MANAGEMENT PLAN

Lesueur National Park

and

Coomallo Nature Reserve

1995 - 2005

Department of Conservation and Land Management
for the
National Parks and Nature Conservation Authority
Perth, Western Australia, 1995

PREFACE

All national parks, conservation parks, marine parks, nature reserves and marine 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 the preparation of management plans for all lands and waters that are vested in it. CALM prepares the plans on their behalf 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.

According to the CALM Act (1984), management plans should 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 for 10 years but a review may take place within the term of the plan.

A draft management plan for Lesueur National Park and Coomallo Nature Reserve was released for public comment. After consideration of public submissions, the NPNCA submitted this revised plan to the Minister for the Environment for approval. The Minister for the Environment approved this document as the Management Plan for Lesueur National Park and Coomallo Nature Reserve on 25 September 1995.

The Bush Fires Board endorsed this Management Plan under section 34(1) of the Bush Fires Act (1954) on 17 August 1995.

ACKNOWLEDGEMENTS

This plan was prepared by the Lesueur-Coomallo planning team, comprising Jacqueline Pontré - Coordinator, David Rose - District Manager, Keith Hockey - Senior Ranger, Neil Gibson - Research Scientist and Matt Cavana - Technical Officer.

Many others have provided valuable assistance in preparing this plan, particularly:

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

The document 'Nature Conservation, Landscape and Recreation Values of the Lesueur Area' (Burbidge, Hopper and van Leeuwen, eds, 1990) was extremely useful in preparing this management plan and the planning team acknowledges the authors of the document.

Special thanks to Roger Armstrong of CALM's Environmental Protection Branch and Rick Sneeuwjagt of CALM*fire* who provided assistance and encouragement throughout the plan preparation. Matt Cavana provided the illustration for the front cover.

NOMENCLATURE

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

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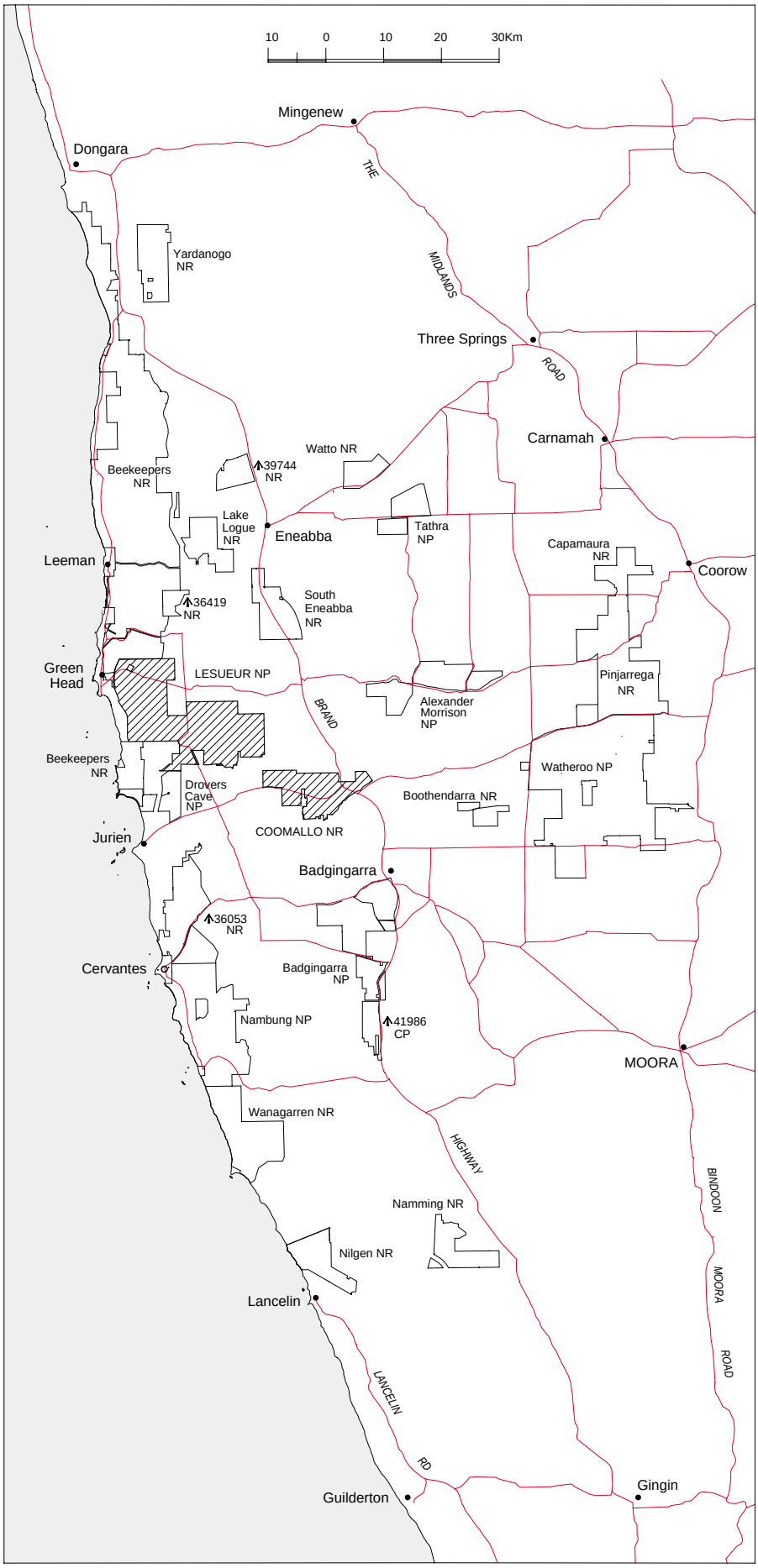
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Mingenew
Dongara
THE
MIDLANDS
ROAD
Yardanogo NR
Three Springs
Carnamah
Watto NR
39744 NR
Beekeepers NR
Lake Logue NR
Eneabba
Tathra NP
Capamaura NR
Coorow
Leeman
36419 NR
South Eneabba NR
Green Head
LESUEUR NP
BRAND
Alexander Morrison NP
Pinjarrega NR
Beekeepers NR
Drovers Cave NP
Watheroo NP
Boothendarra NR
COOMALLO NR
Jurien
Badgingarra
36053 NR
Cervantes
Badgingarra NP
Nambung NP
41986 CP
MOORA
Wanagarren NR
HIGHWAY
BINDOON
MOORA
ROAD
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Lancelin
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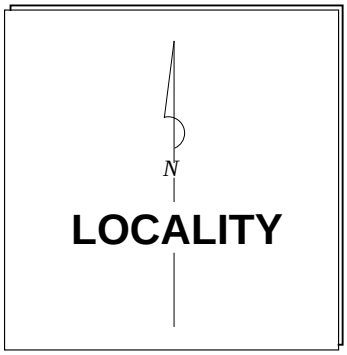
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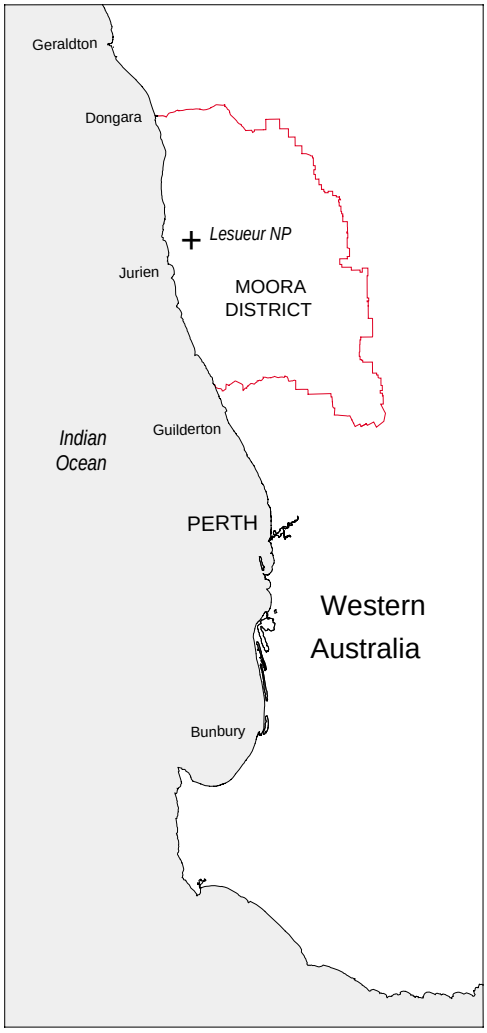

Geraldton
Dongara
Lesueur NP
Jurien
MOORA DISTRICT
Guilderton
Indian Ocean
PERTH
Western Australia
Bunbury

INTRODUCTION

1.0 OVERVIEW

1.1 Brief Description

Lesueur National Park (26 987 ha) and Coomallo Nature Reserve (8 815 ha) are located near the coastal town of Jurien, about 220 km north of Perth. The Park and Reserve are part of CALM's Moora District, which covers areas along the coast from Dongara in the north to Lancelin in the south and extending about 150 km to the east (see Map 1).

The Lesueur-Coomallo area has long been recognised as an area of outstanding flora conservation values, complex geological features and unusually rugged terrain in the otherwise subdued landforms of the northern kwongan[1] region.

The area experiences a Mediterranean climate of hot, dry summers and cool, wet winters with a moderately reliable rainfall. At the nearby town of Jurien the average annual rainfall is 550 mm, occurring mostly between June and August. 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 area's exceptionally diverse flora of more than 900 species represents 10% of the State's known flora. The Lesueur National Park has seven species of declared rare flora, nine endemic taxa, 111 regionally endemic taxa, and 81 taxa at their northern or southern limits. Lesueur ranks as one of the three most important areas for flora conservation in southern Western Australia (the Stirling Range and Fitzgerald River areas being the other two) and its diversity is of international significance.

The vegetation is structurally diverse, consisting mainly of shrublands and woodlands interspersed in a complex mosaic. The great diversity of communities reflects the complexity of underlying strata and an unusually large array of habitats. Some communities in the uplands are not found elsewhere. These values are enhanced by the fact that the area is relatively free of dieback disease.

Lesueur's fauna is also diverse with at least 15 mammal, 124 bird, 48 reptile and nine frog species. The area is critically important to the survival of birds that nest in tree hollows, such as Carnaby's Black Cockatoo, and is abundant in birds of the kwongan. The reptile fauna is particularly rich in geckoes and legless lizards, and indications show a wealth of invertebrate fauna.

Lesueur's recreation values are regionally important. Its scenic grandeur and spectacular viewsheds attract a wide range of recreational use, including nature study, pleasure driving, sightseeing, photography, bushwalking and camping.

The biological diversity of Coomallo Nature Reserve has not been studied in the same depth as Lesueur National Park but, nevertheless, it too has high conservation value. It also provides an important biological corridor between Lesueur and conservation reserves further inland.

1.2 Creation of Lesueur National Park

In the 1950s Government Botanist, Charles Gardner, who was concerned at the effects farming was having on native flora recommended the area be reserved. No action was taken, apparently because of the existence of a reserve for 'Horse Breeding', dating from the days when horses were needed by the Australian Army. However, the importance of Mt Lesueur itself was recognised by the creation of a reserve for 'Educational Purposes' (reserve no. 24275).

The first major review of national parks and nature reserves in Western Australia was by a sub-committee of the Australian Academy of Science. The 1962 report of the Academy (Western Australian Sub-Committee of the Australian Academy of Science Committee on National Parks, 1962) recommended that the area be declared a Class 'A' reserve for a national park. The last major review of nature conservation reserves in Western Australia by the Environmental Protection Authority's Conservation Through Reserves Committee (CTRC, 1974) recommended consolidating several existing reserves and some vacant Crown land in the area into a Class 'A' nature reserve for the conservation of flora and fauna.

The CTRC recommendation was endorsed by the Environmental Protection Authority (EPA) following a period of public review, and by State Cabinet on 20 October 1976. However, the recommendation was not implemented because of objections by the then Department of Mines which believed that coal deposits in the area should be available for exploitation.

In 1982-83 a compromise agreement was achieved whereby the Mines Department agreed that a Class

[1] The term 'kwongan' refers to a broad area of sandplain.

'C' reserve be created on condition that access for mineral and petroleum exploration would be available. This was agreed to by State Cabinet on 16 May 1983 and instructions to create the reserve were passed to the then Department of Lands and Surveys. In the ensuing six months the boundaries of the reserve were finalised, but the reserve was not created because of continuing concerns about access to the coal deposits.

The Conservation and Land Management Act (1984) created a new National Parks and Nature Conservation Authority to replace the previous National Parks Authority and the Western Australian Wildlife Authority. The National Parks and Nature Conservation Authority (NPNCA) recommended that the Lesueur area be declared a national park because of its high nature conservation, landscape and recreational values.

In February 1988, the Western Australian Government released a new policy on exploration and mining in national parks and nature reserves. Under this policy, areas recommended for reservation by the EPA and endorsed by State Cabinet were to be declared national parks and nature reserves, and mining applications were to be evaluated by the EPA and then considered by Parliament. Progress in declaring the Lesueur National Park was delayed because of concern regarding the coal deposits.

In March 1989, Canning Resources Pty Ltd, a subsidiary company of CRA Exploration Pty Ltd, and the Hill River Power Development Company Pty Ltd submitted a Notice of Intent to the EPA, proposing to develop an open-cut mine and power station in the Lesueur area to supply power to the State Energy Commission of Western Australia (SECWA). The EPA decided that the proposal should be subject to evaluation, and requested that the Company prepare an Environmental Review and Management Program (ERMP), and that CALM should prepare a report on the nature conservation, recreation, landscape and education values of the Lesueur area.

In 1991 Canning Resources Pty Ltd and the Hill River Power Development Company Pty Ltd withdrew their Notice of Intent. The EPA recommended that the area be declared a Class 'A' national park. Parliament endorsed the recommendation and Lesueur National Park was gazetted as a Class 'A' reserve for national park on 24 January 1992.

1.3 Creation of Coomallo Nature Reserve

In 1974, the Department of Fisheries and Fauna recommended that a Class 'A' reserve comprising Reserve No. 24276 (Educational Purposes), Reserve No. 24113 (Timber for Settlers), Reserve No. 28559 (Government Requirements and Camping), and vacant Crown land between these reserves, be established and vested in the WA Wildlife Authority. The same areas were recommended for reservation as a national park by the EPA (1976) System 5 recommendations of the Conservation Through Reserves Committee.

Owing to the existence of coal mining and petroleum leases over the area, the reservation had to await clearance by the Department of Mines. The Shire of Dandaragan made requests for the release of Reserve No. 28559 for agricultural purposes in 1980 but in 1988 agreed to CALM managing the reserve. This included the small picnic ground (Reserve No. 29901) at the Jurien Road turn-off which is yet to be formally vested in the NPNCA.

Delays in implementing the EPA's recommendations spurred the Government to establish a taskforce to accelerate implementing outstanding Red Book recommendations, including the formation of the Coomallo reserve. The national park proposal proceeded as a Class 'C' nature reserve after the Government released its 'Resolution of Conflict' mining and environment policy in 1990. In November 1991, Reserve No. 41933 comprising the Coomallo Nature Reserve was gazetted as a Class 'C' reserve vested in the NPNCA. The gazettal did not include Reserve No. 24276 for Educational Purposes because of the potential for mineral exploration.

1.4 Public Participation

This management plan has been prepared with significant public participation including the formation of an advisory committee, meetings, public submissions and recreation surveys. Much of the main direction for the future of Lesueur National Park and Coomallo Nature Reserve is based on the views expressed by the many people who have been involved before and during the planning process.

Lesueur-Nambung Advisory Committee

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

Meetings

Meetings were held with interested groups and individuals, including the Shire of Coorow and the Shire of Dandaragan.

Pre-draft Submissions
Twenty-two submissions were received after a call for comment was advertised locally and Statewide, and after a pamphlet was circulated to the community, organisations and other Government departments announcing that a management plan for Lesueur National Park and Coomallo Nature Reserve was to be prepared. Most were from organisations that represented a broad cross-section of community interests. Public access, fire protection, disease management and educational potential were the main concerns considered during the preparation of the management plan.

Recreation Survey
CALM started surveying visitors to Lesueur National Park and Coomallo Nature Reserve in September 1992, to determine the levels and types of recreation occurring in the area, and what visitors thought about management of the area in the future. The floristic diversity and the scenic landscapes attract nature-based recreators, such as bushwalkers and naturalists. Visitor levels are moderate at present but are likely to increase as the area's values become better known.

Submissions to the Draft Management Plan
Seventeen 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

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.

Lesueur National Park and Coomallo Nature Reserve will be managed with these primary objectives. Other more specific objectives are detailed in individual sections of this plan.

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

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 management goals for Lesueur National Park and Coomallo Nature Reserve, consistent with CALM's mission statement, are:

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

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

Community Relations
- Promote informed appreciation of natural and cultural values.

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

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

Protection
- Protect the value of resources entrusted to the Department so as to meet, as far as possible, the diverse expectations of the community.

Throughout this management plan strategies are prioritised as ongoing (O), high (H), medium (M) or low (L) priority, and are tabled accordingly in

section 19.0 Priorities.

2.4 Key Issues for Future Management

Phytophthora Dieback

Dieback disease caused by soil fungi (*Phytophthora* spp.) is the greatest management concern in Lesueur National Park and Coomallo Nature Reserve. Much of the regional flora is highly susceptible to the disease which is most commonly introduced and spread in infected soil, mud or moist gravel on the wheels and underbodies of vehicles. The loss of vegetation to dieback will seriously reduce the Park's and Reserve's conservation and recreation values.

Seven species of *Phytophthora* occur in the northern sandplains but only *P. citricola* has been identified in Lesueur National Park. *Phytophthora* has not yet been found in the Coomallo Nature Reserve. A dieback risk map produced for the area was used as a guide to plan appropriate visitor access to both areas.

Fire Protection

A number of fires, caused either by lightning or human activities, have occurred in Lesueur and Coomallo over the last 10 years. Interagency agreements between CALM, the Shires and local fire brigades are essential to supplement CALM's limited fire-fighting resources in the region. The fire management strategies aim to protect life, property and environmental values and to manage natural ecosystems.

Recreation Access

In determining the type of recreation access recommended for Lesueur National Park and Coomallo Nature Reserve, the potential to spread dieback was an important consideration. The access proposed for Lesueur National Park facilitates recreation activities that are compatible with conservation objectives.

LAND USE MANAGEMENT

3.0 LAND TENURE

The objectives are to:

1. *Encourage owners of nearby lands to manage their properties in a sympathetic way to the Park and Reserve.*
2. *Seek to incorporate appropriate lands within the Park and Reserve.*

Boundaries and Land Tenure

Lesueur National Park is a Class 'A' reserve (No. 42032) with an area of 26 987 ha. It is vested in the NPNCA with the purpose of 'national park' and was gazetted on 24 January 1992 (see 1.2 Creation of Lesueur National Park). The Park is effectively one block although it is divided by Cockleshell Gully Road and the Coorow-Green Head Road. It is bounded by freehold land, reserves and the Drovers Cave National Park (Table 1). Reserve No. 42030, a Class 'C' reserve of 78 ha for marl resource management, restoration and conservation, and Reserve No. 38501, a 0.2 ha Class 'C' reserve for water supply, are enclaved within the Park. The southern boundary is intruded by Reserve No. 35593, a 348 ha Class 'C' reserve used by the Shire of Dandaragan to extract gravel for road building. Reserve No. 42031, a Class 'C' reserve of 506 ha for gravel resource management, restoration and conservation, abuts the Park's northern boundary. It is subject to a 21 year lease to the Shire of Coorow.

A coastal road to facilitate access between Jurien and Green Head, is currently the subject of negotiations between the Ministry for Planning, Main Roads WA, CALM and the Shires of Dandaragan and Coorow. Lesueur National Park's western boundary was originally based on the proposed road's alignment.

Coomallo Nature Reserve is a 8 815 ha (No. 41933) Class 'C' reserve for conserving flora and fauna. Divided by the Jurien Road and the Brand Highway, it is bounded by freehold land, reserves and roads. Reserve No. 29901 is a 2 ha Class 'C' Shire reserve for picnic ground, located at the junction of Jurien Road and the Highway. The Shire of Dandaragan has agreed for CALM to manage the reserve. Negotiations are currently underway to have it vested in the NPNCA for the purpose of Conservation Park. It is proposed to develop the site to cater for the many visitors who use the area (see 10.0 Access and Recreation Sites). In the long term it is proposed to upgrade Coomallo from 'C' Class to 'A' Class.

Also within the Reserve boundaries are a communications tower and service road (Locations 11088 and 11090) on the Dongara - Perth natural gas pipeline easement which traverses the Reserve. These are subject to a current lease to Shell Development Pty. Ltd. Locations 10953 and 11027 also within the boundaries of Coomallo Nature Reserve are unvested vacant Crown land.

Table 1 lists the reserves in the immediate vicinity of Lesueur National Park and Coomallo Nature Reserve. The two areas are linked by a corridor of uncleared vegetation on Location 10351.

Surrounding Land

Several private properties and significant areas of natural bushland surround Lesueur National Park and Coomallo Nature Reserve. The bush areas fall in a variety of land tenures, most of which are managed by CALM. The Park and Reserve management objectives cannot be achieved in isolation but must be complementary to managing these surrounding areas. In particular, disease and fire management must be approached from the broader perspective in order to achieve specific objectives.

It is beyond the scope of this management plan to address in detail the management of these surrounding lands, but some areas warrant special mention.

Drovers Cave National Park (Reserve No. 31302, 2 681 ha) abuts the south-west boundary of Lesueur National Park. Public access is currently restricted to 4WD vehicles along tracks leading through the Park to coastal locations north of Jurien. The main management concern is that of wildfire which could potentially threaten national park land and private property to the north and east. Interim guidelines for fire management in Drovers Cave National Park will be compiled and implemented concurrently with Lesueur National Park.

The administration of two Parks that share common boundaries may be simplified by amalgamating the areas into one reserve.

The Beekeepers Nature Reserve (Reserve No. 24496, 69 161 ha) flanks Lesueur National Park on both its north-western and south-western boundaries. The reserve is important to the apiculture industry and contains the largest concentration of apiary sites between Perth and Geraldton. Several large wildfires in January 1993 prompted CALM to draft interim management guidelines to protect the reserve from fire.

