Prohibit wood fires in the Park and Reserves.

HIGH PRIORITY cont.

Section

19.4 Camping

2. Allow camping in designated areas (see Map 10) in the Park and Reserves (pending the proposed purpose changes to the Reserves as outlined in section 3.0 Land Tenure).

19.5 Group and Club-Based Activities

4. Set charges for activities consistent with Government policy and the Department's application of the user pays principle.

19.6 Recreational Fishing

1. Rationalise vehicle access in the Park and Reserves as outlined in Section 17.0.
2. Allow camping in designated areas in the Park and Reserves (pending the proposed changes to the Reserves as outlined in section 3.0 Land Tenure).
4. Promote the responsible use of coastal areas and awareness of coastal safety risks.

19.8 Horse-riding

1. Prohibit riding in the Park and Reserves.
2. Inform visitors why riding is not allowed in the Park and Reserves.

20.0 Commercial Visitor Services

1. Require all commercial tourist operators using the Park and Reserves to obtain a CALM Commercial Operators License and to pay necessary fees.
2. Regulate commercial activities through numbers of licences and licence conditions to ensure that they do not compromise the sustainability of the natural resource.
3. Require commercial operators to maintain appropriate safety standards with respect to their clients and Park and Reserve users.
4. Investigate a system of grading tracks in order to set size limits on commercial vehicles according to track conditions.

21.0 Domestic Animals

1. Prohibit domestic animals in the Park and Reserves. However, in certain designated zones along the coast of Nilgen Nature Reserve dogs may be permitted. Constantly monitor impacts and review after five years and modify as appropriate.
2. Inform visitors why domestic animals are not allowed in the Park and some of the Reserves.

22.0 Visitor Safety

1. Implement relevant recommendations arising from a review of vehicle use in the reserves.
2. Request the Australian Defence Forces to conduct a thorough field search for unexploded ordnances in the Reserves.
3. Actively promote visitor safety within the Park and Reserves.
5. Develop a contingency plan in the event unexploded ordnances are discovered within the Park or Reserves.
6. Provide information for visitors that highlights potentially hazardous areas and activities.
7. Regularly inspect roads and recreation sites for potential hazards and initiate appropriate action.
8. Develop a wildfire contingency plan for the main visitor sites in the Park and Reserves. Address the need for evacuation procedures.

23.0 Information, Interpretation and Education

1. Develop a visitor information, interpretation and education program for the Park and Reserves within the Regional context.
3. Support the establishment of a visitor centre in the Park.

25.0 Commercial Fishing

2. Consult with Fisheries WA and commercial fishers to establish mutually beneficial lease agreements. Regularly review and amend lease conditions as necessary.

26.0 Mining, Mineral and Petroleum Exploration

1. Ensure that stringent conditions are in place in order to minimise the adverse impacts of mining and exploration should they be permitted in the Park and Reserves.
2. As far as possible, minimise the impact that any mining operations might have on the Park and Reserves, particularly with regard to introducing or spreading plant diseases, reducing landscape values, biological values and decreasing water quality.

26.1 Basic Raw Material Extraction

2. Follow the Central Coast Regional Strategy's actions for basic raw material protection and extraction.

HIGH PRIORITY cont.

Section

3. Enforce *Phytophthora* dieback hygiene measures when extracting raw materials and maintain dieback-free pits in a dieback-free condition.
4. Rehabilitate all or parts of pits as material extraction is completed. Remove top-soil separately and store it for later rehabilitation work. Use seeds collected within the area for rehabilitation work wherever possible as specified in Guidelines for Planning, Operating and Rehabilitating Borrow Pits (Roadside Conservation Committee, 1994).

27.0 Utilities and Services

1. When the opportunity arises, negotiate to place new utility and service corridors outside the Park and Reserves.
2. If a utility or service corridor must go through the Park or Reserves, ensure that its placement and maintenance have minimal impact on the environment.

28.0 Apiculture

1. Review hive locations and access to these sites subject to current CALM policy.
2. Cancel or relocate sites in the high dieback risk area of Nambung National Park in consultation with apiarists.
3. No additional sites will be permitted in Nambung National Park, Wanagarren and Nilgen Nature Reserves.
4. Foster research on impacts of apiculture on the reserves.

29.0 Research and Monitoring

2. Implement an integrated program of survey, research and monitoring, based on the strategies in the relevant sections of this plan.
4. Ensure that research activities do not impact on the Reserves' values.

30.0 Management Structure and Staff Resources

1. Provide sufficient trained staff to implement the strategies contained in this plan.
2. Seek sufficient financial resources from both Government and private sources to implement this plan.
3. Investigate and implement revenue raising mechanisms to increase resources available for management.

31.0 Priorities and Review

1. Prepare an implementation program taking into account the priorities outlined in Table 5.
2. Review the implementation of this plan annually, prior to preparing the works program for the following year, or as circumstances change. The review should identify which strategies have been achieved and to what degree, and any new information that may affect management.
3. Review the plan within 10 years of its gazettal. Monitoring, in collaboration with the NPNCA, should identify the extent to which the objectives have been achieved and strategies implemented, the reason for the lack of achievement or implementation, and a summary of information that may affect future management.

MEDIUM PRIORITY

5.0 Geology, Soils, Landforms and Coastal Processes

3. In consultation with speleological groups, complete a resource inventory, classification system and access policies for caves and karst features in the area.

6.0 Hydrology

4. Provide information to the public on the values, significance and management of the Reserves' wetlands.

8.0 Fauna

3. Encourage research to identify the key terrestrial and aquatic invertebrate fauna, particularly cave dwelling species, with emphasis on those most likely to be rare or threatened.
4. Provide interpretive material to visitors on the fauna of the reserves.

9.0 Cultural Heritage

2. Train CALM staff to recognise sites of cultural significance to both Aboriginal and non-Aboriginal people in liaison with the Aboriginal Affairs Department and the local community.

11.0 Fire Protection

Pre-suppression

4. Provide water supply points at strategic locations within or near the reserves.

MEDIUM PRIORITY cont.

Section

Information and Education

9. Provide information on the reserves' values and fire risks in order to improve visitors' appreciation and support for fire management programs, and fire safety and survival.

Research and Monitoring

10. Monitor fire behaviour in different vegetation fuel types particularly where new techniques are being tested.

13.0 Introduced Plants and Animals

1. Maintain an inventory of introduced plants and animals and monitor these populations.

16.0 Recreation Opportunities

3. Inform visitors of the recreation opportunities and facilities available elsewhere in the area, particularly those not available in the Park and Reserves.

17.0 Access

5. Maintain and improve roads in keeping with the development of facilities, CALM's roading standards and zoning plan.

19.2 Bushwalking

1. Develop a network of foot access in the Park and Reserves according to the guidelines set out above.

19.4 Camping

3. Monitor the environmental impacts associated with camping. Use the results to refine management policies and practices.

19.5 Group and Club-Based Activities

3. Endeavour to meet the special needs of community groups where this does not compromise the natural environment or other visitors' enjoyment.

19.6 Recreational Fishing

3. Liaise with the local recreation fishing advisory committee regarding management of access.

20.0 Commercial Visitor Services

6. Facilitate liaison with, and training of, commercial operators through appropriate means.

23.0 Information, Interpretation and Education

4. Consider producing multi-lingual information (e.g. brochures) in close liaison with commercial operators.

29.0 Research and Monitoring

1. Encourage volunteers, educational institutions and other organisations to participate in research projects. Promote research programs and findings that address key issues.

LOW PRIORITY

7.0 Vegetation and Flora

1. Encourage detailed mapping and research of flora and vegetation that may be rare, unique or in some way warranting special consideration, with emphasis on developing knowledge on the effects of fire and other factors affecting survival and regeneration.