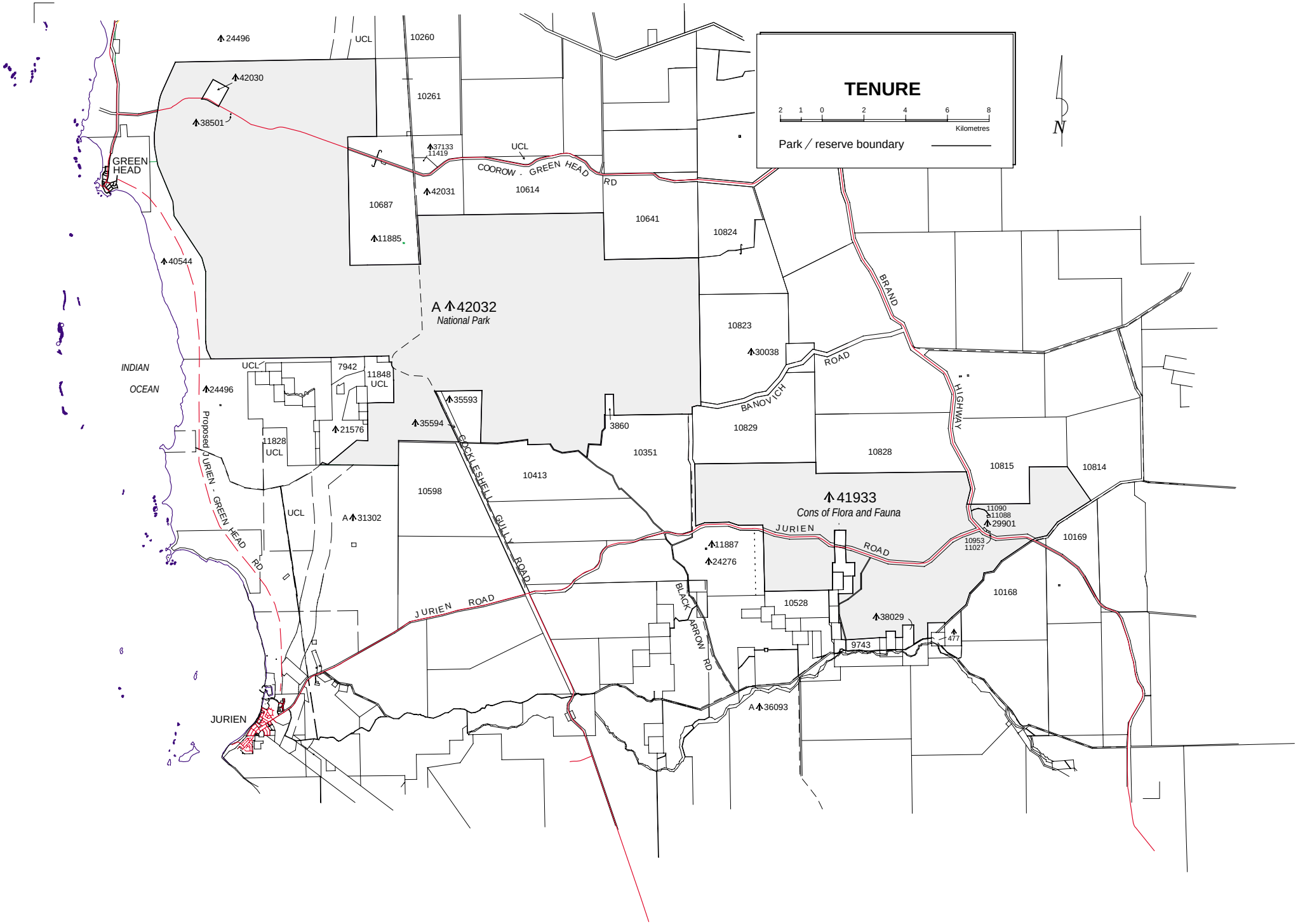

TENURE
2 1 0 2 4 6 8
Kilometres
Park / reserve boundary
N
24496
UCL
10260
42030
10261
38501
37133
11419
UCL
GREEN HEAD
COOROW - GREEN HEAD RD
42031
10614
10687
10641
10824
11885
40544
A 42032
National Park
10823
30038
BRAND HIGHWAY
ROAD
BANOVICH
INDIAN OCEAN
UCL
7942
11848
UCL
24496
35593
35594
21576
3860
10829
10828
10815
10814
11828
UCL
10351
10413
10598
41933
Cons of Flora and Fauna
11090
11088
29901
10953
11027
10169
JURIEN ROAD
11887
24276
Proposed JURIEN - GREEN HEAD RD
UCL
A 31302
COCKLESHELL GULLY ROAD
10528
10168
38029
9743
477
JURIEN ROAD
BLACK ARROW RD
JURIEN
A 36093

Table 1.
TENURE OF RESERVES SURROUNDING LESUEUR NATIONAL PARK AND COOMALLO NATURE RESERVE

Reserve No.	Class†	Purpose	Vesting	Area (ha)
477	C	Water and Stopping Place for Travellers and Stock	Shire of Dandaragan	40
11885	C	Trigonometric Station	Unvested	0.4
11887	C	Trigonometric Station	Unvested	0.4
21576	C	Water	Unvested	4
24276	C	Educational Purposes	Unvested	1 157
24496 (Beekeeper's Nature Reserve)	C	Protection of Flora	NPNCA	69 161
29901	C	Picnic Ground	Shire of Dandaragan	2
30038	C	Government Requirements	Unvested	157
31302 (Drovers Cave National Park)	A	National Park	NPNCA	2 681
35593	C	Gravel Resource Management, Restoration and Conservation*	NPNCA	348
35594	C	Protection of Flora	NPNCA	55
36093 (Hill River Nature Reserve)	A	Conservation of Flora and Fauna	NPNCA	882
37133	C	Gravel	Shire of Coorow	65
38029	C	Sand and Gravel	Shire of Dandaragan	50
38501	C	Water Supply	Minister for Water Resources	0.2
40544	C	Parkland and Recreation	Shire of Coorow	1 425
41933 (Coomallo Nature Reserve)	C	Conservation of Flora and Fauna	NPNCA	8 815
42030	C	Marl Resource Management, Restoration and Conservation**	NPNCA	78
42031	C	Gravel Resource Management, Restoration and Conservation**	NPNCA	506
42032 (Lesueur National Park)	A	National Park	NPNCA	26 987
Loc. 10953	-	Vacant Crown Land	Unvested	1.1
Loc. 11027	-	Vacant Crown Land	Unvested	0.5
Loc. 11088	-	Petroleum Pipeline Ancillary Installation		1.3
Loc. 11090	-	Access to Petroleum Pipeline Ancillary Installation		2.1

† The level of land classification reflects the level of approval required to alter their area or purpose:
Class A - Approval of both Houses of Parliament (WA)
Class B - Approval of the Governor, provided the Minister for Lands presents a report to Parliament
Class C - Approval of the Governor

* Subject to 21 year lease to Shire of Dandaragan

** Subject to 21 year lease to Shire of Coorow

Education Reserve No. 24276 (Mt Benia - 1 157 ha), which abuts the Coomallo Nature Reserve, was originally recommended to be included in Coomallo. This reserve is an important transitional area and contains rare plants not found in Lesueur. CALM undertakes necessary operations as part of managing Coomallo Nature Reserve. The Department of Minerals and Energy has objected to this area being included into the reserve because of its mining prospectivity. Negotiations to include the block in the nature reserve are continuing.

Reserve No. 40544 lies between Lesueur and the coast. This formed part of the original CTRC reserve recommendation but was granted to Coorow Shire on a short-term basis to control squatters. This reserve should eventually revert to the National Park.

Location 10351 is a predominantly uncleared property that links the two reserves. Owned by CRA Pty Ltd, the block has very high conservation value and a dieback washdown facility has been established. CALM will endeavour to liaise with the owners to ensure conservation values are not lost.

Continuing liaison between CALM and the Shires of Coorow and Dandaragan and with other neighbouring landholders is essential for cooperative management, particularly with regard to fire, disease, weeds and feral animals.

STRATEGIES

1. **Liaise with owners and managers of properties and lands with boundaries common with the Park and Reserve to establish cooperative management, particularly with regard to fire management and vermin control. (H)**

2. **Prepare interim management guidelines for the Drovers Cave National Park and adjoining Beekeeper's Nature Reserve that complement strategies in this plan. (H)**

3. **Continue negotiations with relevant bodies to include Reserve No. 24276 in the Coomallo Nature Reserve. In the meantime, endeavour to manage it as part of Reserve 41933. (M)**

4. **Continue negotiations with relevant bodies to have Shire Reserve No. 29901 vested in the NPNCA for the purpose of Conservation Park. (M)**

5. **Incorporate Reserve 40544 into Lesueur National Park following implementation of the Government's squatter shack policy and construction of the coast road. (M)**

6. **Upgrade Coomallo Nature Reserve from a 'C' class to an 'A' class reserve. (M)**

7. **Seek the support of the Shires of Coorow and Dandaragan to manage Shire reserves adjacent to Lesueur and Coomallo in a coordinated and compatible manner to management of the Park and Reserve. (M)**

8. **Acquire, by purchase or exchange when available, private properties adjoining the Park and Reserve that have exceptional conservation values not adequately represented within the Park and Reserve, or that have recreation values, management benefits, or that could protect areas with these values within the Park. Purchase or exchange must also consider other land uses and the views of the local community. (L)**

4.0 MANAGEMENT ZONES

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

Lesueur National Park

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 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 3).

The management zones identified in Lesueur National Park as shown on Map 3 are:

Special Conservation Zones

These zones are specific areas or features that deserve special protection because they contain or support unique, vulnerable or threatened species, best examples of natural features, or best representatives of plant communities. Access within this zone will be strictly controlled. Walking will occur and bush

camping may be permitted (under prior arrangements with Park staff), but no motorised access will be permitted except under special circumstances. Visible evidence of management will be low. A large part of the area east of Cockleshell Gully Road in Lesueur National Park is zoned 'Special Conservation' for its unique landscape and its diversity of vegetation (see sections 6.1, 6.3, 6.4).

Natural Environment Zones

The management priority in these zones is to conserve the diversity of priority and rare flora and animal species. In Lesueur National Park the area west of Cockleshell Gully Road is zoned 'Natural Environment' as it can sustain a selected range of low-key recreation activities while maintaining its natural state with a minimum of impairment. Conditional access by private vehicles will only be permitted where it is safe from the viewpoint of dieback and environmental damage is not caused. Non-motorised access will be preferred. Visible evidence of management will be minimised.

Recreation Zones

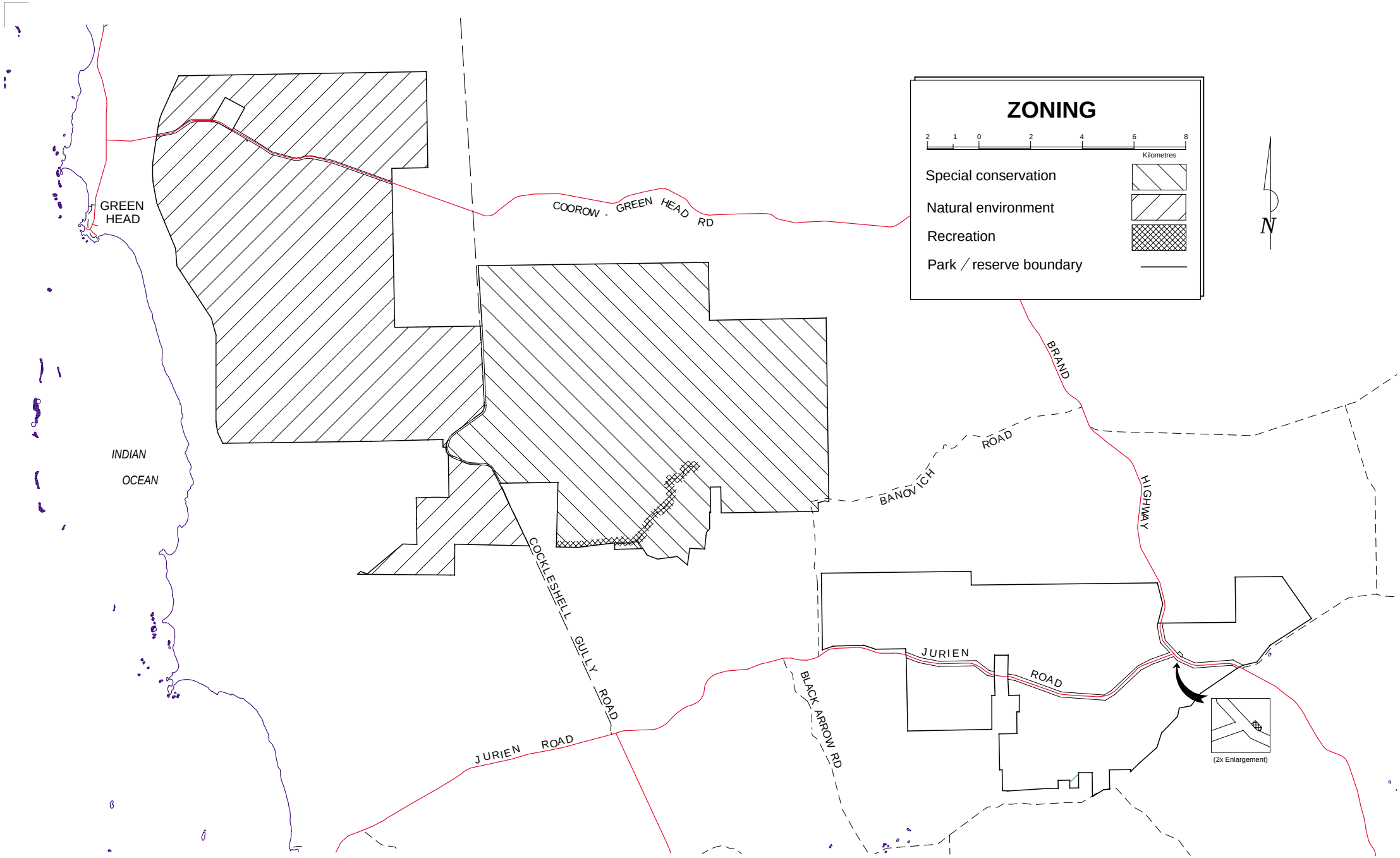
Land in these zones will be managed jointly for appropriate public recreation and for the conservation of native plants and animals. Recreation zones are areas allocated for a broad range of recreation activities of moderate to high intensity. The recreation zone in Lesueur National Park has been selected to encompass the main visitor focal points, i.e. Mt Lesueur (see also section 10.0 Access and Recreation Sites). Motorised access will be permitted and may be separated from non-motorised access. Facilities may include picnic sites, toilets, information shelters and walk tracks. Visible evidence of management may be moderate to high.

Coomallo Nature Reserve

Zoning is not considered necessary in Coomallo Nature Reserve as recreation opportunities are confined to the picnic area currently vested in the Shire of Dandaragan. As discussed in section 3.0 Land Tenure this area is to be vested in the NPNCA as Conservation Park and will cater for visitors who use the area.

STRATEGY

1. **Base future Park and Reserve management on the zoning scheme (Map 3). (H)**



Note: The recreation zone may be extended to incorporate additional public vehicle access (see Map 8)

MANAGEMENT FOR CONSERVATION

5.0 PRINCIPAL CONSERVATION DIRECTIONS

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

CONSERVATION STRATEGY
The conservation strategy for Lesueur National Park and Coomallo Nature Reserve will focus, where possible, on reducing external influences on the Park and Reserve to protect the diversity of priority and rare flora and animal species. Priority will be given to protecting threatened species and their habitats. Conservation values will be protected by preventing the spread of *Phytophthora* dieback, and minimising degradation caused by fire and introduced plants and animals. Human activities will be monitored, and those activities considered compatible with the conservation goals will be facilitated.

6.0 MANAGEMENT FOR CONSERVATION OF RESOURCES

6.1 Geology, Landforms and Soils

The objectives are to:
1. *Protect and conserve geological features, landforms and soils.*
2. *Minimise the disturbance to the soil from any permitted activities.*

Geology
Lesueur National Park and Coomallo Nature Reserve occupy part of the Perth Sedimentary Basin, the geology and geomorphology having been described by Playford *et al.* (1976). Lowry (1974) provides a map and an account of the geology of the Hill River 1:250 000 map sheet. A revision that incorporates significant recent findings is nearing completion (A. Mory (in print), Arrowsmith and Hill River 1:100,000 sheets).

Shallow Quaternary sediments (less than 1.8 million years old) cover the majority of the Lesueur and Coomallo areas. The thickest are the coastal Holocene Safety Bay Sands (6 000 years old to the present) and associated lagoonal deposits. Slightly inland is the Pleistocene Tamala Limestone (0.01-1.8 million years old) that was deposited mostly as coastal sand dunes. The inland areas have in part a thin weathered lateritic layer with residual sands. Erosion has led to the locally redistributed thin sheets of colluvium and alluvium that are most extensive west of the Pleistocene shoreline, now the Gingin Scarp.

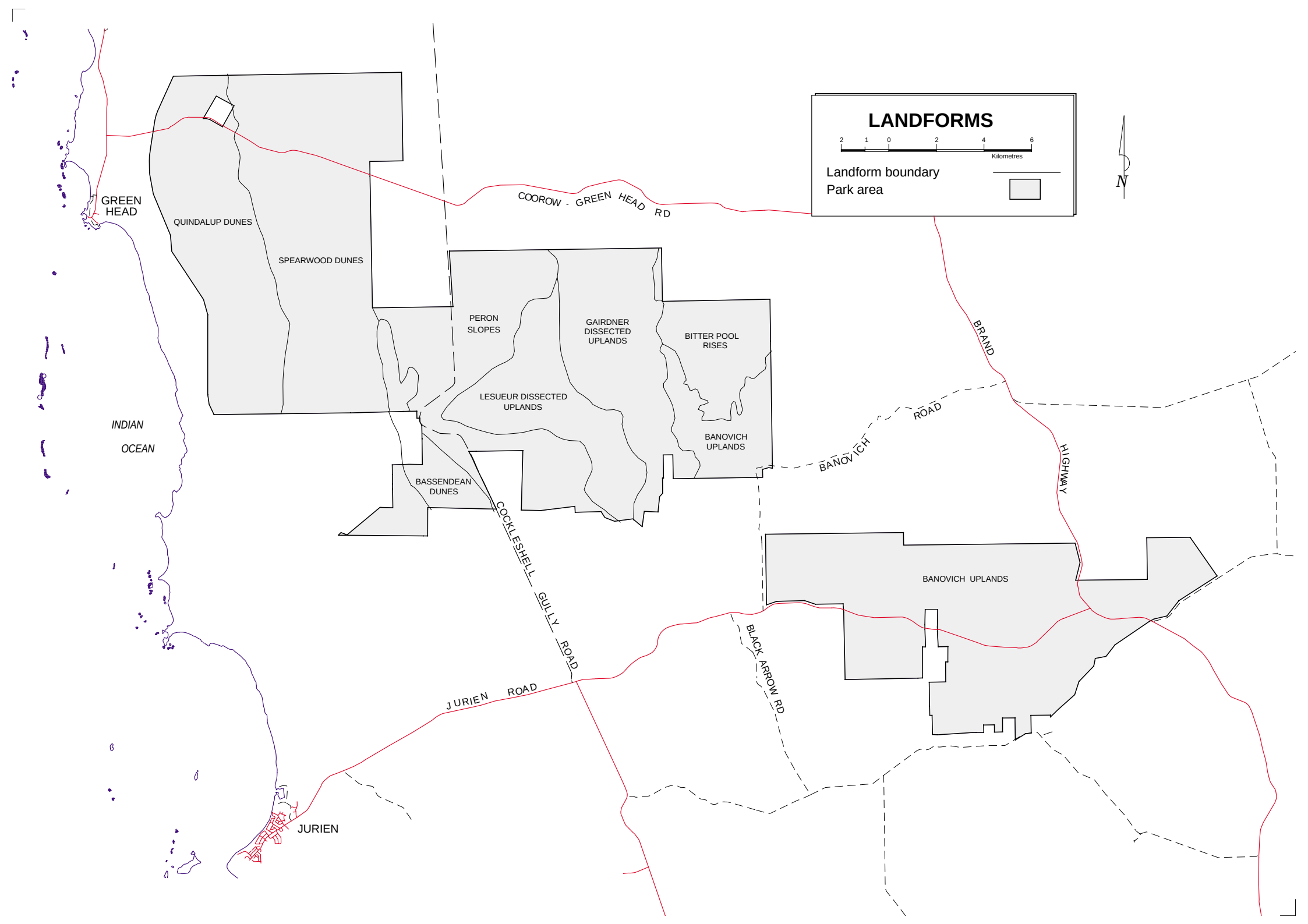
Deeper sub-surface rocks include sedimentary units that range in age from the Early Permian Nangetty Formation (280-285 million years old) to the late Jurassic Yarragadee Formation (150-185 million years old). A complex system of predominantly north-south trending faults defines the sub-surface structure. This structure is the result of a number of tectonic events that controlled the evolution of the Perth Basin, and the eventual shape of the present geomorphology. The rise of a basement ridge (Beagle Ridge) near the coast has eroded younger rocks leaving older rocks such as the Kockatea Shale closer to the surface. Further west, a series of faults lead into a deeper basement where younger rocks such as the Yarragadee Formation are preserved.

The majority of the landform units are sandstone with minor amounts of siltstone and clay. The Eneabba Formation and to a lesser extent the Cattamarra Coal Measures and Cadda Formation have significant amounts of the finer sediments.

The Eneabba Formation and Cattamarra Coal Measures (both formally part of the Cockleshell Gully Formation) have been extensively eroded exposing a wide variety of rock types in weathered and partially weathered states. Relatively few outcrops of the Lesueur Sandstone and the Yarragadee Formation occur, these being mainly covered by laterite, colluvium and some alluvium. The Kockatea Shale is entirely covered by the coastal Pleistocene and Holocene sediments.

The Hill River Coalfield, which underlies the eastern portion of the Lesueur National Park, contains an estimated resource of 366 Mt of sub-bituminous coal. Other resources within the Park include limestone and limesand in the Tamala Limestone formation and Safety Bay Sand. Both Lesueur National Park and Coomallo Nature Reserve are prospective for petroleum, natural gas and condensates.

Many caves and karst features occur in the area associated with the Tamala Limestone. These features include subterranean drainage through caverns and tunnels, dolines and sinkholes. The caves are generally small in size and have little, if any, potential for development as tourist attractions. A detailed inventory of caves and karst features has not been conducted.


LANDFORMS
2 1 0 2 4 6
Kilometres
Landform boundary
Park area
N
GREEN HEAD
QUINDALUP DUNES
SPEARWOOD DUNES
COOROW - GREEN HEAD RD
PERON SLOPES
GAIRDNER DISSECTED UPLANDS
BITTER POOL RISES
LESUEUR DISSECTED UPLANDS
BANOVICH UPLANDS
BASSENDEAN DUNES
BRAND HIGHWAY
BANOVICH ROAD
INDIAN OCEAN
COCKLESHELL GULLY ROAD
BANOVICH UPLANDS
BLACK ARROW RD
JURIEN ROAD
JURIEN

Many aspects of the Park's and Reserve's geology are of particular significance, with the exposure of a wide range of sedimentary rock types being the most important. Others include the exposed fault zones, the scattered occurrences of fossilised wood, the Holocene shell beds and the saltlake deposits.

Landforms and Soils
Playford *et al*. (1976) described two physiographic regions covering the Lesueur and Coomallo areas, the Swan Coastal Plain and the Arrowsmith Region. Griffin and Burbidge (1990) recognised nine landforms in the Lesueur National Park (Table 2). Although the Coomallo Nature Reserve has only one of these units (the Banovich Uplands), it has a range of landforms typical of the Arrowsmith Region (Table 3).

The deep weathering and laterite formation followed by differential erosion has provided a variety of soils, especially in Lesueur National Park. These too are briefly described in Tables 2 and 3.

The most significant aspect is the diversity of landforms and soil types present, especially in the eastern section of Lesueur National Park, and their associated endemic flora.

STRATEGIES

1. **Provide interpretive material to visitors on the geology, landforms and soils of the area. (H)**

2. **Design recreation sites that avoid special geological features and landforms, or consider their significance during the design phase to minimise the impact of development. (M)**

3. **Identify special and fragile geological features and landforms. (L)**

4. **Encourage further research into the geology and geomorphology of the area. (L)**

5. **Liaise with speleologist groups regarding management operations likely to impact on karst features. (L)**

6.2 Water Catchments and Hydrology

The objective is to protect and conserve the quality and quantity of surface water and groundwater.

Surface Hydrology
The drainage pattern in the Lesueur area is intricate and complex. It appears that significant changes to the drainage patterns have occurred since the Pleistocene. Some of the ancient drainage lines have been truncated and, in some, the flow appears to have been reversed. The youthful patterns are a product of rejuvenation.

Five distinct systems drain the Lesueur National Park and Coomallo Nature Reserve. Cockleshell Gully, Stockyard Gully and Munbinea Creek all rise in the National Park. They all have youthful upper tributaries and flow through broad mature valleys that have narrow incised drainage channels. Coomallo Creek has a number of distinct, upper tributaries that rise in the National Park, the Nature Reserve and farmland to the north-east. An unnamed system flows to the north east. All of these have mature form, however, in places the main trunk valleys are narrow and incised.

The flow in these drainage lines is seasonal, although permanent water occurs in some pools. Neither Cockleshell Gully nor Stockyard Gully discharges into the sea. The former flows into salt lakes and the latter into a cave and, it is believed, eventually into the sea via an underground route. Hill River flows into the sea south of Jurien.

The drainage lines of the National Park are extremely significant because of their undisturbed state and their isolation from drainage originating in farmland. These are invaluable as benchmark catchments for hydrology studies.

Groundwater
The four major aquifers in the region are associated with the Tamala limestone, the Lesueur Sandstone, the Cockleshell Gully Formation (Cattamarra and Eneabba units) and the Yarragadee Formation (see 6.1 Geology, Landforms and Soils).

The coastal limestone forms an unconfined aquifer that is recharged by percolating rainfall and probably by upward leakage of the underlying Lesueur Sandstone (Harley, 1975). The aquifer is important as a source of potable groundwater to the towns along the coast.

The Lesueur Sandstone and the Cockleshell Gully Formation form multi-layered aquifers that are recharged by percolating rainfall. The Lesueur National Park is an undisturbed groundwater recharge area for these formations. While it is possible to produce more low-salinity groundwater from the Lesueur Sandstone, the water from Cockleshell Gully aquifer is mainly suitable for stock and industrial purposes.

The most extensive aquifer in the region is formed by the Yarragadee Formation which contains a large resource of low-salinity groundwater. Located west of the Dandaragan Scarp, this aquifer is recharged by percolating rainwater and, if developed sensitively, could support a major water supply.

STRATEGIES

1. **Limit the abstraction of groundwater to use within the Park. (H)**

2. **Investigate the likely impacts of providing a water supply for fire-fighting, dieback washdown facilities and drinking. (H)**

3. **Design recreation sites to minimise impact on water catchments. (H)**

4. **Confer with the Water Authority of Western Australia to ensure that Park management does not detrimentally affect groundwater and surface water supplies. (M)**

5. **Encourage research into the hydrology of the Park and Reserve and the impacts of management practices on surface and groundwater. (L)**

6. **Consider the catchments of the Park as natural benchmarks for catchments in the region. (L)**

6.3 Vegetation[2]

The objective is to protect and conserve native plant communities.

Beard (1976, 1979) produced broad scale vegetation maps covering the Lesueur National Park and Coomallo Nature Reserve. Blackwell and Griffin (1981) mapped part of the Park. Griffin (1982) and Martinick and Associates (1988) produced detailed vegetation maps for the eastern part of the Park and a very minor part of the Reserve.

A great variety of structural types occur in the Lesueur area, comprising numerous floristic types. Some of Australia's most complex vegetation patterns occur here. The principal formations are woodlands, shrublands and heaths; the area also includes sedgelands and occasional herblands. Taken together, the various shrubland formations are the most extensive, often intermingling to form a complex, fine-scale mosaic.

The vegetation descriptions in Table 2 are extracted from Griffin and Hopkins (1990).

Coomallo Nature Reserve's vegetation has not been documented in any detail, although Martinick and Associates (1989a) provides some general information that is summarised in Table 3. The majority is low heath varying in composition in response to soil types. Small patches of woodlands on sands or clays are also present, usually in lower parts of the landscape.

The vegetation of the Park's and Reserve's equivalent lateritic upland soil/landform unit have been shown to be significantly different in floristic composition (e.g. Griffin and Hopkins, 1990). A number of recent studies (Griffin and Keighery, 1989; Griffin, 1990, 1992, 1993) have concluded that the underlying geology is an important factor influencing the regional variation in composition of the vegetation. It should, therefore, be concluded that the Reserve is important in representing vegetation on the Yarragadee Formation.

Monitoring plots have been established at locations with major vegetation communities. These plots will provide useful benchmarks for future research, particularly in relation to monitoring the response of plants to fire or climatic change.

STRATEGIES

1. **Identify plant communities that are rare, unique or in some way warranting special consideration. (H)**

2. **Design facilities and management practices that minimise adverse impacts on these values. (H)**

3. **Protect vegetation from *Phytophthora* dieback with emphasis on regionally rare communities. (H)**

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

5. **Minimise removal or damage to vegetation caused by developing and maintaining visitor facilities. (M)**

6. **Provide visitors with information on the area's vegetation, its features and the need to protect it. (M)**

7. **Use the established monitoring plots as reference areas for further research and monitoring. Monitor to determine the longer term responses by plants to fire and other impacts. (M)**

8. **Research the response of plant community types to management regimes, especially fire. Modify management practices as necessary. (L)**

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2 Vegetation refers to plant communities and their structure while flora refers to the plant species present.

3 Vegetation refers to plant communities and their structure while flora refers to the plant species present.

Table 2.
LANDFORMS, SOILS AND VEGETATION ASSOCIATIONS OF LESUEUR NATIONAL PARK

Landforms and Soils (see Map 4)	Vegetation Associations
Quindalup Dunes Holocene shorelines and dunes with mainly calcareous sand and acid peaty soils in swales behind dunes.	Low heath dominated by *Melaleuca acerosa* and *Acacia lasiocarpa* on dunes; taller shrubs such as *Acacia rostellifera*, *Melaleuca cardiophylla* and *M. huegelii* in interdunal areas.
The Salt Lake Complex Saline lakes with shallow gypsiferous and calcareous deposits over aeolinite; freshwater springs and swamps on eastern margin.	*Casuarina obesa* and *Melaleuca lanceolata* trees on fringe; samphire prominent on lake margins, in some cases completely covering the lake bed.
The Spearwood Dune System Pleistocene coastal dunes lithified in places forming Pinnacles or Tombstones; soils are mainly grey and yellow siliceous sand with small areas of brown sand and leached sand in the wetter sites; dunes underlain by aeolinite; numerous caves developed in this limestone.	Low heath of *Acacia spathulifolia* and *Jacksonia spinosa* with *Dryandra sessilis* being a common emergent; deeper sand with dense low heath of *Banksia leptophylla* and *Calothamnus quadrifidus* or low woodland of *Banksia prionotes* with low shrub understorey. Small woodlands of illyarrie (*Eucalyptus erythrocorys*) occur in the presence of exposed limestone; areas of alluvium near Cockleshell Gully support *Acacia rostellifera* thickets alone or in association with *Eucalyptus rudis* woodlands.
The Bassendean Dune System Pleistocene shoreline deposit comprising dunes with some small swamps; products of the deflated Gingin Scarp have contributed to this subdued dune-swale system; soils are leached siliceous sands with an organically enriched surface layer; a compacted or pan-like layer may be present near the surface.	*Banksia* low woodlands typical of the Bassendean Dunes occupy only a minor portion of the Lesueur area; small patches of dense heath occur along an ephemeral drainage line; extensive areas of low heath typical of the colluvial sand and gravel of the adjacent Peron Slopes also occur.
Peron Slopes Complex of laterite, sand and colluvium typical of much of the Arrowsmith Region outside the National Park; elevated hills have shallow, gravelly sand soils with lateritic gravel on upper pediments and backslopes; bleached sand with gravel pans are common on lower margins where colluvial quartz sand have accumulated over lateritic materials.	Low heath formations dominate; *Xanthorrhoea drummondii* indicates presence of lateritic gravel at or near surface; common species include *Allocasuarina humilis*, *Calothamnus sanguineus*, *Hakea conchifolia* and *Lambertia multiflora*; *Banksia candolleana* very common in shallow sand while deeper sands support *Adenanthos cygnorum* and shrub forms of *Banksia attenuata* and *B.menziesii.*
The Lesueur Dissected Uplands Landform includes prominent breakaway slopes of Cockleshell Gully; sandstone and siltstone of the Lesueur Sandstone are exposed in places; breakaways are up to 100 m high and, together with the flat-topped mesas, flank the mature U-shaped Cockleshell Gully; soils are mainly shallow colluvial sand and gravel with some areas of yellow, sandy clay over weathered sandstone.	Heath up to 2 m tall on tops of mesas; low heath about 0.5 m tall on slopes; similar combination of heath species as the Peron Slopes on sand, but areas of deeper sand support low trees of *Banksia attenuata*, *B. menziesii* and *Eucalyptus todtiana*; alluvial deposits support low heath of *Verticordia densiflora* and *Calothamnus hirsutus*; coarse, sandy drainage channels have distinct flora dominated by *Eucalyptus rudis*, *Melaleuca rhaphiophylla*, *Acacia saligna* and *Jacksonia sternbergiana;* yellow sandy clay or mottled sandy clay support several vegetation types, including heaths of *Hakea neurophylla*, *H. undulata*, *Petrophile chrysantha* and other species.

Landforms and Soils (see Map 4)	Vegetation Associations
Gairdner Dissected Uplands Margins frequently formed by steep cliff faces and breakaways, hills and ridges of resistant sandstone; dissected laterite-capped hills and youthful valleys are feature of this area; soils vary considerably in their morphology: uplands have shallow lateritic gravel and duricrust with few areas of grey or yellow sand; shallow stony brown siliceous sand occur on sandstone ledges and ridges and, in lower areas, there is complex of soils ranging from duplex soils to yellow massive earths and brown, mottled cracking clays associated with sink holes and gilgais; some tunnel erosion occurs near incised drainage lines.	Dominant species on clayey soils include *Calothamnus quadrifidus*, *Melaleuca platycalyx*, *Petrophile seminuda* and *Hakea erinacea*; Marri (*Eucalyptus calophylla*) occurs as scattered trees and occasionally as open woodland. *Eucalyptus wandoo* woodlands occur with an understorey of *Trymalium floribundum* and *Grevillea thelemanniana* ssp. *delta* in areas with rejuvenated drainage in steep V-shaped gullies, or with *Melaleuca undulata*, *M. uncinata*, *Thomasia foliosa* and *Baeckea camphorosmae* on flatter slopes. *Banksia tricuspis*, sometimes accompanied by *Eucalyptus drummondii*, forms a scrub heath on the bare sandstone; *Calothamnus quadrifidus* dominates narrow drainage lines where they pass through clayey areas; narrow stands of *Melaleuca hamulosa* usually fringed by *M. platycalyx* occur where drainage lines are less deeply incised; sandy drainage lines are dominated by *Melaleuca* aff. *acerosa*, and when these are wider, *M. rhaphiophylla* and *Eucalyptus rudis* become common.
The Banovich Uplands Old undulating lateritic uplands, including mesas, cuestas, and their slopes; mature U-shaped valleys with their sandy flanks are prominent; elevated hills have shallow gravelly sand soils with lateritic gravel on upper pediments and backslopes; bleached sand with gravel pans are common on lower margins where colluvial quartz sand has accumulated.	Lateritic Heath and Sand Heath are principal vegetation types; laterites of Banovich Uplands are main area for *Hakea megalosperma* and *Acacia teretifolia*; extensive areas of *Banksia* woodlands occur; sand heath dominated by *Eremaea beaufortiodes* and *Hakea obliqua* are mainly confined to these uplands; drainage lines support low heath of *Verticordia densiflora* and open woodland of *Melaleuca preissiana*.
The Bitter Pool Rises Gently undulating landscape of low hills and rises with few prominent upland areas; landform is unique representing a mature U-shaped valley with clayey soils; unusual also because it is probably a drainage line which has had its direction of flow reversed in response to the tectonic adjustments in the central part of the Perth Sedimentary Basin; gravelly yellow duplex soils, generally loamy and hard setting, occur on the low hills and rises; sink holes and gilgais have developed with a complex of soils including yellow duplex soils, yellow massive earths and brown, structured cracking clay on lower slopes, and in broad drainage lines.	Common species include *Calothamnus quadrifidus*, *Petrophile seminuda* and *Melaleuca platycalyx*; the presence of *Melaleuca uncinata* emerging from an area usually dominated by *Calothamnus quadrifidus* is indicative of very clayey pockets; Marri occurs mainly as stunted tree-mallee form except along the slopes of slightly incised drainage lines where it occurs as trees; heaths of *Melaleuca hamulosa* are interspersed with sedges in broad drainage lines; lateritic heath of *Eucalyptus drummondii* and *Dryandra* aff. *patens* (E.A. Griffin 1507) are not represented on any other lateritic upland in the Park.

Source: Griffin and Hopkins, 1990.

Table 3.
LANDFORMS, SOILS AND VEGETATION ASSOCIATIONS OF COOMALLO NATURE RESERVE

Landforms and Soils	Vegetation Associations
• Uplands with lateritic duricrust or gravel containing mesas, cuestas and breakaways with shallow, gravelly sand.	Mixed low heath, *Eremaea violacea* lateritic heath and *Dryandra carlinioides* lateritic heath.
• Saddles with bleached sand.	Low scrub heath of *Adenanthos cygnorum* and *Stirlingia latifolia*.
• Rounded crests of hills and low rises with gravelly yellow massive earths, and gentle colluvial slopes with yellow duplex soils.	*Gastrolobium spinosum* scrub, *Dryandra* aff. *falcata* heath, and *Eucalyptus calophylla* and *Hakea trifurcata* scrub on gravel.
• Benched pediment slopes, eroded lower slopes with bleached, yellow duplex soils.	Woodlands of *Eucalyptus wandoo* and *E. accedens*.
• Lower colluvial slopes and broad, sandy valleys with bleached sand.	Low woodland of *Eucalyptus todtiana* over *Hakea obliqua* heath and *Stirlingia latifolia* heath. Mixed sand heath with *Banksia candolleana* and *B. grossa.*
• Undulating valley floors with gravelly duplex soils and brown, structured cracking clay.	Low heath of *Allocasuarina campestris*.
• Drainage line slopes and floors with bleached sand and mottled duplex soils.	Low heath of *Melaleuca hamulosa* and *Hypocalymma angustifolium*.

Source: Martinick and Associates, 1989a.

6.4 Flora[4]

The objective is to protect and conserve indigenous flora, especially threatened and other priority species.

James Drummond first collected flora from the Lesueur-Coomallo area in 1850, noting the area's exceptional richness, particularly the proteaceous genera and locally endemic species. Subsequent collections this century by C.A. Gardner (1944, 1947) and N.H. Speck (1958) confirmed Drummond's observations.

A comprehensive study of the flora and vegetation of Lesueur was started by A.J.M. Hopkins and E.A. Griffin in the late 1970s and preliminary data were provided by George *et al*. (1979), Hopkins *et al.* (1983), Hopkins and Griffin (1984) and Griffin and Hopkins (1985). The first full list and analysis of the flora of the whole Lesueur area was provided by Burbidge *et al*. (1990). The area ranks as one of the three most important areas for flora conservation in southern Western Australia (the other two areas being the Stirling Range and Fitzgerald River National Parks).

Griffin and Hopkins (1990) report that the total number of flowering plant taxa at 821, represents about 10% of the State's known flora and a third of the taxa in the Irwin Botanical District. The 821 taxa belong in 268 genera and 76 families of which the Proteaceae, Myrtaceae and Papilionaceae are the richest in species. Genera with the most species are *Acacia* (33 species), *Stylidium* (22), *Hakea* (21) and *Melaleuca* (21). More recent work has revealed 40 more plant taxa and this figure will undoubtably increase as further work progresses.

The majority of geographically restricted and endemic taxa in the northern kwongan occur in the Arrowsmith Physiographic Region and are concentrated in the Lesueur and Eneabba areas. Many of these await formal description. Additionally, an exceptionally high number of plants reach their northern or southern limit in the area, many of which have disjunct distributions. The Lesueur National Park contains 111 regionally endemic taxa, most of which occur in the eastern part, nine endemic taxa and seven declared rare flora (DRF)[6]. An area of moderate richness occurs south-east through Coomallo Nature Reserve down towards Badgingarra, and east of the Brand Highway towards Alexander Morrison National Park.

A number of species at Lesueur appear to have no close relatives and may be relicts from periods when the climate was wetter (Griffin and Hopkins, 1985). Very little assessment of these species has been done, but studies on the Cork Mallee (*Eucalyptus suberea*) (Brooker and Hooper, 1986; Ladiges *et al*.,

4 Flora deals with plant species.

5 Flora deals with plant species.

6 The term 'declared rare flora' is used to mean any plant taxon that is threatened with extinction and declared by the Minister for the Environment under the Wildlife Conservation Act as 'rare flora', i.e. 'is likely to become extinct or rare or otherwise in need of special protection.'

1987; Chippendale, 1988) indicate that this is an isolated taxon that presumably arose early in the evolution of the Western Australian eucalypts, possibly when much of south-western Australia was covered by subtropical rainforest (Hopper, 1979).

The number of known DRF in the Lesueur area may change given that 54 additional taxa are on CALM's Priority List[7] for urgent further survey to assess their status. With the exception of *Banksia tricuspis*, the genetics, population biology and recruitment of all Lesueur's DRF have yet to be investigated in detail. A priority order for urgent further survey has been developed for most of the taxa on the priority list that occur in the Lesueur area. Mapping of these plants is considered the top priority for future work aimed at documenting the area's flora conservation values. If genetic management, relocation and revegetation are required for endangered populations then chromosome studies in certain groups is an essential prerequisite.

Coomallo Nature Reserve's flora has not been studied in the same detail as has Lesueur's, although Bell and Loneragan studied a small area in 1985. It is clearly not as rich as Lesueur because of the lower geological and landscape diversity. Unpublished data by E.A. Griffin show that the combined area of Coomallo and Mt Benia have at least 500 vascular plant species. Many, but not all of these, are shared with Lesueur, including several DRF.

STRATEGIES

1. **Protect DRF, locally endemic and other priority flora, particularly those susceptible to plant diseases and vulnerable to fire management regimes. (H)**

2. **Survey areas for DRF and priority flora before undertaking management actions. (H)**

3. **Encourage research on the area's priority flora, including distribution mapping, responses to disturbance, reproductive biology and taxonomy. (M)**

4. **Provide opportunities for visitors to increase their knowledge and develop an appreciation of the area's flora, including appropriate walk tracks, a field herbarium and interpretive material. (M)**

[7] CALM's Priority List is a list of flora that either is poorly known and in need of survey to determine their conservation status (Priority 1, 2 and 3), or known to be rare but not threatened (Priority 4). See Appendix 3.

6.5 Fauna

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

Lesueur National Park and Coomallo Nature Reserve's fauna has not been studied in detail. The only published biological surveys are of a vertebrate survey of the western parts of the area by the Western Australian Museum in 1973 and 1974 (Chapman *et al.* 1977) and an ecological study of the heathlands of the Leeman area by the W.A. College of Advanced Education, Claremont Campus, in 1981 and 1982 (Foulds and McMillan, no date). The biology of the Ash-grey Mouse, *Pseudomys albocinereus*, was studied in some detail at Lesueur National Park by Morris (1981) and Morris and Bradshaw (1981).

Some additional data are available from unpublished studies from universities and by consultants commissioned by the companies exploring the coal deposits in the area, and from other studies on specific species (Burbidge *et al.* 1990).

The fauna of Coomallo has not been studied to a great extent to date. It is expected, however, that it would have much in common with Lesueur. In particular, many mobile fauna would use both areas. The major difference would be the fauna that are presently restricted to particular vegetation types found only in Lesueur landforms such as salt lakes, limestone and sandstone outcrops, and steeply dissected valleys.

Mammals

Fifteen species of indigenous mammals including four species of bat have been recorded. None has been declared 'rare or likely to become extinct' or 'in need of special protection' under the Wildlife Conservation Act, and none has restricted distributions. The bat fauna is under-sampled and, based on known distributions, another three species may be present.

Of particular interest is the occurrence of three (possibly four) species of *Sminthopsis* (Dunnarts) at Lesueur. *Sminthopsis granulipes* has a restricted range in the south-west of Western Australia, and in the northern kwongan is restricted to an area bounded by Moora, Three Springs, Eneabba, Lesueur and Badgingarra. The taxonomy of the *Sminthopsis murina* species complex is not clear and the records of both *Sminthopsis griseoventer* and *S. dolichura* at Lesueur require further investigation.

The occurrence of recent fossil mammal deposits in nearby caves is an important feature of the Lesueur National Park. Chapman and Kitchener (1977) only recorded six of the 18 species identified in cave deposits during their survey of the Cockleshell Gully area. Some of the locally extinct species,

such as Woylie, Chuditch, Mardo, Dibbler, Quenda, Western Mouse and Heath Rat, still occur in other parts of the south-west and could be reintroduced if foxes and cats could be controlled, suitable fire regimes were maintained and the area was kept free of *Phytophthora*.

Eight introduced mammal species have been recorded (see 7.3 Introduced Animals). In common with most of Western Australia, house mice, cats and foxes are abundant.

Birds

Lesueur National Park has a very rich bird fauna with 122 indigenous and two introduced species. This is partly due to the wide range of habitats present, but also to the relatively large area of bushland and its relatively undisturbed condition. An additional 30 species of birds have been recorded along the coastline (Dell and Johnstone, 1977).

The area is particularly rich in bird species of the kwongan, such as honeyeaters, thornbills, fairy-wrens, Southern Emu-wren, White-browed Scrub-wren, and Calamanthus. It is probably the only place where four species of Fairy-wren (*Malurus*) occur together in the same kwongan formations.