9.0 Cultural Heritage

5. Develop the Old North Road Stock Route as a Heritage Trail in consultation with local Government and the National Trust as recommended in the Central Coast Regional Strategy (WA Planning Commission, 1996).

10.0 Landscape Management

3. Encourage neighbours to recognise the importance of landscape management by the sensitive siting of facilities and signs, selection of site-compatible materials and colours, and careful planning and siting of utilities and roads to minimise impacts on the Park's and Reserves' landscape values.

19.2 Bushwalking

3. Monitor the environmental impacts of bushwalking and whether bushwalking opportunities are meeting visitor needs.
4. Provide interpretive and educational material for walkers with emphasis on the Park's and Reserves' conservation values.

LOW PRIORITY cont.

5. Provide adequate information from which visitors can choose walking opportunities that best suit their needs.

19.7 Boating

2. Investigate the future requirements and feasibility for the development of formal boat launching facilities (i.e. boat ramps) at Grey and Wedge.

20.0 Commercial Visitor Services

7. Encourage commercial operators to maintain appropriate standards with respect to information and quality of service provided.

27.0 Utilities and Services

3. Control and monitor the effects of utility corridors and their maintenance upon conservation, landscape and recreation values.

30.0 Management Structure and Staff Resources

4. Develop volunteer programs to assist in implementation of the plan.

BIBLIOGRAPHY

Bastian, (1964). Morphology and development of caves in the South West of Western Australia. *Helictite*, July 1964: 105-118.

Beard, J.S. (1979). *The Vegetation of the Moora and Hill River Areas, Western Australia. Map and Explanatory Memoir. 1:250 000 series*. Vegmap Publications, Perth.

Boniecka, L. (in prep). Cervantes Water Reserve Water Source Protection Plan, Cervantes Town Water Supply. Water and Rivers Commission Water Resource Protection Series No. WRP 8.

Burbidge, A.H. and Boscacci, L.J. (1989). *A Spring Reconnaissance Survey of the Flora and Fauna of the Southern Beekeeper's Reserve*. Department of Conservation and Land Management, Technical Report No 22. Perth, Western Australia.

Crook, I.G., Williams, A.A.E., Chatfield, G.R. and Moore, S.A. (1984). Nature Reserves of the Shire of Dandaragan. Volume 1. *Western Australian Nature Reserve Management Plan* No. 5.

Department of Conservation and Environment (1978). *Caves in Western Australia*, Bulletin 51, 6pp.

Department of Conservation and Land Management (1994a). *Lesueur National Park and Coomallo Nature Reserve Draft Management Plan.* Department of Conservation and Land Management, Perth, Western Australia.

Department of Conservation and Land Management (1994b). *Reading the Remote. Landscape Characters of Western Australia*. Department of Conservation and Land Management, Perth, Western Australia.

Elliot, I. (1992). *The Central Coast: Marine and Coastal Environment between Guilderton and Port Denison.* Coastal Planning Section Report, Department of Planning and Urban Development.

Grey, K., Moore, L.S., Burne, R.V., Pierson, B.K. and Bauld, J. (1990). Lake Thetis, Western Australia: an Example of Saline Lake Sedimentation Dominated by Benthic Microbial Processes. *Aust. J. Mar. Freshwater Res.*, **41**, 275-300.

Griffin, E.A. (1993). *Flora of the Quindalup Dunes Between Swan and Irwin Rivers, Western Australia.* Unpublished Report to Coastal Planning Branch, Department of Planning and Urban Development, and the Heritage Council of W.A.

Hallam, S.J. (1971). Roof markings in the 'Orchestra Shell' cave, Wanneroo, near Perth, Western Australia. *Mankind*, **8**(2): 90-103.

Hallam, S.J. (1975). *Fire and Hearth - a study of Aboriginal usage and European usurpation in south-western Australia.* Australian Institute of Aboriginal Studies, Canberra 1975. AAS 58.