Carnaby's Black Cockatoo has declined considerably in both abundance and range since European settlement. It is specially protected under the Wildlife Conservation Act, and may be declared 'endangered' if habitat loss continues. The species depends on both the heathlands and the woodlands, the former for food and the latter for nest sites and shelter. It also requires access to free water. Nesting occurs only in nest hollows of particular dimensions and at Lesueur these are generally confined to *Eucalyptus wandoo* woodlands (Saunders 1979, 1980, 1982; Saunders and Ingram 1987). In the Lesueur - Eneabba area, only a few pockets of woodland occur that satisfy the requirements for successful breeding, and the woodlands to the east of Lesueur are one of the four most important.

Other hollow-nesting species that depend on the wandoo woodlands are the Long-billed Corella (Saunders 1977, 1979), Galah, Regent Parrot (now an uncommon species), Western Rosella, Port Lincoln Ringneck, Barn Owl, Boobook Owl and Australian Owlet-nightjar. The population of Western Rosella in Lesueur is now isolated and is the last remaining population in the northern Wheatbelt (Mawson and Long, 1994).

The Lesueur area is home to several species at or near their northern range limit, a few at their southern limit on the mainland, and also isolated populations of species such as the White-breasted Robin. This reflects the area's biological importance, its value as a refuge, and its value in studies of factors that limit distribution.

The salt lakes are important summer refuges and feeding places for several species of waterbirds, including resident and migratory wading birds covered by the Japan - Australian and China - Australia Migratory Birds Agreements. The freshwater springs flowing into the salt lakes are especially important, since they provide drinking and feeding places for species that cannot survive on salt water alone, and other species that utilise the salt lakes for food. They are also important breeding places for species that require dense rushes or reeds.

Reptiles

Lesueur National Park's reptile fauna is a rich one. Forty-eight reptile species have been recorded in (or immediately adjacent to) the Park, and 14 additional species have been recorded in nearby, comparable areas of the northern kwongan. Lesueur National Park is particularly rich in geckoes (nine species) and legless lizards (six species).

The Lesueur area contains several taxa with limited geographic ranges, and several species at the northern or southern limit of their ranges. Some are known only from one or a few landforms, while others may be restricted to special habitats. It is the only place where three species of the *Diplodactylus vittatus* group (*granariensis*, *ornatus* and *polyophthalmus*) occur together, and it provides an opportunity for evolutionary and ecological studies of this group. The population of *Diplodactylus polyophthalmus* is a disjunct one as its main distribution range is from the Stirling Range to the Darling Range. The skink lizard, *Lerista christinae*, has a very restricted range and is only known from Badgingarra National Park and Rottnest Island. It is currently on the Reserve List.

Populations of the Woma python (*Aspidites ramsayi*), a species declared in need of special protection under the Wildlife Conservation Act, may also occur in the Lesueur-Coomallo area where large areas of its habitat can be found. The only recent records in the northern kwongan are from near Badgingarra and Yandanooka in the 1960s and from near Gunyidi in 1989.

Amphibians

The frog fauna known from the Lesueur-Coomallo area is not rich in species and is typical of that of the northern kwongan. Nine species have been recorded, none of which are rare or geographically restricted. The Lesueur National Park is near the northern limit of the range of *Heleioporus eyrei*, and *Ranidella pseudinsignifera* occurs as an isolated population at the northern end of its range.

Terrestrial Invertebrates

The only published study on the invertebrate fauna of the Lesueur National Park is that of the W.A. College of Advanced Education in 1980 and 1981 (Foulds and McMillan n.d.). They worked along the Coorow - Green Head Road and recorded 463 species of invertebrates, including 29 species of jewel

beetle, during two brief surveys. Jewel beetles are 'threatened fauna' and are fully protected.

Many close associations exist between the large number of endemic plants of the northern kwongan and insects and other invertebrates, and many invertebrate species are likely to be unique to the area. For example, the Arrowsmith Spider Orchid (*Caladenia crebra*) can only be pollinated by an undescribed thynnid wasp. The terrestrial mollusc *Bothriembryon perobesus* is restricted to the northern kwongan, and the native bee *Leioproctus tomentosus* is restricted to flowers of *Conospermum crassinervium* which grow between Eneabba and Gingin. Other insects of restricted distribution include the undescribed lycaenid butterfly *Ogyris* sp. and the skipper butterfly *Croitana croites* (W.A. Museum, pers. comm. in Burbidge *et al.*, 1990).

Aquatic Invertebrates
The only data available on aquatic invertebrates are from a brief October 1988 survey carried out by Streamtec Ecological Consultants (1988) for Martinick and Associates.

One hundred and four macro-invertebrate taxa were recorded during their study. The most diverse group was the Coleoptera, principally the Dytiscidae (water beetles), with 36 species from four families. The Chironomidae (midges) comprised a combination of stream and pool species. Three species found have not been recorded previously and are probably new to science. Evidence shows that Koonacs (*Cherax plebejus*), a south-west endemic threatened by both habitat destruction and competition from the introduced yabbie (*C. destructor*) can be found.

The very large number of predators found in Lesueur indicates systems that are drying up and is a warning that it is not a typical fauna that was sampled. The biological significance of Lesueur's streams needs to be assessed, which requires sampling in all seasons, including summer after heavy rainfall.

STRATEGIES

1. **Identify and protect the habitats of significant vertebrate and invertebrate fauna. (H)**

2. **Design facilities and management practices to accommodate these values. (H)**

3. **Monitor fauna in Lesueur National Park and Coomallo Nature Reserve.(M)**

4. **Encourage research to identify the key terrestrial and aquatic invertebrate fauna, with emphasis on those most likely to be rare or threatened. (M)**

5. **Provide interpretive material to visitors on the fauna of the Park and Reserve. (H)**

6.6 Cultural Heritage

The objective is to protect and conserve the Park's and Reserve's cultural heritage and values.

Aboriginal History
The Lesueur-Coomallo region did not appear to support a large, permanent Aboriginal population because of the lack of a reliable water supply. The area was renowned for its dryness even among early European settlers who avoided the rugged terrain. It was common for Aboriginal people from further inland to frequent the coastal sandplain for a time each summer, and evidence of small groups were found near partially dried up watercourses by early settlers (O'Connor *et al.*, 1989).

Only one Aboriginal site has been registered for Lesueur National Park and Coomallo Nature Reserve with the Department of Aboriginal Sites of the Western Australian Museum. However, because a comprehensive study of the whole area has not been conducted, other sites may exist. These would most likely be small, quartz dominated, surface artefact scatters near water sources or along creeklines. Such water sources should be considered as potentially significant. A midden artefact scatter is known to exist in the Jurien Bay area and a number of caves in the Gairdner Range are known to contain paintings. A number of springs in the vicinity of Hill River are likely to be associated with a Wagyl mythic water serpent (O'Connor *et al.*, 1989).

All Aboriginal sites are protected by the Aboriginal Heritage Act (1972-80) regardless of whether they are known or not to the Western Australian Museum. Section 17 of this Act makes it an offence to alter an Aboriginal site in any way without written permission from the Minister for Aboriginal Affairs.

European History
Mt Lesueur was first observed and named from the sea by French explorers on the corvette *Naturaliste* in June 1801. Charles-Alexandre Lesueur was a topographical and natural history artist on the expedition and subsequently worked closely with the expedition's naturalist, François Péron, after whom Mt Peron is named. More recently, a third prominent hill near Mt Lesueur has been named Mt Michaud after André Michaud, botanist-gardener on the *Naturaliste*.

Europeans led by G. Grey first traversed the Lesueur area in 1839, and a party led by A.C. Gregory ascended Mt Lesueur in 1849. During this time, Gregory found exposed coal along Munbinea Creek. From 1850 onwards, Lesueur was avoided by travellers and pastoralists because of its rugged

terrain and the abundance of poisonous plants (*Gastrolobium* spp.). 1850 was also the year that the Lesueur area was first explored by botanist, James Drummond, who was delighted to find a rich flora with many plants new to science. Drummond's son, James Drummond Jr, took out a lease near Munbinea on the Hill River as well as an extensive lease at Dandaragan. These two leases provided convenient bases for James Drummond Snr to explore the area's plants and animals. He was able to describe many of the plants of the Mt Lesueur area in detail.

In 1855, Walter Padbury took out a lease at Cockleshell Gully, which was managed by William Bashford in the 1860s, and then by Padbury's wife's nephew John Grigson from 1869 onwards. The Grigson family is still there today.

The establishment of Padbury's and Drummond's pastoral leases on the major route between Perth and Geraldton meant that the Lesueur area was thoroughly explored by the end of the 1850s. It was neglected by all but a few bushmen and botanists for the next 100 years. The Stock Route around the south and west sides of Mt Lesueur was officially gazetted in 1889 at the instigation of Alexander Forrest, and a reserve for horse breeding in the Mt Peron-Cockleshell Gully area was gazetted in 1913.

The Lesueur area was prominently featured in a Ph.D. study by N.H. Speck of the University of Western Australia in 1958 in which he proposed a new Lesueur Botanical District because of the distinctive vegetation, landforms and soils of the area. Speck was the first to describe the Lesueur Vegetation System and he strongly urged the creation of a national park. Since the early 1970s, the area has been visited by an increasing number of botanists, naturalists and bushwalkers, as well as employees of mining and petroleum exploration companies.

STRATEGIES

1. **Protect all known Aboriginal sites and other historic sites of significance.(H)**

2. **Incorporate information on the European and Aboriginal history of the area into interpretive material (see section 15.0 Information, Interpretation and Education). (H)**

3. **Liaise with local Aboriginal communities on the significance of the Lesueur-Coomallo area to Aboriginal people. (L)**

4. **Encourage the study of the area's cultural history by tertiary institutions and interested individuals. (L)**

6.7 Landscape Management

The objective is to protect and restore the Park's and Reserve's visual 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 fauna, flora, water and recreation. In this context, the term 'landscape' refers to the appearance or visual quality of an area as determined by its geology, soils, landforms, vegetation, water features and land use history.

The identification and description of what are termed Landscape Character Types (LCTs) is central to the methodology employed by CALM in assessing visual landscape values. The Geraldton Plains Landscape Character Type covers the area including Mt Lesueur and the other nearby peaks, slopes and drains of the Gairdner Range (CALM, 1994).

The landscape encompassed by the Park and Reserve is of major regional significance and importance. The Gairdner Range contains some of the highest and most scenically attractive landforms within the Geraldton Plains Landscape Character Type. Only the Morseby Range north and east of Geraldton contains topography of comparable scenic appeal. West of the Gairdner Range, a line of outer reefs and small islands and an extensive chain of salt lakes that run parallel to the coastline provide added visual interest to the landscape character.

The Geraldton Plains LCT comprises the Peron Slopes, Lesueur and Gairdner Dissected Uplands, Banovich Uplands and Bitter Pool Rises (see 6.1 Geology, Landforms and Soils, and Map 4).

The Peron Slopes on the western flank of the Gairdner Range are of low to moderate scenic quality. Cockleshell Gully Road dissects this landform unit, and east from this road several narrow sand tracks and firebreaks lead to the escarpment's summit and the uplands beyond. Some of these tracks cut directly across the contour, visually scarring and reducing the intrinsic scenic quality of these largely unblemished slopes.

Immediately east of the escarpment, the Lesueur and Gairdner Dissected Uplands unfold to reveal a high scenic quality landscape comprising numerous hills, valleys and breakaways. Further to the east and north, portions of the Banovich Uplands and the Bitter Pool Rises are clearly visible. Here the landscape broadens out into a series of low undulating hills, flats and broad valleys of moderate scenic quality.

The diverse landforms and vegetation associations, along with the associated textural and colour

patterns, make the northern kwongan is an area of high scenic appeal. The only visual intrusion on this otherwise pristine landscape is the network of firebreaks and access tracks that crisscross the Ranges. While many are reasonably located, others are situated on steep slopes and extend across prominent viewsheds, partially spoiling what would otherwise be unblemished views.

Along the coastline, the Quindalup Dune System appears as a series of low, sparsely vegetated sandhills. Many of these are unconsolidated and there are several large expanses of mobile dunes.

A chain of salt lakes and swamps are a prominent and attractive coastal feature, particularly when viewed from the Peron Slopes or from on top of the Range. Features such as wave break over the reef, rock stacks and small islands off the coast, provide visual diversity to the landscape in the form of edge and colour contrast.

Adjoining the Park along Cockleshell Gully Road some freehold land has been cleared for grazing, but while some of these developments are visually intrusive, they do not dominate or significantly detract from the natural character of the landscape.

Descriptive criteria termed 'frames of reference' have been established to help in assessing the scenic quality components. While all landscapes have some value, some are of greater scenic attraction and importance than others. To assess such differences, CALM's Landscape Management System recognises three classes of relative scenic quality - High, Moderate and Low. These three classes for various landscape components - landform, vegetation, waterform and land use - are described in Appendix 1.

Broad Scale Landscape Assessment

Landscape management involves maintaining, restoring or enhancing the landscape (including landform, vegetation, waterform), and planning and designing land-use activities and developments so as to provide diverse views in a natural setting. Human-imposed changes to the landscape should be subordinate to the established natural visual character. In accordance with CALM's Landscape Management Classification System, the landscape management preservation objective should be implemented to manage the Park and Reserve. This objective recommends that any landscape alteration should allow for little more than natural change or very low impact changes that are carefully planned to accommodate and/or enhance the Park's and Reserve's special visual qualities. 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.

Table 4 sets out specific guidelines that should be implemented.

Table 4.
LANDSCAPE MANAGEMENT GUIDELINES

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, 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 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's Policy No. 34 (Landscape Management of CALM's Lands and Waters) in all aspects of land management of the Park and Reserve. (O)**

2. **Implement CALM's Landscape Management Preservation Objective in managing the Park and Reserve. (O)**

3. **Implement the landscape management guidelines set out in Table 4. (H)**

4. **Encourage surrounding Shires, other Government agencies and private landholders 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. (L)**

7.0 MANAGEMENT FOR PROTECTION

Protection Goal
Protect the value of resources entrusted to the Department so as to meet, as far as possible, the diverse expectations of the community.

7.1 Plant Diseases

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

Dieback is one of the most important management concerns in the Lesueur National Park and Coomallo Nature Reserve. Dieback is a disease caused by microscopic root-rotting fungi belonging to the genus *Phytophthora*. These fungi are not native to Western Australia and are thought to have been introduced soon after European settlement. The fungi can attack and kill many of our native plants. Some plant communities are affected to such a serious extent that local extinctions of plants and the animals that depend on them may have occurred.

New infections result from autonomous spread downslope via motile fungal spores that move in soil and water and as a result of human activities which move infected soil and root material. It is most commonly spread by the movement of infected soil during earthworks, in mud on the wheels and underbodies of vehicles and on walkers boots.

The Lesueur-Coomallo area is at risk from the disease for several reasons. The area's warm, relatively moist climate favours the production of fungal spores, particularly the five months of winter, which provides time for *Phytophthora* dieback to become established and spread. Harsh summer conditions do not preclude the survival of the fungi once inside plant tissue or in moisture gaining sites in the topography. Soil horizons may impede drainage allowing water to drain laterally spreading the fungus further. Muddy conditions in winter can cause infected soil to stick to vehicles.

The acidic sands of the Bassendean dune system are dominated by highly susceptible species belonging to the families Proteaceae (*Banksia* family), Epacridaceae (southern heath family), Fabaceae (pea family, includes genera such as *Daviesia* and *Jacksonia*) and some Myrtaceae (includes genera such as *Darwinia* and *Verticordia*).

The eastern section of Lesueur National Park contains many vegetation types with high hazard ratings, particularly those found in the Bitter Pool Rises, Gairdner Dissected Uplands, Peron Slopes, Lesueur Dissected Uplands and the Banovich Uplands (see Map 4). These communities are characteristically dominated by susceptible species. These vegetation types occur on a wide range of positions in the landscape, none of which are immune to the disease (Hill, 1990).

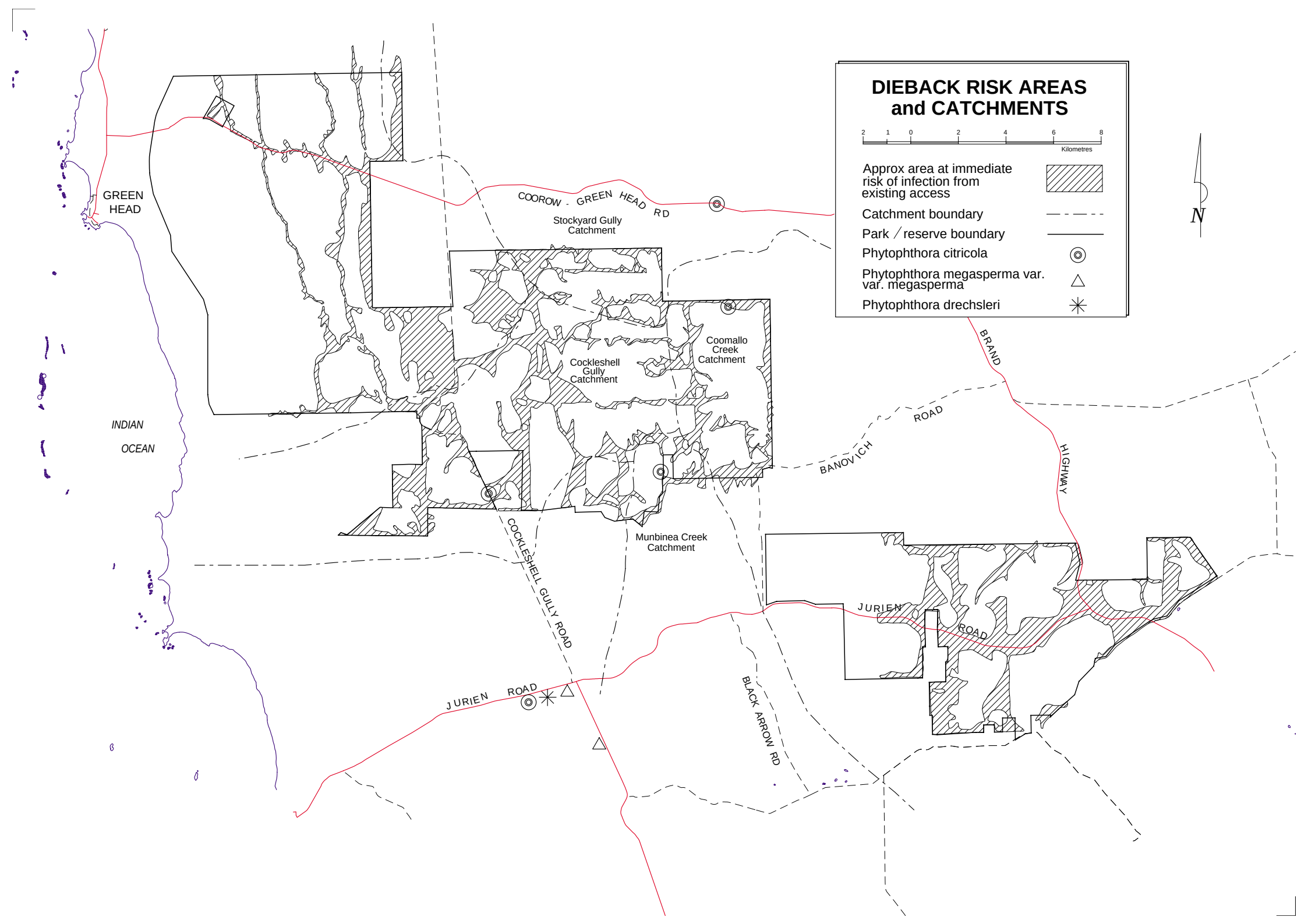
Access to the National Park is generally on gravel roads, some of which are infected and over which CALM has no control. The potential of vehicles carrying dieback and infected soil under wet conditions must be considered high. Uncontrolled access by two-wheel drive and four-wheel drive vehicles presents an unacceptable hygiene risk to the Park.

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 to the Park and to apply stringent disease hygiene to all Park operations.

The Northern Sandplains Dieback Working Party commissioned a major survey in 1990 and a second survey in 1991/2 to determine the distribution of dieback on a regional basis. The Working Party represents CALM, the Department of Minerals and Energy, the Main Roads Department and three mining companies, all of whom have a common interest in managing the disease in the northern sandplains. Seven species of *Phytophthora* were found to occur in the Moora District (see Map 1 for Moora District boundaries). The species of most concern are *P. cinnamomi* and *P. megasperma* var. *megasperma* which prefer wet sites and impact significantly on vegetation. Of slightly less concern is *P. citricola* which is able to establish on drier sites and exhibits variable but usually lower impacts on vegetation (Hart *et al.*, 1992).

No known infections of *P. cinnamomi* occur in Lesueur National Park, but at least three infections of *P. citricola* have been observed. One of these occurs along Cockleshell Gully Road. Incidence of the disease in Coomallo Nature Reserve has not been verified but spot infections of *P. citricola*, *P. megasperma.* var. *megasperma* and *P. drechsleri*, a less common species, have been recorded along the Jurien Road. Intensive surveys are required to detect all infections. Management of *Phytophthora* dieback will be carried out according to CALM's Policy Statement No. 3 (*Phytophthora* Dieback) and the Moora District Dieback Protection Plan (1990). Dieback risk areas (Map 5) identify susceptible areas down slope from existing tracks and these have been used to plan for recreation access (see 10.0 Access and Recreation Sites). The roads servicing and surrounding the Park all exhibit signs of infection at various points.

MAP 5.


DIEBACK RISK AREAS
and CATCHMENTS
2 1 0 2 4 6 8
Kilometres
Approx area at immediate risk of infection from existing access
Catchment boundary
Park / reserve boundary
Phytophthora citricola
Phytophthora megasperma var. var. megasperma
Phytophthora drechsleri
N
GREEN HEAD
INDIAN OCEAN
COOROW - GREEN HEAD RD
Stockyard Gully Catchment
Cockleshell Gully Catchment
Coomallo Creek Catchment
Munbinea Creek Catchment
BRAND HIGHWAY
BANOVICH ROAD
COCKLESHELL GULLY ROAD
JURIEN ROAD
BLACK ARROW RD
JURIEN ROAD

STRATEGIES

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 Reserve. (O)**

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

3. **Implement a program of opportunistic survey of the Park and Reserve to determine whether other infections occur. (H)**

4. **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. (H)**

5. **Train staff associated with the area to recognise dieback and in sampling and management techniques. (H)**

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

7. **Close 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. (H)**

8. **Inform Park users about dieback and its management, and why it is important to prevent its introduction and spread (see 15.0 Information, Interpretation and Education). (H)**

9. **Investigate the potential to remove utility easements from the Coomallo Reserve, and pursue any opportunity to decrease the potential of utility users to introduce disease to the Reserve. (H)**

10. **Investigate means by which cost effective and efficient washdown facilities for public use can be installed especially at the entrance to Lesueur National Park. (L)**

7.2 Fire Protection

MAP 6.

The objectives are to:

1. *Use Wildfire Threat Analysis to define values at risk from wildfire and as a basis for fire management planning.*
2. *Protect visitors, neighbours, departmental staff, fire-fighters and property from wildfire.*
3. *Protect plant communities and ecosystems, physical and landscape values from the effects of frequent uncontrolled fires and from inappropriate burning regimes and suppression techniques.*
4. *Where possible, restrict fires to single management blocks, and maintain as much as possible of the vegetation free from fire for the duration of this management plan where this does not pose a direct threat to adjoining community assets.*
5. *Reduce the risk and frequency of unplanned fires starting near or within the Park as a result of human activity.*

Wildfire Threat Analysis

The Wildfire Threat Analysis is a computerised decision support system which provides an objective and repeatable means of integrating the key factors that contribute to a wildfire threat to an area. These factors are the values at risk, the probability of fires starting, the suppression response that can be mounted and the likely fire behaviour at the site. These factors can be mapped and ranked so that it is possible to determine which values are most at risk.

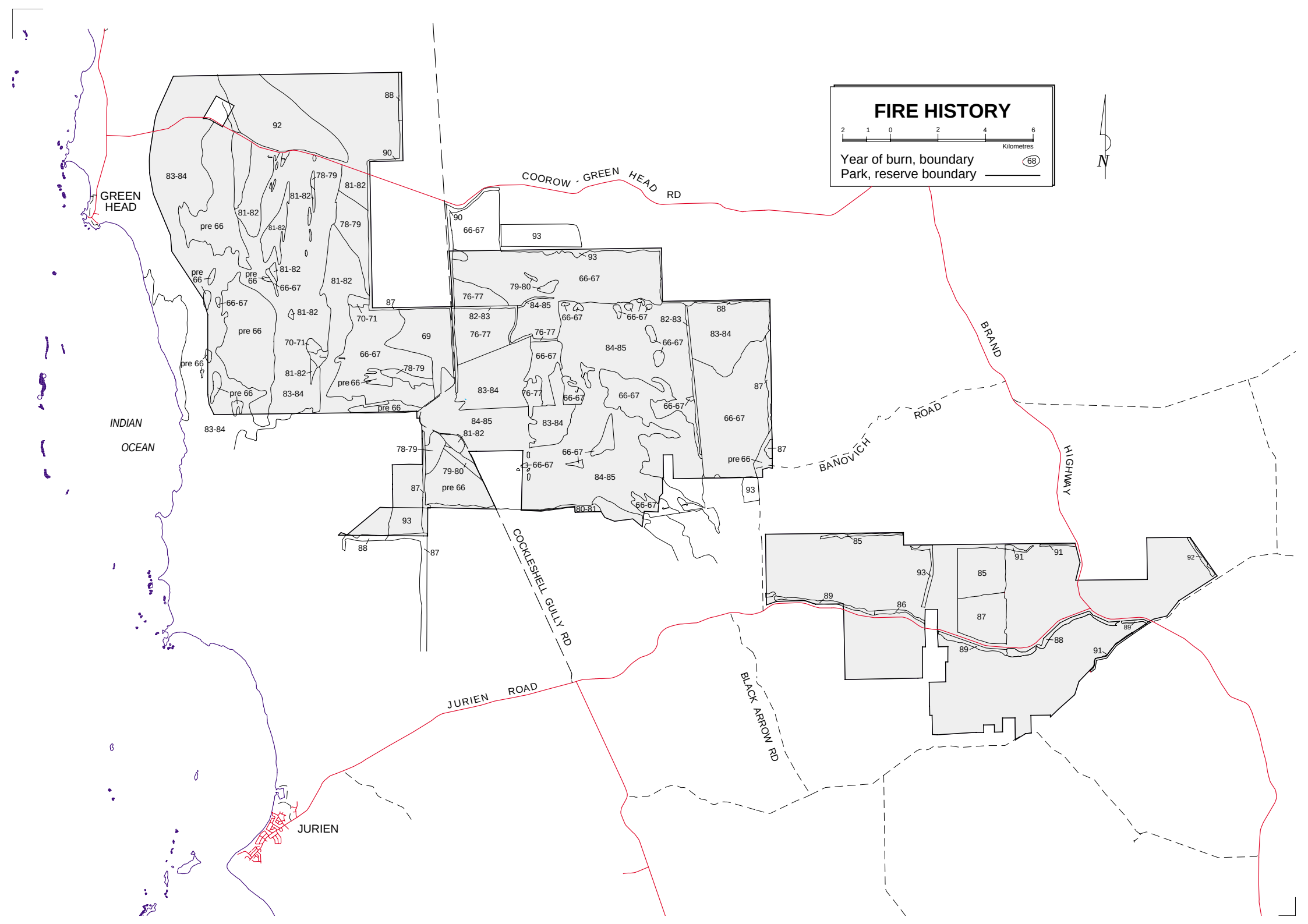
Values on Adjoining or Nearby Lands

Values on adjoining lands which are potentially threatened by fire include people living or visiting the areas, declared rare flora and the agricultural industry with its homesteads, pasture, crops, stock, machinery, buildings and fences. The adjoining coastal towns of Greenhead and Jurien also represent highly vulnerable assets both in terms of their residents and the fact that they are popular tourist destinations. Protection of these values and assets must be considered in the development of fire protection and prevention strategies.

In addition to the agricultural industry, other agencies adjoining the Lesueur-Coomallo area include the Water Authority of WA, the State Energy Commission, the Dandaragan Shire Council and WAPET. Ongoing liaison will occur with these agencies in regard to fire protection and prevention associated with the various land uses.

Fire History

Most of the fuels between Lesueur and Coomallo have been unburnt for between eight and 15 years (Map 6). The last major fire in the area occurred in 1985 and burnt over approximately 4 800 ha. The oldest patches are about 30 years old, but these are relatively small. Most of both areas has been burnt more than once in the last 30 years.


FIRE HISTORY
2 1 0 2 4 6
Kilometres
Year of burn, boundary
Park, reserve boundary
68
N
GREEN HEAD
INDIAN OCEAN
COOROW - GREEN HEAD RD
BRAND HIGHWAY
BANOVICH ROAD
COCKLESHELL GULLY RD
JURIEN ROAD
BLACK ARROW RD
JURIEN
pre 66
66-67
78-79
79-80
80-81
81-82
82-83
83-84
84-85
85
86
87
88
89
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91
92
93
69
70-71
76-77

Lightning is a significant cause of fires in this general area. In the summer of 1992/93, dozens of lightning-caused fires burned up to 100 000 ha of Crown land and private property along the central coast. A fire in the northern Beekeepers Nature Reserve burnt about 50 000 ha following three lightning strikes within the Reserve. Lightning-caused fires in Lesueur and Coomallo over the past 30 years have been relatively small in size, as these have been either naturally extinguished by rain, or quickly suppressed.

Most of the area burnt in the last 30 years has been by fires started accidentally by humans. Escapes from clearing burns on adjacent farmlands were a significant cause of fires in the 1960s and 1970s, but this source has since declined considerably.

Fire Behaviour

Fire behaviour is affected by the amount and type of fuel, air temperature, fuel dryness, wind speed and topography (Sneeuwjagt and Peet, 1985). Different vegetation types accumulate fuel at different rates and have different fire spread characteristics. The major fuel types in Lesueur National Park and Coomallo Nature Reserve are scrub heath and mallee heath vegetation types.

Differences in the fuel accumulation and structure between these fuel types result in differences in fire behaviour characteristics, and variation in the conduct of fire management operations. Mallee-heath fuels can often be discontinuous and require specific threshold conditions of fuel moisture and wind speed in order to sustain fire spread. The erratic nature of fire behaviour in these discontinuous fuels 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 and thickets allow for a greater range in the weather conditions under which fire spread is possible, and fires may sustain under mild conditions. Woodland fuel types present in the east Lesueur area carry leaf litter and woody material such as fallen branches. These fuels may remain alight for extended periods. The woody fuels provide ready sources for re-ignition of fires following a period of mild conditions. Open edged fires in these woodland fuel types are risky because of the probability of escapes resulting from re-ignitions.

During summer from October to April, the advent of hot, dry northerly winds frequently results in severe fire weather conditions. Intense and fast-moving fires are possible in all fuel types, with the exception of areas of vegetation where the fuel is less than three years old. Direct suppression action on fires in older fuels is usually neither effective nor safe in these conditions.

Wind speed and direction is probably the major factor influencing the spread of wildfires in this

central coast area. A typical daily weather pattern during the fire season starts with light to moderate offshore winds in the early morning. Moderate to strong south to south-westerly sea breezes take over in the late morning or early afternoon. The sea breeze is commonly over 30 kph. These usually abate in the evening returning to the east or south-east.

The predictability of these patterns of wind speed and direction assists greatly in planning buffer burns. Open edge burns of east-west buffers may be conducted relatively safely under the influence of the southerly winds. North-south buffers are more difficult because of the strong change in wind direction from west to east and vice versa.

The headwaters of the Cockleshell Gully include steep slopes and gullies that can promote erratic and severe fire behaviour. Wildfires are difficult and dangerous to contain in this area.

Fire Ecology

Plant species can be classified according to whether or not they are killed by fire, their mode and rate of regeneration, and the location of any surviving organ. This is a useful way of highlighting those species that are most vulnerable to changes in abundance under inappropriate fire regimes, such as frequent fires or fires out of season.

Monitoring has shown that the plants of the Lesueur and Coomallo areas have a variety of ways to regenerate after fire (E.A. Griffin and A.J.M. Hopkins, pers. comm). Classification of the species in these areas according to a scheme based on the above parameters has been initiated but is not complete.

The plants most vulnerable to fire are those which are killed by fire and regenerate only from seed (obligate seeders). Those relying on seed retained on the plant appear to be particularly vulnerable. This generalisation has not proven entirely reliable as a number of soil-stored obligate seeders are also vulnerable where the time to flowering is greater than the interval between fires. The most important issue is how quickly these species regenerate and produce adequate seed to replace themselves.

The single-stemmed woody shrub lifeform type includes most of those which appear to be especially vulnerable. In the Lesueur area this lifeform accounts for about 20% of the total flora. Multi-stemmed woody shrubs (30%), perennial sedges and grasses (14%), annuals (12%), geophytes (11%) and sub-shrubs (9%) are the main lifeform types of less vulnerable species.

Appendix 2 is a list of those plant species considered most vulnerable to depletion by frequent fires. This should not be taken as complete. A number of priority or geographically restricted flora are included (e.g. *Andersonia longiflora* and *Hakea neurophylla*). However, none of the Declared Rare Flora (DRF) species are considered particularly vulnerable. That is not to say that some may be adversely affected in some way. *Banksia tricuspis* which survives by epicormic sprouting still requires in the order of 25 years to produce viable seed, while hot fires can kill seedlings up to 18 years old. On the other hand some species appear to be more abundant in the early years (perhaps up to 10) following fire.

It should also be noted that many of the vulnerable species are dominant or structurally important in many of the vegetation types in the Lesueur National Park in particular. Not only would frequent fires result in the depletion of these species but also a number of the vegetation types would be grossly modified.

Appropriate fire-free intervals are yet to be determined. This is a complex issue as the rate of regeneration of the most vulnerable species varies greatly. Limited research has suggested that a fire-free interval of greater than 15 years is desirable in the Coomallo area.

The potential impact of fuel reduction burning on DRF and Priority 1 species that occur in buffers has been assessed (Appendix 3). Few of the species occur in buffers that are planned to be burnt frequently. In these areas the impact on these species is considered to be insignificant or at worst only minor. Many of the DRF and Priority 1 species occur in the open edged burns with a 15 year burning cycle. For most of these the potential impact also would be insignificant or only minor. This is not only due to the regeneration potential of these species, but also the small proportion of the populations that are present in these buffers.

Some species might be adversely affected by the fire frequency proposed for the buffer zones. The rate of regeneration of *Andersonia longiflora*, an endemic to Lesueur, is not known. The total or major proportion of populations of four other species in the Park or Reserve are within proposed buffers and must be considered. *Dryandra* sp. aff. *hewardiana* and *Verticordia fragrans* occur in other conservation areas and this reduces any potential impact on these species by buffer burning at Lesueur and Coomallo. However, *Goodenia xanthotricha* and *Grevillea batrachioides* are only known from Lesueur. Both have small, poorly mapped populations and little is known of the rate of their recovery after fire. All of these species have, however, regenerated following fires in the past.

Some patches of old or long-unburnt vegetation (about 30 years since the last fire) in the Lesueur area have been examined. No evidence exists of the vegetation in these areas being senescent, i.e. showing a decline in vigour or collapse of the tall obligate seeders. It is unlikely that any of these

areas would require regeneration within the next 10 years.

Monitoring studies have also shown a number of species, mainly annuals, that are found only in the first years after fire. These species are responsible for the increase in species richness observed after fire. This increased richness declines rapidly to pre-fire levels; nevertheless, some fire is necessary in these areas to maintain maximum biodiversity.

Perimeter areas adjacent to cleared land are vulnerable to weed invasion which can be exacerbated by fire. Vegetation types on loamy or duplex soils are particularly vulnerable because of the natural ability of these areas to support a flush of annual species following fire.

Little information has been published about the influence of fire on the fauna in the Lesueur and Coomallo areas. The recognised varied requirements of the different groups of fauna would be best served by much of the vegetation being retained unburnt, supplemented by areas with a range of fire ages. This has been inferred from observations in the kwongan of the Fitzgerald River area (Moore *et al.*, 1991).

The implications of management techniques used in buffer areas has received some attention recently. Scrub-rolling with a light chain (Griffin, 1990) 'knocks down' the standing vegetation (leaving the root stock sprouters undisturbed) and facilitates more effective burning under safer conditions. Some decline was evident in the population of obligate seed regenerating species with canopy stored seed in the first three years at least. This was attributed to the destruction of seed released in the interval between scrub-rolling and burning. Seed losses would be minimised by burning buffers within a few weeks of scrub-rolling. However, the scrub-rolling and subsequent burn treatment resulted in increased species richness due to the regeneration of plants from soil-stored and dispersed seed stimulated by disturbance.

Other Considerations

Preventing dieback disease from being introduced into the Park and Reserve is the greatest management concern. In the longer term, dieback disease has the potential to degrade the ecosystems of these areas more than fire because plant species and community losses are permanent. Construction and maintenance of mineral earth firebreaks must be kept to a minimum, and only conducted in summer, to reduce the risks associated with soil movement (see 7.1 Plant Diseases).

Many of the existing tracks in the dissected topography of the Cockleshell Gully have eroded where they have crossed steep slopes and patches of heavy soil. A strategy of reducing reliance on mineral earth firebreaks, and closing, relocating and rehabilitating existing tracks should significantly reduce this erosion.

Fire protection strategies that are based on burnt strips to achieve low fuel areas, will need to use 'open edge' techniques rather than traditional methods of burning between parallel mineral earth breaks. This is considered hazardous in terms of potential fire escapes, but minimises the chances of introducing dieback.

The plan area contains surveyed populations of Declared Rare Flora (DRF) and priority species. Burning is defined as 'taking' under the Wildlife Conservation Act so Ministerial approval must first be obtained before areas containing DRF can be burnt. To ensure that any special requirements of these species can be considered in the prescription, CALM's Science and Information Division is required to be notified of any burn proposals likely to affect DRF and priority species.

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 wildfire threat analysis carried out by CALM in consultation with the local community. A Fire Advisory Committee with representation from local bushfire organisations, Shires, Bush Fires Board and CALM will be established to assist with fire management.

Research and Monitoring

Soon after a major fire in the Lesueur area in 1985 a program to monitor the regeneration of vegetation was initiated. This was based on marked quadrats established for botanical surveys prior, but unrelated, to this fire. Several hundred additional marked plots are available for future monitoring.

The virtues of additional detailed monitoring of the regeneration of DRF and priority plant species following each planned burn will be canvassed in the process of notification and approval. This monitoring program will assist in determining appropriate inter-fire intervals and fuel build up rates.

The high conservation value of the east Lesueur area (Cockleshell Gully and Mt Lesueur itself) in relation to both the west Lesueur and Coomallo areas, dictates to a large degree the greatest amount of protection effort and expenditure that is to be

allocated to this area to maintain buffers and tracks.

MAP 7.

GENERAL STRATEGIES

The Park and Reserve currently contain vegetation with a wide range of fire ages although most is relatively young. Existing roads and tracks divide them into a system of relatively small blocks. These factors dictate a conservative set of strategies, at least until significantly more is known about them.

The basic strategy proposed for the Park is to provide 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 being burnt at the one time, while minimising the risk of wildfires entering or leaving the Park. The existing network of roads, tracks, buffers and recently burnt areas will be used to provide block boundaries in the Park. The aim is to restrict fires to the block in which they start.

Fire Management Plan

A fire management plan is to be developed based on management blocks separated by strategic fuel-reduced buffers and fire management tracks. The fire management plan will be integrated into the existing Central West Coast Fire Protection Plan developed by the Bush Fires Board for all Crown land and private property in the central west coastal zone.

The fire management plan recognises three separate sections: Lesueur West, Lesueur East and Coomallo (Map 7). Each has different values and problems and is separated by the Cockleshell Gully Road and areas of private property.

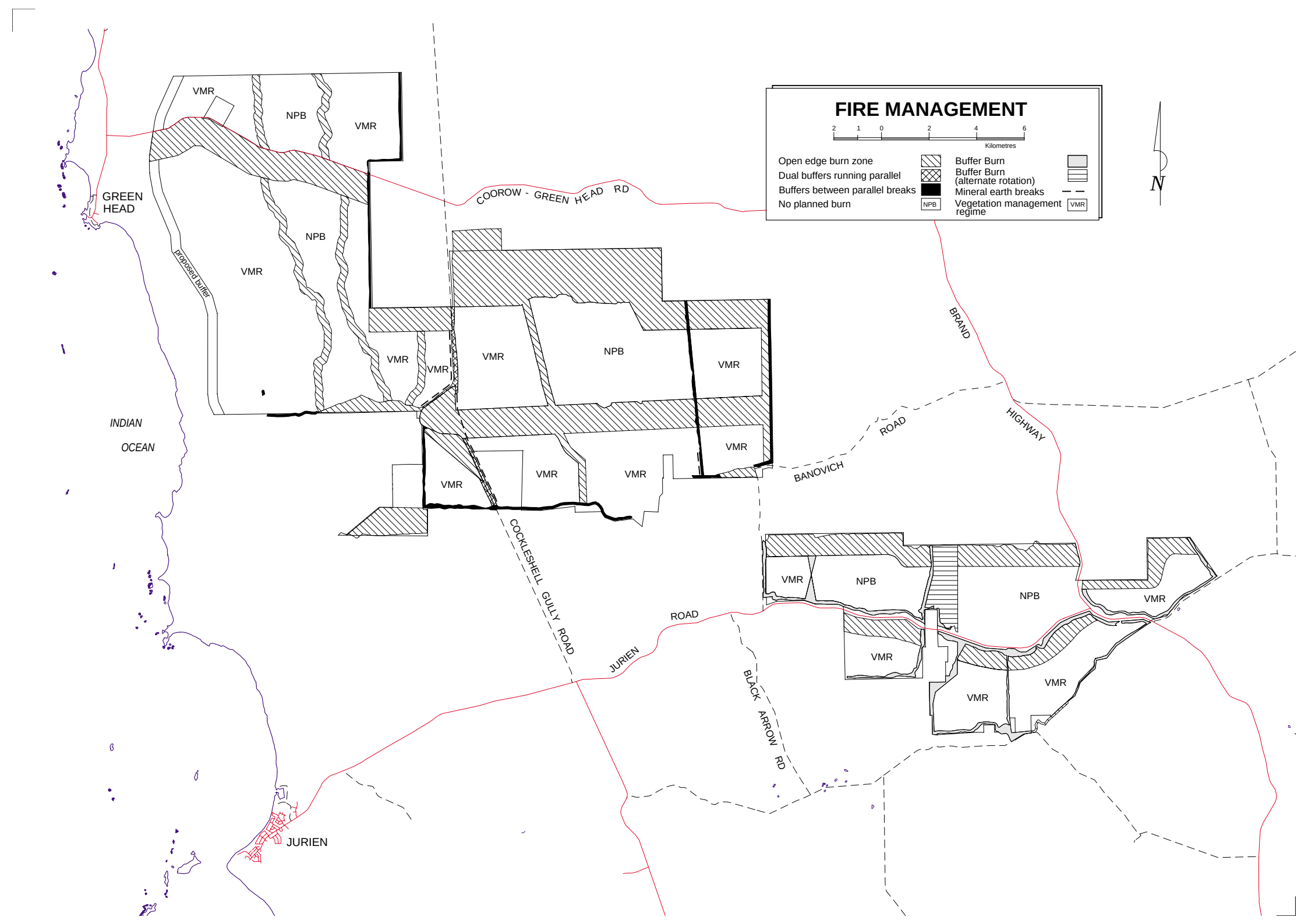
Lesueur West

This section focuses on the area of limestone and salt lakes where the control of fire has been unsatisfactory in the past, partly because of the difficulties in creating effective low fuel areas.

Firebreaks quickly overgrow where limestone is exposed on the surface. This section is of great importance to the apiculture industry (see 14.5 Apiculture) which has much to lose from frequent fire. The involvement of beekeepers in implementing the plan will be vital.

The strategy for this area is to create effective perimeter buffers using the natural features (salt lakes) and major roads. The area north of the Coorow - Green Head Road will be managed in association with the Beekeeper's Reserve. Localised burning to protect apiary sites will be considered on a case by case basis.

A coast road is being planned to link Jurien and


FIRE MANAGEMENT
2 1 0 2 4 6
Kilometres
Open edge burn zone
Dual buffers running parallel
Buffers between parallel breaks
No planned burn
NPB
Buffer Burn
Buffer Burn (alternate rotation)
Mineral earth breaks
Vegetation management regime
VMR
N
GREEN HEAD
COOROW - GREEN HEAD RD
proposed buffer
INDIAN OCEAN
BRAND HIGHWAY
BANOVICH ROAD
COCKLESHELL GULLY ROAD
JURIEN ROAD
BLACK ARROW RD
JURIEN
VMR
NPB

Green Head and is likely to be constructed within the next two years. The road will provide a break and a base for future buffers along the coast. The location of the road has not been determined but is likely to be adjacent to the western boundary of Lesueur.

Lesueur East
This section has the highest concentration of conservation values and holds the greatest attraction for visitors. Fires in this section are likely to cause more damage to ecological values than those in other sections. To minimise the potential impact of a wildfire the section has been divided by low fuel buffers into six management blocks.

The northern boundary of the Park adjoining private property will be prescribed burnt to help prevent wildfires from entering or leaving the Park.

A program of burning of an east-west buffer through the centre of this section will help protect Park visitors while also offering protection to the Park from the high visitation area to the south.

Coomallo Nature Reserve
This Reserve has been divided into seven distinct blocks by major roads and private property locations. The main strategy to effectively control fires includes open edge burns along the main east-west orientated buffer and the regular burning of several north-south orientated buffers.