Hart, Simpson and Associates (1992). *Dieback infections in the northern Sandplains*, Unpublished report to the Northern Sandplains Dieback Working Party.

Hoch, H. (1993). A new troglobitic planthopper species (Hemiptera: Fulgoroidea: Meenoplidae) from Western Australia. *Rec. West. Aus. Mus.* **16**, pp. 393-398.

Holland, E. (1993). *The Effects of Fire on Soluble Rock Landscapes.* Proceedings of the Tenth Australasian Conference on Cave and Karst Management, Rockhampton, Queensland. pp20-23.

Kern, A.M. (1988). *The geology and hydrogeology of the superficial formations between Cervantes and Lancelin, Perth Basin Cataby Project.* Western Australian Geological Survey Hydrogeological Report 1988/43, Vols 1-2.

Lobry de Bruyn, L. and Ochman, P.G. (1987). *Draft Coastal Management Plan Cervantes Area*. Department of Conservation and Environment, Bulletin 247. Perth, Western Australia.

Lowry, D.C. (1974). *Dongara - Hill River, W.A. 1:250 000 Geological Series, Explanatory Notes*. Aust. Govt. Publ. Services, Canberra.

McNamara, K. J. (1995). *Pinnacles*. Western Australian Museum, Revised 1995. Perth, Western Australia.

Merrilees, D., Dix, W.C., Hallam, S.J., Douglas, W.H. and Berndt, R.M. (1973). Aboriginal man in southwest Australia. *Roy. Soc. West. Aust.* **56**(1, 2): 44-55.

Oma, V.P.M., Clayton, D.M., Broun, J.B. and Keating, C.D.M. (1992). *Coastal Rehabilitation Manual*. Western Australian Department of Agriculture, Bulletin 4248. Perth, 126pp.

Passfield, A. (1988). Nambung Here We Come. Production by WordsWork*Express* Pty Ltd.

Playford, P., Cockbain, A.E. and Low, G.H. (1975). *Geology of the Perth Basin, Western Australia*. Geological Survey of Western Australia, Bulletin 124. Government Printer, Perth, W.A.

Poulter, N. (1973). Nambung National Park, Western Australia. Australian Speleological Federation Newsletter No. 62, 1973.

Roadside Conservation Committee (1994). *Guidelines for Planning, Operating and Rehabilitating Burrow Pits*.

Semeniuk Research Group, V. and C. (1994). Ecological Assessment and Evaluation of Wetlands in the System 5 Region. Report to the Australian Heritage Commission, Canberra.

Shea, S. and Sharp, J. (1992). Emerging Tourism Opportunities - Western Australia's 'Natural Advantage'. Paper presented to the *Into Asia Conference*, Perth, Western Australia, November 1992.

Shearer, B.L. (1994). The major plant pathogens occurring in native ecosystems of south-western Australia. *J. Roy. Soc. of WA.* **77**: 113-122.

Thomas, J.F., McArthur, W.M. and Bartle, G.A. (1990). *Land Use and Management in the Defence Training Area at Lancelin, Western Australia*. CSIRO, Australia Report No. 90/10.

Tindale, N.B. (1975). *The Aboriginal Tribes of Australia*. Australian National University Press, Canberra.

Tinley, K.L. (1992). *Environmental Audit of the Central West Coast, Western Australia*. Commissioned report for the Department of Planning and Urban Development.

Turner, J.H. (1963). pers. comm. to National Parks Board. In: Poulter, N. (1973). *Nambung National Park, Western Australia*. Australian Speleological Federation Newsletter No. 62.

Western Australian Planning Commission (1996). *Central Coast Regional Strategy. A Strategy to Guide Land Use in the Next Decade.* Western Australian Planning Commission.

Wilde, S.A. and Low, G.H. (1978). *Geological Survey of Western Australia. 1:250 000 Geological Series, Explanatory Notes. Perth, Western Australia (Sheet SH50-14).* Geol. Surv. West. Aust., Perth, 36pp.