No Planned Burn Regime (NPB)
Sections of the Park and Reserve are to be designated 'No Planned Burn'. These areas will not be burnt for the duration of this plan and may be retained for reference in the long term. If wildfires should occur in these areas, the strategy will be to allow them to burn to surrounding buffers or to use back burning from existing management tracks. Fires in these areas will not be attacked directly.

Vegetation Management Regime (VMR)
Prescribed burning will be excluded from these areas for the life of this plan until:
- mechanisms have been devised to install wind-driven buffers in a controlled way; and
- it is assessed that, on balance, it would be preferable to burn at least part of these areas.

Prescribed Burning Buffers
Burn buffers will play a major role in protecting the area. Basically two types of buffers are planned. Most north-south oriented buffers are 50 - 100 m wide with firebreaks on both sides. These buffers will be burnt approximately every 8 to 10 years and the firebreaks upgraded relatively frequently. Most east-west buffers will be a set of four or five open edge burns each 200 - 400 m wide. These will be burnt in sequence from north to south, one every three or four years, so that each strip is burnt only once every 15 years or more. Open edged burning is a technique being developed to carry out buffer

burns without the need for construction of mineral earth breaks. This technique does pose a higher risk of escape than burning between two mineral earth breaks, however, the advantage of not needing to construct new breaks far outweighs the higher risk of burns escaping. In some instances and with some vegetation types scrub-rolling may be required to ensure a safe and effective burn.

In the northern sandplains, experience has shown that under severe conditions a low fuel buffer of less than three years fuel age and of minimum 400 m width is effective in allowing wildfire to be brought under control.

It is planned for most buffers to be ignited and secured by ground crews. Aerial ignition techniques will be considered where these are considered safer and more cost effective than ground ignition operations.

Prescriptions will be prepared for all proposed burns in accordance with CALM's Policy No. 19 (Fire Management). This will also involve the completion of a pre-burn check list. All burns carried out by external agencies, ie. 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 will be developed by the Bush Fires Board in conjunction with local authorities and CALM. It is intended that the wildfire response plan will be part of an interagency agreement between these parties.

STRATEGIES

Prescribed Burning

1. **Continue to apply standard Departmental requirements for an approved prescription before initiating a planned fire. The prescription must take particular account of environmental values, especially the need to control dieback, and minimise impacts on the landscape and visual resources. (O)**

2. **Implement the Fire Management Plan (Map 7). (H)**

3. **Monitor the Fire Management Plan annually to take into account major wildfires, and the inability to achieve burning programs. (H)**

4. **Modify, relocate or defer burns where Declared Rare Flora or Fauna occur within proposed burn areas. Where it is essential for protection purposes for burning to occur, Ministerial permission to 'take' rare species must be obtained before conducting a burn. (H)**

5. **Conduct fuel reduction burning in the open-edge burn zones and parallel buffers only. (M)**

6. **Consider scrub-rolling of heath vegetation buffers where this is considered advantageous. Scrub-rolling may only be carried out under dry soil conditions, and must take into account landscape impacts and soil erosion potential. (L)**

Liaison

7. **Establish a Fire Advisory Committee with representatives from local bushfire organisations, Shires, Bush Fires Board, beekeepers and CALM to meet at least annually and review implementation of the fire plan and priorities. This group will make recommendations on the program priorities for the next year. CALM will aim to implement each annual program as recommended by the Advisory Committee after considering other District and Departmental priorities. (H)**

8. **Continue to work closely with local authorities and brigades, beekeepers, adjacent landholders and the Bush Fires Board to ensure an effective fire management force is in place. The mutual-aid arrangements in carrying out burns and suppression activities will be encouraged in accordance with the Central West Coast Fire Protection Plan. In particular, Park perimeter buffer burns should be conducted in conjunction with local bush fire brigades and neighbouring landholders. (H)**

Pre-suppression

9. **Develop a fire emergency contingency plan as part of the Moora District Fire Control Working Plan. Include standby and response arrangements and update the plan annually. (H)**

10. **Maintain a network of fire management access and firebreaks using methods that minimise soil erosion and do not increase the risk of, or contribute to introducing, spreading and intensifying dieback. (H)**

11. **Maintain an effective fire detection**

system involving CALM staff, local bushfire brigades and neighbours. (H)

12. **Prohibit the lighting of woodfires within the Park and Reserve. (H)**

13. **Establish cost-effective water supply points at strategic locations within or near the Park and Reserve. Design such storage points to prevent fauna from using them. (M)**

Suppression

14. **In the event of a wildfire in or near the Park, fire suppression arrangements must be in accordance with the Central West Coast Fire Protection Plan and the Moora District Fire Control Working Plan. (H)**

15. **Endeavour to contain wildfires that enter or start in the Parks within a management block defined by the strategic buffers given in Map 7. (H)**

Information and Education

16. **Prepare a communication plan to promote the Park's and Reserve's values and visitor appreciation and support for fire management programs, and fire safety and survival. (M)**

17. **Develop bushwalker registration points. (M)**

Research and Monitoring

18. **Record and analyse details of all fires, including fire behaviour information. (H)**

19. **Encourage research on the regeneration of flora after fire, with particular emphasis on fire vulnerable species such as obligate seeders. (M)**

20. **Prepare and implement a program to monitor changes in vegetation and weed structure and composition following fire. (L)**

7.3 Introduced Animals

The objective is to minimise the impact of introduced animals on ecosystem values.

Non-indigenous animals, such as feral cats, foxes and rabbits, and domestic pets have a detrimental effect on native animals and plants. Foxes and cats can severely reduce or eliminate native fauna by preying on them or by competing for food and territory. Rabbits can cause erosion by destroying native vegetation, and horses and pigs can spread dieback disease. The management and control of introduced animals varies according to the species and its impact on the environment.

The introduced animals occurring in the Park are:

- Red Fox *Vulpes vulpes* — Common throughout
- Feral Cat *Felis catus* — Common throughout
- House Mouse *Mus musculus* — Common throughout
- European Rabbit *Oryctolagus cuniculus* — Common near farmland
- Dog *Canis familiaris* — Uncommon
- Horse *Equus caballus* — Scarce
- Feral Pig *Sus scrofa* — Scarce
- Feral Pigeon *Columbia livia* — Scarce
- Laughing Kookaburra[8] *Dacelo novaeguineae* — Uncommon
- Feral Bees *Apis mellifera* — Common

STRATEGIES

1. **Monitor the incidence of feral animals, prepare a five-year control program and implement programs. (H)**

2. **Liaise and coordinate feral animal control programs with neighbouring land owners. (M)**

8 The Laughing Kookaburra is not native to Western Australia (it was introduced from the eastern States in 1896) but is still native Australian fauna and protected under the Wildlife Conservation Act.

7.4 Introduced Plants

The objective is to minimise the impact of introduced plants on ecosystem values.

A bushland weed can be defined as an unwanted plant or species growing in bushland. Weeds displace native plants, particularly in disturbed sites, by outcompeting the indigenous species for light, nutrients and water. They can have a significant adverse impact on conservation values by altering animal habitats and harbouring pests and diseases.

Burbidge *et. al.* (1990) reported 24 species of introduced plant for Lesueur National Park (3% of the Park's species). These are most likely agricultural weeds from adjoining farms that occur in limited areas. However, an additional 40 species of introduced plant likely to occur in the coastal Holocene deposits is reported in Griffin (1993). Most of these species extend from around Shark Bay to the south-west of Western Australia. Only limited information is available about weeds in Coomallo Nature Reserve.

None of the species of bushland weeds recorded in the area has been declared under the Agriculture and Related Resources Protection Act (1976) which provides appropriate policies and controls for declared species. Bushland weeds in Lesueur and Coomallo will be managed according to CALM Policy Statement No. 14 (Weed Management) and other management strategies discussed in this plan.

STRATEGIES

1. **Prepare and initiate a weed management program in accordance with CALM Policy Statement No. 14 (Weed Management). Update the program annually seeking specialist advice as required. (H)**

2. **Give priority to controlling weeds that are encroaching on threatened flora. (H)**

3. **Eradicate, where practical, isolated outbreaks of weeds while the infestations are small and easily controlled. (H)**

4. **Liaise with neighbours, local Government and other relevant authorities to encourage an integrated approach to weed management. (M)**

5. **Monitor weed control measures to determine their success and the need for further treatment. (L)**

7.5 Rehabilitation

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

The majority of Lesueur National Park and Coomallo Nature Reserve is relatively undisturbed. However, a large number of tracks and several borrow pits occur within the area. All tracks were surveyed while this management plan was being prepared to assess their usefulness for fire management, recreation and for management in general. Those tracks that are not considered essential will be closed and rehabilitated.

Several gravel pits occur along Cockleshell Gully Road. These were established by local Government authorities for road maintenance, and will be rehabilitated in consultation with the authorities.

Seed or cuttings from local native species will be used in rehabilitation operations, and landforms will be rehabilitated to resemble as closely as possible the natural landforms in the vicinity.

A number of disused exploration tracks and drill sites are currently being rehabilitated by CRA Pty Ltd in conjunction with CALM.

STRATEGIES

1. **Rehabilitate degraded sites in accordance with CALM Policy Statement No. 10 (Rehabilitation of Disturbed Land) and guidelines. (H)**

2. **Prepare a detailed rehabilitation program. Review the rehabilitation program on an annual basis. (M)**

3. **Monitor the effectiveness of rehabilitation works on a regular basis. Recommend changes to rehabilitation strategies to effect improvement. (M)**

4. **Provide opportunities for interested individuals and groups to be involved in rehabilitation projects. (L)**

MANAGEMENT FOR RECREATION

8.0 PRINCIPAL RECREATION DIRECTIONS

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

RECREATION MANAGEMENT PHILOSOPHY

The continued enjoyment by visitors of the Lesueur National Park and the Coomallo Nature Reserve can only be assured while these areas are managed to protect their conservation values and to maintain the natural environment.

In essence, the recreation management philosophy for Lesueur National Park and Coomallo Nature Reserve is to meet the needs of visitors seeking nature-based activities. This will be achieved by acknowledging visitor needs and providing access, where practicable, to quality recreation experiences for the widest range of visitors. Recreation activities will be managed to protect conservation values and to maintain the natural environment and social values of recreation settings in perpetuity.

9.0 RECREATION OPPORTUNITIES

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

The Moora District encompasses seven national parks, about 90 nature reserves ranging in size from 0.5 ha to many thousands of hectares, and includes approximately 30 offshore islands which are 'C' Class nature reserves.

Recreation and tourism in the Moora District is generally characterised by coastal-related recreation 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 wide range of active and passive recreation opportunities are available owing to both coastal and inland features of the area. The most popular pursuits are swimming, relaxing, fishing, viewing scenery, picnicking, pleasure driving and bushwalking.
The increase in the numbers of people that are likely to seek recreation opportunities in the Lesueur-Coomallo area has the potential to degrade those values that attract them in the first place. For this reason recreational use of Lesueur National Park and Coomallo Nature Reserve will be managed according to the zoning plan (4.0 Management Zones) which aims to protect conservation values by allocating recreation facilities and activities to those areas capable of sustaining use. Recreation opportunities will be provided that:

- meet the needs of visitors of all ages where this can be practically achieved;
- maintain the natural qualities of recreation settings;
- do not impair recreation experiences by overuse or conflicting uses; and
- enhance visitor appreciation of natural and cultural values.

Lesueur National Park will be developed and managed to facilitate low-key recreational pursuits, that is minimum facilities, minimum impact activities. Coomallo Nature Reserve will be retained in its natural environment with the exception of the existing picnic area adjacent to Brand Highway which will be redeveloped as a day-use rest and picnic area with facilities.

Activities that have minimal or no adverse impact on the environment may be allowed. Activities that have the potential to cause damage to the environment will not be allowed.

A regional perspective is essential when planning for recreational opportunities in Lesueur National Park and Coomallo Nature Reserve in order to complement existing opportunities in the region. The integration of recreation opportunities in the Lesueur-Coomallo area 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. Interagency liaison at a regional level will help to integrate opportunities in the Moora District.

STRATEGIES

1. **Provide recreation opportunities in the Park and Reserve to complement opportunities available elsewhere on CALM-managed and other public land in the region. (H)**

2. **Provide recreation opportunities and facilities with minimal environmental impact as in the zoning plan (see 4.0 Management Zones) for the widest group of people possible. (H)**

3. **Determine visitor numbers and patterns of use by monitoring vehicle numbers, and conducting site surveys and interviews to determine recreation needs. (L)**

10.0 ACCESS AND RECREATION SITES

The objective is to provide and maintain suitable access and recreation sites ensuring dieback control receives the highest priority.

Public access in Lesueur National Park is centred on the eastern part of the Park (Map 8). Cockleshell Gully Road and the Coorow - Green Head Road traverse the Park, but these are generally used as through-routes for people travelling between coastal town centres. Tracks within the Park are numerous and originate from previous reserve boundaries and firebreaks, and mining, exploration and drilling programs. Many tracks follow straight alignments that detract from the scenic quality of the landscape. Several have been closed to prevent further degradation and the spread of dieback (see 7.1 Plant Diseases). Closer to the coast, tracks are in place to service apiary sites.

Past recreational use of the Lesueur area has been restricted to 4WD-based activities, camping and bushwalking. Small, informal recreation sites occur in woodlands near Cockleshell Gully and Munbinea Creek.

The Brand Highway and the Jurien Road provide the main public access through the Coomallo Nature Reserve. The Nylagarda Road is used to access private property, and as a link with the Cantabilling Road. Motorists travelling between Perth and Geraldton often stop to rest or sometimes camp at a picnic ground at the junction of Brand Highway and Jurien Road.

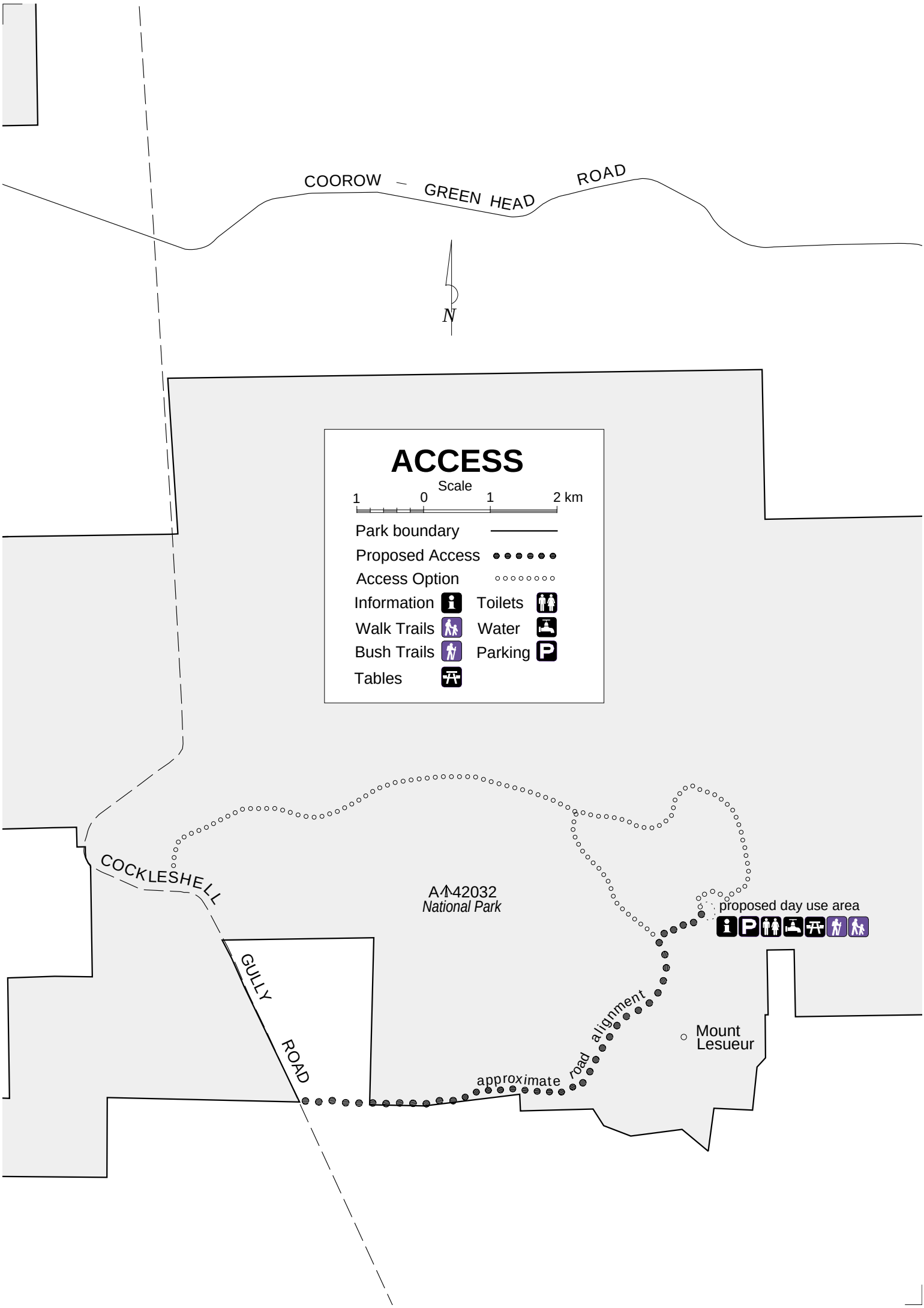
When providing access into Lesueur National Park and Coomallo Nature Reserve the most important consideration is the possible impact of *Phytophthora* dieback. In order to minimise the spread of the disease, vehicle activity must be strictly controlled, and road alignments, wherever possible, should remain low in the landscape. Visitor numbers are expected to increase as the area becomes better known, increasing the risk of dieback being brought in or spread in the Park. If current access is not rationalised and visitor numbers increase as expected, the risk of introducing and spreading dieback in the Park and Reserve will be greatly increased.

The proposed access system shown in Map 8 was produced after considering:
- known dieback infections and the dieback risk map (Map 5) prepared as part of this management plan;
- the hazard and risk ratings of major plant communities in Lesueur (Hill, 1990);
- access requirements for fire management (see 7.2 Fire Protection and Map 7);
- access requirements by beekeepers (see 7.2 Fire Protection and 14.5 Apiculture);
- public submissions on recreational access;
- the results of a recreation survey in Lesueur and Coomallo; and
- the coast road between Jurien and Green Head.

The section of road from Cockleshell Gully Road to the proposed day use area will follow the approximate alignment shown on Map 8. Additional access may be provided if warranted by increased visitor use. Due to the rugged terrain and the high conservation values of the area, the alignment of additional access will need to be thoroughly assessed for dieback susceptibility and engineering feasibility, and will be subject to detailed flora and fauna surveys. Possible options include a loop road or an alternative exit through Cockleshell Gully as shown on Map 8.

The proposed road will be constructed to an all-weather two-wheel drive standard. Limestone is the preferred road building material because of its resistance to *Phytophthora* dieback. Parking nodes will be established along the road where features of interest and walk tracks occur. When the first stage of the proposed road is constructed any unnecessary sections of existing track will then be rehabilitated.

As an interim measure, the track heading east from Cockleshell Gully Road along the Park's southern boundary was upgraded to give better four-wheel drive access to the Mt Lesueur area. For most of its length this follows the alignment of the proposed all-weather road discussed above. The Banovich Road entry into the Park has been closed as it poses an unacceptable dieback risk and is not appropriate because:
- it passes through two seasonally wet areas causing soil and mud to adhere to vehicles;
- upgrading the road would also require upgrading or relocating a section of the track inside the Park that passes through a seasonally wet area.
- the risk of disease spread is high because it is high in the landscape;
- the vegetation belongs to the Banovich Uplands which have very high conservation value (see 6.3 Vegetation and 6.4 Flora); and
- the vegetation types have a high dieback hazard rating (Hill, 1990).


COOROW – GREEN HEAD ROAD
N
ACCESS
Scale
1 0 1 2 km
Park boundary
Proposed Access
Access Option
Information
Toilets
Walk Trails
Water
Bush Trails
Parking
Tables
COCKLESHELL GULLY ROAD
A 42032
National Park
proposed day use area
approximate road alignment
Mount Lesueur

For dieback protection reasons it is necessary to restrict the use of vehicles off-road in Lesueur to the low hazard natural environment zone west of Cockleshell Gully Road. Vehicle access will be subject to strict control depending on soil condition (see 4.0 Management Zones and 7.1 Plant Diseases). If the presence of dieback is suspected or confirmed on or adjacent to the tracks then future management of the access way will be carefully considered. Evaluation should include considering further surfacing of the track, or realignment if required. The use of 4WDs in Coomallo Nature Reserve will not be permitted.

Visitor facilities will be developed according to the guidelines stated in the zoning plan and the site development plans. These will include appropriate information panels or displays at the start of walk tracks. The proposed day use area will be developed as a focal point for day visitors. Facilities will include defined picnic sites, information displays and toilets. Walk tracks will radiate from this area (see also 11.1 Bushwalking and 15.0 Information, Interpretation and Education).

The Coomallo picnic area on the Brand Highway is heavily used by many groups. It is currently vested in the Shire of Dandaragan but negotiations are underway to have it vested in the NPNCA as Conservation Park (see 3.0 Land Tenure). Ways of improving this site to better cater for visitors will be investigated. CALM will seek to involve the private sector in the planning and upgrading of the Coomallo picnic area (see 14.1 Commercial Operators and 11.3 Group and Club-based Activities).

STRATEGIES

1. **Subject all road and track maintenance and construction to strict dieback hygiene measures. (O)**

2. **Design the proposed new access road into Lesueur National Park to comply with standards established by CALM and Main Roads W.A. (H)**

3. **Determine the most appropriate alignment of any additional access with regard to the Park's conservation and other values. (H)**

4. **Progressively develop a system of walk tracks in Lesueur National Park and Coomallo Nature Reserve (see also 11.1 Bushwalking). (M)**

5. **Assess and redesign the Coomallo picnic area to maximise visitor enjoyment of the area while minimising loss of natural attributes. (M)**

6. **Develop the Lesueur day use area and redesign the Coomallo picnic area according to site development plans. (M)**

7. **Close and rehabilitate tracks that are not required for management activities. Involve the community in rehabilitation projects (see 7.5 Rehabilitation). (M)**

8. **Close particular areas, roads, tracks and walks if the presence of dieback is suspected or confirmed or if a high risk of introducing or spreading dieback is identified so that control measures can be evaluated or other strategies can be implemented. (M)**

11.0 RECREATION ACTIVITIES

Given that recreational pursuits should be dependent on the values of the area and consistent with maintaining Lesueur and Coomallo's natural character, the following criteria have been applied to determine the acceptability of recreational 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.
- Priority will be given to those activities that do not degrade the area or reduce its conservation values.
- The intensity of the activity will be controlled, if necessary, to ensure that it does not degrade the conservation values of the Park or Reserve.