Wills, R.T. (1989). Management of the flora utilised by the European honey bee in kwongan of the northern sandplain of Western Australia. Ph.D. thesis, University of WA, Nedlands, WA.

APPENDIX 1. State Government Squatter Policy

While the Government is mindful of the emotional attachment and financial investment people have made in squatter shacks, it considers that action to remove squatter shacks is in the interests of all Western Australians. In view of the potential for further environmental degradation, and the creation of town sites that would be difficult to service and be a continual financial drain to the Government, it is now the general objective of the Government to avoid the creation of additional squatter shacks and work towards the removal of those already existing.

The Government's policy with respect to squatter shack development is as follows:

1. No new illegal shacks will be permitted on reserved or vacant Crown land along the State's coastline from the date of Cabinet's approval of this policy.

2. Existing shack owners will be permitted to remain for a period of 6 years provided that:

   i) there are no extraneous circumstances in particular areas which require shacks to be removed sooner; and
   ii) the shacks are not situated on reserved land which has been subject to a management plan under the CALM Act.

   This 6 year period is to allow for the reasonable usage of existing investment while deterring extensive improvements or redevelopment. The 6 years will be calculated from the commencement date of arrangements for particular areas.

3. This 6 year tenancy is subject to:

   i) no services being provided by State or Local Government;
   ii) the sites being left in a clean and tidy condition upon completion of occupancy and the cost of removal of the shack and rehabilitation of the site being borne by the shack owner;
   iii) no further clearing or making of access roads being undertaken;
   iv) no transfer of shacks or occupancy rights being permitted;
   v) no improvements or extensions apart from those sanctioned by the local authority for safety or health reasons being undertaken;
   vi) State, Federal and local governments being indemnified against damage to property or persons resultant from the poor condition of the shacks;
   vii) the payment of an annual fee to the local authority which should cover progressive rehabilitation and management of shack areas;
   viii) the land not being required for another purpose at an earlier time, in which case the shack owner(s) would be issued with a notice for removal of the structure within 90 days;
   ix) there being no entitlement for compensation as a result of a notice for removal (of a shack), whether the notice be issued at the conclusion of the 6 year period or at an earlier time.

4. The Government recognises that professional fishermen merit an exemption from the policy and they will be permitted to continue to operate from shack areas. However, formalised tenure to a fisherman's shack, in the form of a lease, will only be granted in conjunction with fishing licences under the control of Fisheries WA and subject to conditions laid down by the Department. Leasing of sites for professional fishermen's shacks to generally be granted and administered by local government with variations subject to negotiation between local government and the Department of Land Administration and/or consideration by the West Coast Working Group as part of the practical implementation. Fishermen's shacks should be of a reasonable standard as determined by the particular local authority. In using these coastal areas, fishermen must have regard for the coastal environment. This should be monitored and regulated by the local authority

This general policy will be further developed by the progressive examination of individual areas of the State. More detailed studies of particular areas will be undertaken in order to consider the tenure of particular coastal lands, the uses to which these areas will be put once squatters are removed and management programs considered appropriate.