11.1 Bushwalking

The objective is to provide a variety of bushwalking opportunities that do not adversely affect conservation and landscape values.

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. Walks may be short self-guided circuit paths or long distance walking tracks.

The impact of bushwalking 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. Other

impacts, such as the spread of dieback disease and the introduction of weeds, may also occur. These problems must be minimised effectively through the sensitive location and design of walks and suitable education.

Lesueur National Park and Coomallo Nature Reserve offer a wealth of bushwalking opportunities. It is proposed to develop a selection of bushwalking tracks using the following guidelines:

- location should be low in the landscape, wherever possible, to minimise the risk of introducing or spreading disease but should also be placed to provide visual diversity;
- walks should be circuits or loops rather than starting and ending at widely divergent points;
- beginning of walks should be relatively accessible to vehicles to facilitate visitor and management use, and provide information about the walk;
- walk alignments or routes should be located along or near the boundaries of different landforms, soil types or plant communities to provide maximum visual diversity;
- walks should be in locations that are capable of sustaining them; and
- adequate parking should be provided at trail heads.

A number of opportunities to explore Lesueur National Park by foot will be developed, incorporating a range of experiences, landscapes and length of walks. Most walks will link with others, providing many options for bushwalkers.

STRATEGIES

1. **Develop a network of foot access in Lesueur and Coomallo. (H)**

2. **Promote a code of ethics for walkers in the Park (refer to 15.0 Information, Interpretation and Education). (H)**

3. **Close foot access temporarily or permanently where the results of monitoring indicates that this is appropriate to protect the environment or, in extreme fire danger, the walker. (H)**

4. **Provide adequate information from which visitors can choose the walk that is best suited to them. (M)**

5. **Provide self-registration points for walkers using remote areas for safety reasons and to evaluate the effects of users on remote areas. (M)**

6. **Monitor the environmental effects of bushwalking and how bushwalking opportunities meet visitor needs. (M)**

11.2 Camping

The objective is to provide limited camping opportunities.

Backpack camping will be permitted in designated areas in Lesueur National Park under prior arrangements with Park staff. Camping is usually permitted in the Natural Environment Zone (see 4.0 Management Zones). Ground fires will not be permitted because of the risk of wildfire and the impacts of firewood gathering on native vegetation. Areas designated for backpack camping must be able to sustain the activity with minimal environmental impact. Camping will be managed according to CALM Policy Statement No. 18 (Recreation, Tourism and Visitor Services).

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. It is not considered appropriate for camping to occur in Coomallo Nature Reserve as camping is available in other areas in the Shire.

For safety reasons it is important for visitors to inform Park staff of their intention to spend extended time in the Park (see 12.0 Visitor Safety).

STRATEGIES

1. **Provide opportunities for backpack camping in Lesueur National Park.(M)**

2. **Monitor the environmental impacts associated with camping. Use the results to refine management practices. (M)**

3. **Liaise with other organisations to provide information on camping opportunities available elsewhere in the region. (L)**

11.3 Group and Club-based Activities

The objective is to accommodate use by groups and clubs to the extent that their activities are compatible with the goals of this plan.

Lesueur National Park is used by bushwalking and naturalist clubs, school groups and various community groups. The development of a road into the Park will attract more visitors, particularly during the wildflower season.

Coomallo Nature Reserve's picnic area on the Brand Highway is heavily used by many groups. Ways of improving this site to better cater for visitors will

be investigated (see 10.0 Access and Recreation Sites).

Management strategies will ensure that visitors are given the opportunities to fully appreciate the Park and Reserve 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. (H)**

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

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

12.0 VISITOR SAFETY

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

People visiting any natural area face inherent risks and dangers. Potential hazards in the Lesueur-Coomallo area include:

- 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;
- possibility of being bitten by native animals, e.g. snakes, ticks and ants; and
- threats of wildfire, particularly to bushwalkers in remote areas.

Lookout points, walk tracks and other facilities are expected to be developed and maintained to provide safe visitor experiences.

STRATEGIES

1. **Advise visitors of natural hazards. Provide and support educational material aimed at visitor safety. Include visitor safety information in Park and Reserve literature. (H)**

2. **Design recreation facilities to minimise potential risks to visitors. (H)**

3. **Liaise with the appropriate emergency services to prepare plans including an evacuation plan, to deal with accidents and search and rescue operations. (M)**

4. **Provide and maintain rescue equipment and train staff to assist in emergency situations. (L)**

13.0 DOMESTIC ANIMALS

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

Domestic animals, for example cats, dogs and horses, can create problems in national parks by disturbing other users and wildlife. They may also create health problems by defecating in recreation areas and spreading diseases such as hydatids. Other problems include the further spread of dieback disease and weed species. While management arrangements can be made to overcome these problems, the Lesueur-Coomallo area with its outstanding conservation values must be protected from potential problems associated with domestic animals.

STRATEGIES

1. **Prohibit domestic animals, including horses and dogs, in Lesueur National Park and Coomallo Nature Reserve, excluding the Coomallo picnic area.(H)**

2. **Allow pets under restraint at the Coomallo picnic area only. (H)**

3. **Inform visitors why domestic animals are not allowed in the Park and Reserve. (H)**

COMMERCIAL AND OTHER USES

14.0 MANAGEMENT OF COMMERCIAL AND OTHER USES

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

14.1 Commercial Operators

The objective is to ensure that commercial visitor services are conducted in an environmentally and socially sensitive manner.

The development of a road into Lesueur National Park is likely to attract more commercial interest, particularly from operators conducting wildflower tours during spring.

The Coomallo picnic area on the Brand Highway is heavily used by many groups. Ways of improving this site to better cater for visitors will be investigated (see 10.0 Access and Recreation Sites, and 11.3 Group and Club-based Activities). The area is currently vested in the Shire of Dandaragan but negotiations are underway to have it vested in the NPNCA as Conservation Park (see 3.0 Land Tenure).

With the growing popularity of nature-based tourism, including camping and bushwalking, the opportunities for partnership between CALM and private sector tourist operators to develop nature-based tours in Lesueur National Park are immense. CALM sees that it has a complementary role with the tourism industry in managing and preserving natural assets (Shea and Sharp, 1992). Management strategies will ensure that visitors are given the opportunity to fully appreciate the Park and Reserve and at the same time protect and preserve the natural and cultural values of these areas in perpetuity. CALM will support private enterprise in developing opportunities to cater for transportation, accommodation and comfort needs of visitors.

STRATEGIES

1. **Encourage external agencies to be involved in providing for visitors' needs that are compatible with strategies contained in this management plan. (H)**

2. **Set charges and other licence fees where it is appropriate. (H)**

14.2 Mining, Mineral and Petroleum Exploration

The objective is to minimise the impact of mining, mineral and petroleum exploration on Lesueur National Park and Coomallo Nature Reserve.

Currently 24 granted and three pending Mining Act tenements cover the eastern part of the Lesueur National Park. The granted tenements were approved before the Park's declaration. Coomallo Nature Reserve has no current tenements. Petroleum permits cover both Lesueur National Park and Coomallo Nature Reserve.

Government policy on mineral and petroleum exploration and mining in national parks and nature reserves stipulates that the Mining, Petroleum and Conservation Acts are closely followed. They require that no tenements will be approved until the Minister for the Environment clears these activities with the Minister for Minerals and Energy. Proposals for explorations 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.

Parts of the Park and Reserve are prospective for coal and gas. In 1989 a proposal to develop an open-cut coal mine and a power station within the boundaries of the then proposed Lesueur National Park and adjoining private land was subject to comprehensive environmental impact assessment. It was rejected by government because of the high conservation values of the area involved (see 1.2 Creation of Lesueur National Park).

STRATEGIES

1. **If mining activities are to occur, ensure that stringent conditions are in place in order to minimise its impact. (H)**

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

14.3 Basic Raw Material Extraction

The objectives are to:

1. *Wherever possible obtain gravel and other industrial materials for internal construction work from outside the Park and Reserve.*
2. *Allow quarrying only after the absence of other suitable sources has been demonstrated. Quarrying should then be limited to areas where such activity will have minimal impact on increasing the spread of dieback disease, public use and the area's flora, fauna and landscape.*
3. *Minimise the risk of spreading dieback disease from activities associated with quarrying and transporting gravel and other industrial materials.*

Basic raw materials, including gravel, limestone, marl sand and rock aggregate, are needed for road construction and maintenance, and recreation site developments within the Park and Reserve. It is preferred that these materials are obtained from outside the Park and Reserve or from areas that are already disturbed or which are of lower conservation value. Transporting gravel and other industrial materials from areas outside the Park and Reserve increases the cost of road construction. Gravel and other industrial materials may only be extracted from the Park and Reserve in accordance with the NPNCA's Policy on Basic Raw Materials. Good quality gravel is a limited resource in the Lesueur region. Two gravel reserves adjoin the National Park, and a marl (limestone) reserve occurs on the Coorow-Green Head Road (see 3.0 Land Tenure). A pit in Coomallo Nature Reserve supplies gravel for maintenance works on the Brand Highway. Extraction is regulated under the Local Government, CALM and Mining Acts.

Extracting and moving gravel and other industrial materials can spread dieback disease. The presence of *Phytophthora citricola* along Cockleshell Gully Road calls for strict hygiene measures to be adopted when extracting gravel from pits along the road (see 7.1 Plant Diseases).

STRATEGIES

1. **Follow the NPNCA's Policy on Basic Raw Materials when extracting raw materials from the Park and Reserve. (O)**

2. **Enforce dieback hygiene measures when extracting raw material and maintain dieback free pits in a dieback free condition. (O)**

3. **Rehabilitate all or parts of pits as soon as material extraction is complete. Remove top-soil separately and store it for later rehabilitation work. Use seeds collected within the area for rehabilitation work wherever possible. (O)**

4. **Follow the Central Coast Region's draft basic raw materials protection policy. (O)**

14.4 Utilities and Services

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

A State Energy Commission powerline services a private property on Cockleshell Gully Road but there are no Telecom or Water Authority service lines or associated transport links that transect Lesueur National Park. However, the Coorow-Green Head Road and Cockleshell Gully Road traverse the Park. Coomallo Nature Reserve is affected by State Energy Commission, Telecom and Water Authority service lines and the natural gas pipeline. The roads servicing and surrounding the Park and Reserve show signs of *Phytophthora* dieback infections at various points (see 7.1 Plant Diseases).

Future Proposals

Any future proposals for utilities and services should be based on physical, biological, social and visual considerations and should be placed outside the Park and Reserve. All proposals that may have an impact on the environment will be referred to the Environmental Protection Authority (EPA), and are subject to environmental impact assessment in accordance with the Environmental Protection Act (1986).

STRATEGIES

1. **When the opportunity arises, negotiate to place new utility and service corridors outside the Park and Reserve. (H)**

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

3. **Control and monitor the effects of utility corridors and their maintenance upon the Park's conservation, landscape and recreation values. (M)**

4. **Investigate the potential to remove utility easements from Coomallo Nature Reserve. (M)**

14.5 Apiculture

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

The uncleared coastal heathlands between Wanneroo and Dongara are the 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 36 registered apiary sites occur in Lesueur National Park and Coomallo Nature Reserve. As beekeeping has occurred in the area for generations most of these sites were in place before the National Park was gazetted. 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 the current policy (Policy Statement No. 41, 1992), CALM will continue to assist the apiculture industry in so far as 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 honeybees, and the occurrence of declared rare flora. Under the zoning scheme, apiary sites are normally not permitted in Special Conservation areas (see 4.0 Management Zones). CALM's policy on beekeeping will be reviewed in 1995. In the meantime, no new sites will be permitted in the National Park and Nature Reserve.

STRATEGIES

1. **Require beekeepers to notify and consult with the local CALM office before visiting their sites so that a review of access and hive locations can be conducted. (O)**

2. **Require beekeepers to forward to CALM maps with all the tracks and firebreaks they use in Lesueur National Park and Coomallo Nature Reserve. (H)**

3. **For dieback reasons, cancel or relocate sites in the Special Conservation Zone in Lesueur National Park in consultation with apiarists. (H)**

4. **Review management of existing apiary sites in 1995, taking due regard to research results relevant to managed hives. (H)**

5. **Do not approve any additional apiary sites before the review in 1995. (H)**

COMMUNITY RELATIONS

Community Relations Goal
Promote informed appreciation of natural and cultural values.

15.0 INFORMATION, INTERPRETATION AND EDUCATION

The objective is to increase awareness, appreciation and understanding of the values of Lesueur National Park and Coomallo Nature Reserve, and support the strategies used to manage and conserve them.

An effective information, interpretation and education strategy is essential to achieve the goals and objectives to manage Lesueur National Park and Coomallo Nature Reserve. It informs the public of attractions, facilities and recreational opportunities available and provides an avenue to appreciate and greater understand the natural environment. At the same time, it fosters appropriate behaviour so that adverse impacts on the environment are minimised.

The information process has three parts:
- Information - provides details of facilities, activities and regulations;
- Interpretation - explains cultural and natural features; and
- Education - provides detailed materials and programs designed to facilitate learning of target groups.

Different information, interpretation and education programs will be developed for Lesueur National Park and Coomallo Nature Reserve.

Lesueur National Park is a popular destination especially in the wildflower season. The Park is rich in interpretive features including geology, flora, fauna, views and history.

Coomallo Nature Reserve is a major stopping point between Perth and Geraldton and is an entry point to Lesueur from the south. It is an ideal location to present interpretive material on the natural values of the area and the District in general.

It is important that the information conveyed is integrated throughout the Park, the District, and the Region (each site or area should provide a different thematic story). Interpretive stories should encourage exploration to enhance visitors' experiences and understanding of Park values.

Through innovative interpretation and education techniques, staff can also communicate how CALM manages its estate, not only in the Park but in all national parks, forests and natural areas.

STRATEGIES

1. **Develop a range of interpretive education programs that highlight the Park's and Reserve's natural features (including flora and fauna), cultural heritage, and management issues. (H)**

2. **Develop and implement a communication plan for Lesueur National Park and Coomallo Nature Reserve. (M)**

3. **Provide opportunities for visitors to make contact with CALM staff. (M)**

4. **Establish volunteer programs to use community expertise, knowledge and enthusiasm for interpretation and education purposes. (M)**

5. **Develop and implement schemes within the Park and Reserve that will foster positive visitor attitudes to environmental issues. (M)**

6. **Monitor all programs regularly and revise as required. (M)**

16.0 INTERACTION WITH THE COMMUNITY AND OTHER AUTHORITIES

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

Effective communication and liaison with other authorities is an essential component of sound management. Sound management must provide a forum for the community to contribute to managing Lesueur National Park and Coomallo Nature Reserve, as well as being informed about the area and management issues. Communication between neighbours and land managers also provides for integrated land management that is of particular importance when management issues go beyond the boundaries of the Park and Nature Reserve, such as

fire, weeds and visual resource management. Contingency plans in case of an emergency, such as rescue and evacuation in the event of a fire, should be prepared.

Community Involvement

Community involvement is an integral part of CALM's operations. The principal benefits from community involvement are better informed decisions that 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.

Volunteer groups and individuals have been involved during the preparation of this management plan and have assisted with management activities at Lesueur National Park. Volunteers will continue to be sought and will be of considerable benefit in many aspects of management.

Advisory Committee

An advisory committee was established by CALM to provide advice on the management plan for Lesueur National Park and Coomallo Nature Reserve and for Nambung National Park, Wanagarren, Southern Beekeepers and Nilgen Nature Reserves. Members of the Committee were selected following a call for expressions of interest advertised in local papers. Representation on the Committee includes a wide range of experience, values and viewpoints, such as local Shires, farming, volunteer bushfire brigades, apiary, conservation, commercial tours, scientific community, recreation interests and local community. The Committee's role was to advise on the preparation of the management plan. This Committee should be disbanded and its structure and membership reviewed. A new Advisory Committee may be formed with revised membership to advise CALM about implementation of this management plan.

Government Agency Liaison

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

- integrating fire and disease management;
- integrating management of Shires' reserves with the Lesueur-Coomallo area; and
- providing a valuable recreation resource to the local community.

Ongoing liaison with the Bush Fires Board, local Bush Fire Control Officers and volunteer brigades regarding fire protection of areas adjacent to Lesueur National Park and Coomallo Nature Reserve is also critical.

It is very important that all Government agencies whose role overlaps with Lesueur and Coomallo recognise the values of the area and the main issues of concern, and the part that they can play in protecting the environment of these areas. It is of particular importance to maintain liaison with agencies such as the Water Authority of WA, Western Power Corporation, Main Roads WA, the Department of Minerals and Energy, Telecom and the Northern Sandplains Dieback Working Party to ensure that stringent disease hygiene is applied to all operations that are carried out within and near the Lesueur-Coomallo area.

STRATEGIES

1. **Develop volunteer programs to implement the management plan where appropriate. (H)**

2. **Review the structure, membership and role of the existing Advisory Committee and the possibility of a new Committee. (H)**

3. **Involve individuals and organisations in helping to implement the management plan. (M)**

4. **Continue to liaise with other Government agencies and Shires, and involve them in managing and protecting the Park and Reserve. (M)**

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.

17.0 RESEARCH AND MONITORING

The objective is to plan and implement an integrated program of survey, research and monitoring by:
- *developing an understanding of natural and cultural environments; and*
- *assessing visitor use including experiences and perceptions.*

Research and monitoring are essential components of effective management and provide a scientific basis for management.

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

Monitoring projects should evaluate:
- efficacy in achieving management objectives;
- the environmental impacts of management practices;
- the social impacts of management practices; and
- the operation of management methodologies.

Research needs to be oriented to both natural and social environments.

Research and monitoring projects should give priority to those values identified as being most at risk (sensitive to disturbance) and to management practices 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.

It would be appropriate that research projects and monitoring programs involve as wide a range of people as possible. Involving volunteers, educational institutions and individual researchers can reduce research and monitoring costs, and help provide information to the broader community. CALM currently coordinates and promotes research undertaken within Lesueur National Park and Coomallo Nature Reserve.

STRATEGIES

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

2. **Encourage the Lesueur National Park and Coomallo Nature Reserve to be considered as benchmarks for environmental research and monitoring programs in the region. (H)**

3. **Implement an integrated program of survey, research and monitoring, including social monitoring, based on the strategies in the relevant sections of this plan. (M)**

4. **Integrate research and monitoring in Lesueur National Park and Coomallo Nature Reserve with studies outside the Park and Reserve. (L)**

IMPLEMENTATION

18.0 MANAGEMENT STRUCTURE AND STAFF RESOURCES

The objective is to provide staff and funds from sources internal and external to CALM to implement this plan.

Lesueur National Park and Coomallo Nature Reserve are serviced by CALM officers from the Moora District Office, which includes four rangers based at Cervantes and two operations officers based at Moora. Implementing the strategies contained in the Lesueur National Park and Coomallo Nature Reserve Management Plan over the next 10 years will place considerable demands on existing staff. Volunteer assistance in implementing the plan would alleviate some of these demands.

CALM provides funds to manage the Park and Reserve. 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, including establishing a trust fund to be used for managing the Park and Nature Reserve.

STRATEGIES

1. **Provide adequate staff numbers and train staff to implement the strategies contained in this plan. (H)**

2. **Take advantage of resources from both Government and private sources to implement this plan. (H)**

3. **Investigate and implement revenue raising mechanisms with the intention of retaining within the District the revenue raised. (H)**

4. **Develop volunteer programs. (M)**

19.0 PRIORITIES

The objective is to manage Lesueur National Park and Coomallo Nature Reserve according to assigned priorities.

Many strategies are put forward in this plan. While many are guidelines for management, others prescribe specific strategies 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.

STRATEGY

1. **Prepare a 10-year implementation plan taking into account the priorities outlined in Table 5. Prepare an annual progress report and review the implementation plan annually or as circumstances change. (M)**

Table 5.
STRATEGIES FOR LESUEUR NATIONAL PARK AND COOMALLO NATURE RESERVE BY LEVEL OF PRIORITY

ONGOING PRIORITY

6.7 Landscape Management

1. Implement CALM's Policy No. 34 (Landscape Management of CALM's Lands and Waters) in all aspects of land management of the Park and Reserve.
2. Implement CALM's Landscape Management Preservation Objective in managing the Park and Reserve.

7.1 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 Reserve.

7.2 Fire Protection

Prescribed Burning

1. Continue to apply standard Departmental requirements for an approved prescription before initiating a planned fire. The prescription must take particular account of environmental values, especially the need to control dieback and minimise impacts on the landscape and visual resources.

10.0 Access and Recreation Sites

1. Subject all road and track maintenance and construction to strict dieback hygiene measures.

14.3 Basic Raw Material Extraction

1. Follow the NPNCA's Policy on Basic Raw Materials when extracting raw materials from the Park and Reserve.
2. Enforce dieback hygiene measures when extracting raw material and maintain dieback-free pits in a dieback-free condition.
3. Rehabilitate all or parts of pits as soon as material extraction is complete. Remove top-soil separately and store it for later rehabilitation work. Use seeds collected within the area for rehabilitation work wherever possible.
4. Follow the Central Coast Region's draft basic raw materials protection policy.

14.5 Apiculture

1. Require beekeepers to notify and consult with the local CALM office before visiting their sites so that a review of access and hive locations can be conducted.

HIGH PRIORITY

3.0 Land Tenure

1. Liaise with owners and managers of properties and lands with boundaries common with the Park and Reserve to establish cooperative management, particularly with regard to fire management and vermin control.
2. Prepare interim fire management guidelines for the Drovers Cave National Park and adjoining Beekeeper's Nature Reserve that complement strategies in this plan.

4.0 Management Zones

1. Base future Park and Reserve management on the zoning scheme (Map 3).

6.1 Geology, Landforms and Soils

1. Provide interpretive material to visitors on the geology, landforms and soils of the area.

6.2 Water Catchments and Hydrology

1. Limit the abstraction of groundwater to use within the Park.
2. Investigate the likely impacts of providing a water supply for fire-fighting, dieback washdown facilities and drinking.
3. Design recreation sites to minimise impact on water catchments.

6.3 Vegetation

1. Identify plant communities that are rare, unique or in some way warranting special consideration.

HIGH PRIORITY (Cont'd)

2. Design facilities and management practices that minimise adverse impacts on these values.
3. Protect vegetation from *Phytophthora* dieback with emphasis on regionally rare communities.

6.4 Flora

1. Protect DRF, locally endemic and other priority flora, particularly those susceptible to plant diseases and vulnerable to fire management regimes.
2. Survey areas for DRF and priority flora before undertaking management actions.

6.5 Fauna

1. Identify and protect the habitats of significant vertebrate and invertebrate fauna.
2. Design facilities and management practices to accommodate these values.
5. Provide interpretive material to visitors on the fauna of the Park and Reserve.

6.6 Cultural Heritage

1. Protect all known Aboriginal sites and other historic sites of significance.
2. Incorporate information on the European and Aboriginal history of the area into interpretive material (see section 15.0 Information, Interpretation and Education).