APPENDIX 2. Landscape Character Types

Scenic Quality	Scenic Quality Classification
GERALDTON PLAINS Landscape Character Sub-type	
Landform	Broad, flat to undulating sandplain ranging in elevation from 30-250 m with pronounced escarpments and low ranges (up to 300 m); some areas of exposed limestone and sandstone outcropping.
Vegetation	Coastal heathlands and scattered banksia/eucalypt woodland; extensive agricultural pastoral clearing throughout much of this sub-type.
Waterform	Numerous small streams and intermittent creeks; some larger streams and rivers which drain from east to west across the coastal plain; numerous wetland areas, primarily in the southern portion of this sub-type.
Land Use	Combination of reserves and vacant Crown land supporting native vegetation with extensive freehold land supporting grazing and grain growing.
HIGH	
Landform	High rounded hills with steep slopes, mesa topped ranges and escarpments to 300 m in elevation with sharp breakaways. Steep-sided gorges and strongly dissected valleys.
Vegetation	Areas of high plant diversity (structural and/or species richness) which display distinctive textural and colour patterns. Pockets or bands of vegetation which become focal points due to relative height, position in landscape, isolation or colour contrast.
Waterform	Larger wetlands, river pools and other permanent water features. Steep-sided gorges or valleys associated with major river drainages.
Land Use	Large expanses free of human disturbance or developments, such as roads/firebreaks, and where edge contrasts are not evident. Spot developments which are in harmony with naturally established forms, lines, colours and textures.
MODERATE	
Landform	Gently undulating plains and rounded hills similar in gradient to surrounding landforms and which are not visually distinctive or prominent.
Vegetation	Some structural and seasonal colour patterns evident in vegetation, but lacking in uniqueness or distinction relative to surrounding vegetation. Gradual transition between heathland and woodland communities.
Waterform	Seasonal wetlands, intermittent streams and creeklines.
Land Use	Pastoral, agricultural landscapes in which clearings, firebreaks, roads and other human-imposed developments borrow significantly from natural patterns; some discordant visual impacts apparent.
LOW	
Landform	Expansive plains with little or no dissection and with limited topographic features of specific visual interest.
Vegetation	Extensive areas/vistas of similar vegetation cover with little or no structural diversity or colour/texture changes.
Waterform	Waterforms absent.
Land Use	Developments in which the form, line, colour and texture of introduced elements contrast markedly with natural features.
SWAN COASTAL PLAIN Landscape Character Type	
Landform	Coastal landforms include extensive sand beaches, dunes (both consolidated and mobile), offshore reefs, stacks and islands, high cliffs, headlands and coastal gorges.
Vegetation	Range of vegetation communities including dune grasses, coastal heathlands, woodlands and mangrove thickets.
Waterform	Indian Ocean, numerous streams and rivers, extensive embayments and tidal estuaries.
Land Use	Several urban centres and numerous smaller coastal towns; some squatter settlements and scattered shacks; various recreation access points, some with developed areas and facilities.
HIGH	
Landform	Cliffs and headlands. All islands, stacks, offshore sandbars and reefs. Rock features, caves, faultlines, obviously banded sedimentary rocks. Irregular coastline edges often emphasised by distinctive rock outcropping, bays, inlets and sand deposition patterns. Primary dunes which display areas of active weathering, steep slopes and/or sandblown edges.
Vegetation	Windshaped, gnarled or dwarfed vegetation unusual in form, colour or texture. Single tree, shrubs or patches of vegetation which become focal points due to isolation or position in relation to rocks or water. Strongly defined patterns of woodland, dune vegetation, Melaleuca scrub, mangrove thickets and/or barren rock.
Waterform	All estuaries, inlets, lakes and swamps. Unusual ocean shoreline motion as eddies due to islands, reefs, surf zones and shoreline configuration.

Scenic Quality	Scenic Quality Classification
Land Use	Long stretches of coastal landscape free of human development and disturbance. Spot developments which are in harmony with naturally existing forms, lines, colours and textures.
MODERATE	
Landform	Expanses of beach of uniform width and colour without rock outcroppings or local features. Regular coast edges without bays, inlets, promontories, stacks or cliffs.
Vegetation	Predominantly heath or beach grasses with some variation in colour, texture or pattern. Some contrast caused by different colours.
Waterform	Uniform ocean shoreline and motion characteristics with little diversity.
Land Use	Coastal areas in which human-imposed developments, disturbances borrow significantly from natural landscape patterns; some discordant visual impacts apparent.
LOW	
Landform	Expanses of uniform (indistinctly dissected) landform.
Vegetation	Extensive areas of similar vegetation such as heath or beach grass, with very limited variation in colour or texture.
Waterform	Water, where present, rates no lower than moderate in this Type.
Land Use	Developments in which the form, line, colour and texture of introduced elements contrast markedly with natural features.