6.7 Landscape Management

3. Implement the landscape management guidelines set out in Table 4.

7.1 Plant Diseases

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 Reserve to determine whether other infections occur.
4. 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.
5. Train staff associated with the area to recognise dieback and in sampling and management techniques.
6. Include disease management specifications in contract documents (including scientific flora collection licences) and job prescriptions, where appropriate.
7. Close particular areas, roads, tracks and walks if the presence of dieback is suspected or confirmed, or if a high risk of introducing or spreading dieback is identified.
8. Inform Park users about dieback and its management, and why it is important to prevent its introduction and spread (see 15.0 Information, Interpretation and Education).
9. Investigate the potential to remove utility easements from the Coomallo Reserve, and pursue any opportunity to decrease the potential of utility users to introduce disease to the Reserve.

7.2 Fire Protection

Prescribed Burning

2. Implement the Fire Management Plan (Map 7).
3. Monitor the Fire Management Plan annually to take into account major wildfires, and the inability to achieve burning programs.
4. Modify, relocate or defer burns where declared rare flora or fauna occur within proposed burn areas. Where it is essential for protection purposes for burning to occur, Ministerial permission to 'take' rare species must be obtained before conducting a burn.

Liaison

7. Establish a Fire Advisory Committee with representatives from local bushfire organisations, Shires, Bush Fires Board, beekeepers, and CALM to meet at least annually to review implementation of the fire plan and priorities. This group will make recommendations on the program priorities for the next year. CALM will aim to implement each annual program as recommended by the Advisory Committee after considering other District and Departmental priorities.
8. Continue to work closely with local authorities and brigades, beekeepers, adjacent landholders and the Bush Fires Board to ensure an effective fire management force is in place. The mutual-aid arrangements in carrying out burns and suppression activities will be encouraged in accordance with the Central West Coast Fire Protection Plan. In particular, Park perimeter buffers burns should be conducted in conjunction with local bush fire brigades and neighbouring landholders.

HIGH PRIORITY (Cont'd)

Pre-suppression

9. Develop a fire emergency contingency plan as part of the Moora District Fire Control Working Plan. Include standby and response arrangements and update the plan annually.
10. Maintain a network of fire management access and firebreaks using methods that minimise soil erosion and do not increase the risk of or contribute to introducing, spreading or intensifying dieback.
11. Maintain an effective fire detection system involving CALM staff, local bushfire brigades and neighbours.
12. Prohibit the lighting of woodfires within the Park and Reserve.

Suppression

14. In the event of a wildfire in or near the Park, fire suppression arrangements must be in accordance with the Central West Coast Fire Protection Plan and the Moora District Fire Control Working Plan.
15. Endeavour to contain wildfires that enter or start in the Parks within a management block defined by the strategic buffers given in Map 7.

Research and Monitoring

18. Record and analyse details of all fires, including fire behaviour information.

7.3 Introduced Animals

1. Monitor the incidence of feral animals, prepare a five-year control program and implement programs.

7.4 Introduced Plants

1. Prepare and initiate a weed management program in accordance with CALM Policy Statement No. 14 (Weed Management). Update the program annually seeking specialist advice as required.
2. Give priority to controlling weeds that are encroaching on threatened flora.
3. Eradicate, where practical, isolated outbreaks of weeds while the infestations are small and easily controlled.

7.5 Rehabilitation

1. Rehabilitate degraded sites in accordance with CALM Policy Statement No. 10 (Rehabilitation of Disturbed Land) and guidelines.

9.0 Recreation Opportunities

1. Provide recreation opportunities in the Park and Reserve to complement opportunities available elsewhere on CALM-managed and other public land in the region.
2. Provide recreation opportunities and facilities with minimal environmental impact as in the zoning plan (see 4.0 Management Zones) for the widest group of people possible.

10.0 Access and Recreation Sites

2. Design the proposed new access road into Lesueur National Park to comply with standards established by CALM and Main Roads WA.
3. Determine the most appropriate alignment of any additional access with regard to the Park's conservation and other values.

11.1 Bushwalking

1. Develop a network of foot access in Lesueur and Coomallo.
2. Promote a code of ethics for walkers in the Park (refer to 15.0 Information, Interpretation and Education).
3. Close foot access temporarily or permanently where the results of monitoring indicates that this is appropriate to protect the environment or, in extreme fire danger, the walker.

11.3 Group and Club-based Activities

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

HIGH PRIORITY (Cont'd)

12.0 Visitor Safety

1. Advise visitors of natural hazards. Provide and support educational material aimed at visitor safety. Include visitor safety information in Park and Reserve literature.
2. Design recreation facilities to minimise potential risks to visitors.

13.0 Domestic Animals

1. Prohibit domestic animals, including horses and dogs, in Lesueur National Park and Coomallo Nature Reserve excluding the Coomallo picnic area.
2. Allow pets under restraint at the Coomallo picnic area only.
3. Inform visitors why domestic animals are not allowed in the Park and Reserve.

14.1 Commercial Operators

1. Encourage external agencies to be involved in providing for visitors' needs that are compatible with strategies contained in this management plan.
2. Set charges and other licence fees where it is appropriate.

14.2 Mining and Mineral Exploration

1. If mining activities are to occur ensure that stringent conditions are in place in order to minimise its impact.
2. As far as possible, minimise the impact that any mining operations might have on the Park and Reserve, particularly with regard to introducing and spreading plant diseases, reducing landscape values, and decreasing water quality.

14.4 Utilities and Services

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

14.5 Apiculture

2. Require beekeepers to forward to CALM maps with all the tracks and firebreaks they use in Lesueur National Park and Coomallo Nature Reserve.
3. For dieback reasons, cancel or relocate sites in the Special Conservation zone of Lesueur National Park in consultation with apiarists.
4. Review management of existing apiary sites in 1995, taking due regard to research results relevant to managed hives.
5. Do not approve any additional apiary sites before the review in 1995.

15.0 Information, Interpretation and Education

1. Develop a range of interpretive education programs that highlight the Park's and Reserve's natural features (including flora and fauna), cultural heritage and management issues.

16.0 Interaction with the Community and other Authorities

1. Develop volunteer programs to implement the management plan where appropriate.
2. Review the structure, membership and role of the existing Advisory Committee and the possibility of a new Committee.

17.0 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.
2. Encourage the Lesueur National Park and Coomallo Nature Reserve to be considered as benchmarks for environmental research and monitoring programs in the region.

18.0 Management Structure and Staff Resources

1. Provide adequate staff numbers and train staff to implement the strategies contained in this plan.
2. Take advantage of resources from both Government and private sources to implement this plan.
3. Investigate and implement revenue raising mechanisms with the intention of retaining within the District the revenue raised.

HIGH PRIORITY (Cont'd)

20.0 Evaluation and Review

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

MEDIUM PRIORITY

3.0 Land Tenure

3. Continue negotiations with relevant bodies to include Reserve No. 24276 in the Coomallo Nature Reserve. In the meantime, endeavour to manage it as part of Reserve 41933.
4. Continue negotiations with relevant bodies to have Shire Reserve No. 29901 vested in the NPNCA for the purpose of Conservation Park.
5. Incorporate Reserve 40544 into Lesueur National Park following implementation of the Government's squatter shack policy and construction of the coast road.
6. Upgrade Coomallo Nature Reserve from a 'C' class to an 'A' class reserve.
7. Seek the support of the Shires of Coorow and Dandaragan to manage Shire reserves adjacent to Lesueur and Coomallo in a coordinated and compatible manner to management of the Park and Reserve.

6.1 Geology, Landforms and Soils

2. Design recreation sites that avoid special geological features and landforms, or consider their significance during the design phase to minimise the impact of development.

6.2 Water Catchments and Hydrology

4. Confer with the Water Authority of Western Australian to ensure that Park management does not detrimentally affect groundwater and surface water supplies.

6.3 Vegetation

4. Protect populations of species that are vulnerable to particular fire regimes by implementing appropriate fire management strategies.
5. Minimise removal or damage to vegetation caused by developing and maintaining visitor facilities.
6. Provide visitors with information on the area's vegetation, its features and the need to protect it.
7. Use the established monitoring plots as reference areas for further research and monitoring. Monitor to determine the longer term responses by plants to fire and other impacts.

6.4 Flora

3. Encourage research on the area's priority flora, including distribution mapping, responses to disturbance, reproductive biology and taxonomy.
4. Provide opportunities for visitors to increase their knowledge and develop an appreciation of the area's flora including appropriate walk tracks, a field herbarium and interpretive material.

6.5 Fauna

3. Monitor fauna in Lesueur National Park and Coomallo Nature Reserve.
4. Encourage research to identify the key terrestrial and aquatic invertebrate fauna, with emphasis on those most likely to be rare or threatened.

7.2 Fire Protection

Prescribed Burning

5. Conduct fuel reduction burning in the open-edge burn zones and parallel buffers only.

Pre-suppression

13. Establish cost-effective water supply points at strategic locations within or near the Park and Reserve. Design such storage points to prevent fauna from using them.

Information and Education

16. Prepare a communication plan to promote the Park's and Reserve's values and visitor appreciation, and support for fire management programs and fire safety and survival.
17. Develop bushwalker registration points.

MEDIUM PRIORITY (Cont'd)

Research and Monitoring

19. Encourage research on the regeneration of flora after fire, with particular emphasis on fire vulnerable species such as obligate seeders.

7.3 Introduced Animals

2. Liaise and coordinate feral animal control programs with neighbouring land owners.

7.4 Introduced Plants

4. Liaise with neighbours, local Government and other relevant authorities to encourage an integrated approach to weed management.

7.5 Rehabilitation

2. Prepare a detailed rehabilitation program. Review the rehabilitation program on an annual basis.
3. Monitor the effectiveness of rehabilitation works on a regular basis. Recommend changes to rehabilitation strategies to effect improvement.

10.0 Access and Recreation Sites

4. Progressively develop a system of walk tracks in Lesueur National Park and Coomallo Nature Reserve (see also 11.1 Bushwalking).
5. Assess and redesign the Coomallo picnic area to maximise visitor enjoyment of the area while minimising loss of natural attributes.
6. Develop the Lesueur day use area and redesign the Coomallo picnic area according to site development plans.
7. Close and rehabilitate tracks that are not required for management activities. Involve the community in rehabilitation projects (see 7.5 Rehabilitation).
8. Close particular areas, roads, tracks and walks if the presence of dieback is suspected or confirmed or if a high risk of introducing or spreading dieback is identified so that control measures can be evaluated or other strategies can be implemented.

11.1 Bushwalking

4. Provide adequate information from which visitors can choose the walk that is best suited to them.
5. Provide self-registration points for walkers using remote areas for safety reasons and to evaluate the effects of users on remote areas.
6. Monitor the environmental effects of bushwalking and how bushwalking opportunities meet visitor needs.

11.2 Camping

1. Provide opportunities for backpack camping in Lesueur National Park.
2. Monitor the environmental impacts associated with camping. Use the results to refine management practices.

12.0 Visitor Safety

3. Liaise with the appropriate emergency services to prepare plans including an evacuation plan, to deal with accidents and search and rescue operations.

14.4 Utilities and Services

3. Control and monitor the effects of utility corridors and their maintenance upon the Park's conservation, landscape and recreation values.
4. Investigate the potential to remove utility easements from Coomallo Nature Reserve.

15.0 Information, Interpretation and Education

2. Develop and implement a communication plan for Lesueur National Park and Coomallo Nature Reserve.
3. Provide opportunities for visitors to make contact with CALM staff.
4. Establish volunteer programs to use community expertise, knowledge and enthusiasm for interpretation and education purposes.
5. Develop and implement schemes within the Park and Reserve that will foster positive visitor attitudes to environmental issues.
6. Monitor all programs regularly and revise as required.

MEDIUM PRIORITY (Cont'd)

16.0 Interaction with the Community and other Authorities

3. Involve individuals and organisations in helping to implement the management plan.
4. Continue to liaise with other Government agencies and Shires, and involve them in managing and protecting the Park and Reserve.

17.0 Research and Monitoring

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

18.0 Management Structure and Staff Resources

4. Develop volunteer programs.

19.0 Priorities

1. Prepare a 10-year implementation plan taking into account the priorities outlined in Table 5. Prepare an annual progress report and review the implementation plan annually or as circumstances change.

20.0 Evaluation and Review

2. Review the plan within 10 years of its gazettal. This review should identify the extent to which the objectives have been achieved and strategies implemented, the reason for lack of achievement or implementation, and a summary of information that may affect future management.

LOW PRIORITY

3.0 Land Tenure

8. Acquire, by purchase or exchange when available, private properties adjoining the Park and Reserve that have exceptional conservation values not adequately represented within the Park and Reserve, or that have recreation values, management benefits, or that could protect areas with these values within the Park. Purchase or exchange must also consider other land uses and the views of the local community.

6.1 Geology, Landforms and Soils

3. Identify special and fragile geological features and landforms.
4. Encourage further research into the geology and geomorphology of the area.
5. Liaise with speleologist groups regarding management operations likely to impact on karst features.

6.2 Water Catchments and Hydrology

5. Encourage research into the hydrology of the Park and Reserve and the impacts of management practices on surface and groundwater.
6. Consider the catchments of the Park as natural benchmarks for catchments in the region.

6.3 Vegetation

8. Research the response of plant community types to management regimes, especially fire. Modify management practices as necessary.

6.6 Cultural Heritage

3. Liaise with local Aboriginal communities on the significance of the Lesueur-Coomallo area to Aboriginal people.
4. Encourage the study of the area's cultural history by tertiary institutions and interested individuals.

6.7 Landscape Management

4. Encourage surrounding Shires, other Government agencies and private landholders 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.

7.1 Plant Diseases

10. Investigate means by which cost effective and efficient washdown facilities for public use can be installed, especially at the entrance to Lesueur National Park.

LOW PRIORITY (Cont'd)

7.2 Fire Protection

Prescribed Burning

6. Consider scrub-rolling of heath vegetation buffers where this is considered advantageous. Scrub-rolling may only be carried out under dry soil conditions, and must take into account landscape impacts and soil erosion potential.

Research and Monitoring

20. Prepare and implement a program to monitor changes in vegetation and weed structure and composition following fire.

7.4 Introduced Plants

5. Monitor weed control measures to determine their success and the need for further treatment.

7.5 Rehabilitation

4. Provide opportunities for interested individuals and groups to be involved in rehabilitation projects.

9.0 Recreation Opportunities

3. Determine visitor numbers and patterns of use by monitoring vehicle numbers, and conducting site surveys and interviews to determine recreation needs.

11.2 Camping

3. Liaise with other organisations to provide information on camping opportunities available elsewhere in the region.

12.0 Visitor Safety

4. Provide and maintain rescue equipment and train staff to assist in emergency situations.

17.0 Research and Monitoring

4. Integrate research and monitoring in Lesueur National Park and Coomallo Nature Reserve with studies outside the Park and Reserve.

20.0 EVALUATION AND REVIEW

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.

STRATEGIES

1. **Review the implementation of the plan annually, prior to preparing the works program for the following year. The review should identify which strategies have been achieved and to what degree, and any new information that may affect management. (H)**

2. **Review the plan within 10 years of its gazettal. This review should identify the extent to which the objectives have been achieved and strategies implemented, the reason for lack of achievement or implementation, and a summary of information that may affect future management. (M)**

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Appendix 1. LANDSCAPE CHARACTER TYPES

Scenic Quality	General Description
Geraldton Plains Landscape Character Type	
HIGH	
Landform	High rounded hills or ridges with steep slopes e.g. Mt Fairfax. Mesas, ranges and escarpments with sharp breakaways, e.g. Mt Lesueur. Steep-sided gorges and strongly dissected valleys, e.g. Stockyard Gully. Cliffs and headlands, e.g. White Cliffs. Islands and reefs, e.g. Houtman Abrolhos Islands. Irregular coastline edges often emphasised by distinctive rock outcropping, bays or inlets, e.g. Dynamite Bay. Primary dunes which display areas of active sand movement.
Vegetation	Windshaped, gnarled or dwarfed vegetation unusual in form, colour or texture, e.g. Greenough River Gums. Areas of high plant diversity which display distinctive textural and colour patterns. Single trees, shrubs or vegetation patches which become focal points due to isolation or position in landscape. Dramatic displays of seasonal colour, e.g. Illyarrie.
Waterform	All estuaries, inlets, lakes and swamps, e.g. Hutt Lagoon. Unusual ocean shoreline motion due to islands, reefs and shoreline configuration. River pools and other permanent water features, e.g. Noondamurra Pool. Steep-sided valleys associated with major river drainages, e.g. Irwin River.
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	Expanses of beach of uniform width and colour without rock outcroppings, cliffs or headlands. Gently undulating plains and rounded hills similar in gradient to surrounding landforms which are not visually distinctive or prominent.
Vegetation	Some structural, textural and seasonal colour patterns evident in vegetation but lacking in uniqueness or distinction relative to surrounding vegetation.
Waterform	Seasonal wetlands, intermittent streams and creeklines. Uniform ocean shoreline and motion characteristics with little diversity.
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	Expanses of indistinctly dissected landform.
Vegetation	Extensive areas of similar vegetation cover with little or no structural or textural diversity or colour changes.
Waterform	Waterforms absent.
Land Use	Developments in which the form, line, colour and texture of introduced elements contrast markedly with natural features.

Appendix 2.
SPECIES MOST VULNERABLE TO DEPLETION BY FREQUENT FIRES[9]

Storage	Priority Code	Geog. Range	Vegetation	Species
1	-	2	V	*Banksia lanata*
1	-	-	V	*Banksia leptophylla*
1	-	-	V	*Banksia prionotes*
1	-	2	V	*Banksia telmatiaea*
1	3	2	I	*Beaufortia bicolor*
1	-	-	I	*Beaufortia elegans*
1	-	-	V	*Dryandra carlinoides*
1	-	-	V	*Dryandra sessilis*
1	-	2	V	*Dryandra* sp. aff. *falcata*
1	1	2	V	*Dryandra* sp. aff. *hewardiana*
1	-	-	V	*Hakea erinacea*
1	-	-	I	*Hakea gilbertii*
1	4	1	V	*Hakea neurophylla*
1	-	-	V	*Hakea obliqua*
1	-	-	V	*Hakea trifurcata*
1	-	-	V	*Hakea undulata*
1	-	-	V	*Isopogon adenanthoides*
1	1	-	-	*Isopogon drummondii*
1	-	-	V	*Isopogon dubius*
1	3	2	-	*Isopogon tridens*
1	-	-	V	*Melaleuca platycalyx*
1	-	-	V	*Melaleuca* sp. aff. *acerosa*
1	-	-	V	*Petrophile chrysantha*
1	-	-	-	*Petrophile ericifolia*
1	-	-	V	*Petrophile seminuda*
1	-	-	-	*Petrphile serruriae*
2	1	1	-	*Andersonia longifolia*
2	-	-	-	*Astroloma xerophyllum*
2	-	-	-	*Conospermum glumaceum*
2	-	2	-	*Conospermum nervosum*
2	-	-	-	*Daviesia daphnoides*
2	-	-	V	*Gastrolobium spinosum* var. *spinosum*
2	-	-	-	*Lysinema ciliatum*
2	-	-	V	*Verticordia densiflora*
2	1	1	-	*Verticordia fragrans*

Source: E.A. Griffin and A.J.M. Hopkins, unpublished data.

Key
Storage Location: 1 - On plant 2 - In soil
Geographical Range: 1 - < 50 km 2 - 50 -150 km
Vegetation: V - Very important or dominant in some vegetation types
I - Important in some vegetation types

Priority Codes

Priority 1. Poorly Known Taxa.
Taxa which are known from one or a few (generally < 5) populations which are under threat, either due to small population size, or being on lands under immediate threat, e.g. road verges, urban areas, farmland, active mineral leases etc., or the plants are under threat, e.g. from disease, grazing by feral animals etc. They may include taxa with threatened populations on protected lands. Such taxa are under consideration for declaration as 'rare flora' but are in urgent need of further survey.

Priority 2. Poorly Known Taxa.

9 This occurs if the time between successive fires is less than the time taken for a species to regenerate flower seeds. The time differs for each species.

Taxa which are known from one or a few (generally < 5) populations, at least some of which are not believed to be under immediate threat, i.e. not currently endangered. Such taxa are under consideration for declaration as 'rare flora' but are in urgent need of further survey.

Priority 3. Poorly Known Taxa.
Taxa which are known from several populations, at least some of which are not believed to be under immediate threat, i.e. not currently endangered. Such taxa are under consideration for declaration as 'rare flora' but are in need of further survey.

Priority 4. Rare Taxa
Taxa which are considered to have been adequately surveyed and which, whilst being rare (in Australia), are not currently threatened by any identifiable factors. These taxa require monitoring every 5-10 years.

Appendix 3.
POTENTIAL IMPACT ON DECLARED RARE AND PRIORITY 1 SPECIES OF FUEL REDUCTION BURNING OF BUFFERS.

Occurrences in frequently and less frequently burnt buffers are listed separately. Potential impact on these occurrences are coded in parenthesis ( ).

Regen. Mode	Buffer - 8 yrs	Buffer - 15 yrs	DRF	Species
OSc	l(m)	h(m)		*Dryandra* sp. aff. *hewardiana*
OSs	-	l(e)		*Acacia forrestiana*
OSs	i(e)	l(e)	R	*Asterolasia drummondii*
OSs	-	l(?)		*Andersonia longifolia*
OSs	i(e)	l(e)		*Daviesia 'pteroclada'*
OSs	l(?)	l(?)		*Gompholobium* sp. (Gairdner Range)
?OSs	-	m(?)		*Goodenia xanthotricha*
OSs	-	l(i)		*Grevillea thelemanniana* ssp. *delta*
OSs	-	t(?)		*Verticordia fragrans*
S	i(i)	l(i)	R	*Banksia tricuspis*
S	-	l(i)	R	*Eucalyptus lateritica*
S	-	l(i)	R	*Eucalyptus suberea*
S	l(i)	-	R	*Hakea megalosperma*
S	-	l(i)		*Leucopogon plumuliflorus*
S	i(i)	l(i)		*Xanthosia tomentosa*
C	i(i)	l(i)		*Patersonia argyrea*
G	-	l(i)	R	*Thelymitra stellata*
?	?	m(?)		*Grevillea batrachioides*

Source: E.A. Griffin and A.J.M. Hopkins, unpublished data.

Buffer Type
8 yrs - mainly those between mineral earth breaks
15 yrs - open edge burns

Regeneration Mode
OSc Obligate Seeder (canopy seed store)
OSs Obligate Seeder (soil seed store)
S Sprouting shrubs and mallees
G Sprouting geophyte
C Sprouting chaemophyte
? uncertain

Occurrence in buffer and proportion of populations in Lesueur and Coomallo areas
- absent
i insignificant proportion
l low proportion
m moderate proportion
h high proportion
t total

Impact on populations within buffers
i insignificant
e enhanced (likely to increase population size)
m minor
? uncertain, possibly adverse