Fitzgerald River National Park

Management Plan 1991-2001

MANAGEMENT PLAN No 15

Department of Conservation and Land Management

FITZGERALD RIVER NATIONAL PARK

MANAGEMENT PLAN

1991 - 2001

Project Team

Sue Moore (Coordinator)
Matt Cavana
Kelly Gillen
Chris Hart
Steve Hopper
Kate Orr
Wayne Schmidt

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

PREFACE

Most national parks and nature reserves in Western Australia are vested in the National Parks and Nature Conservation Authority (NPNCA). The Department of Conservation and Land Management (CALM) manages these parks and reserves.

The NPNCA is responsible for the preparation of management plans for all lands which are vested in it. Area plans for individual national parks and nature reserves are prepared on a priority basis. CALM and its two controlling bodies - the National Parks and Nature Conservation Authority (NPNCA) and the Lands and Forest Commission (LFC) - are also responsible for the preparation of regional management plans. These provide a framework for individual area management plans. CALM's South Coast Regional Management Plan, which is currently being prepared, includes reference to the Fitzgerald River National Park.

A draft management plan for Fitzgerald River National Park was prepared by CALM and issued by the NPNCA for public comment. After considering public comment, the NPNCA submitted the revised plan to the Minister for the Environment for approval. The Minister approved this document as the management plan for Fitzgerald River National Park on 6 June 1991.

On 7 May 1991, the Bush Fires Board endorsed this plan under Section 34(l) of the Bush Fires Act (1954) as the basis for the preparation of an annual works program by the fire advisory group (refer to Prescription 8, Section 9.2).

ACKNOWLEDGEMENTS

The advice provided by the Fitzgerald River National Park Advisory Committee has formed the basis of this plan. The Committee's honorary members - Tom Atterby (Chairman), Keith Bradby, Alan Carmichael, Rodney Daw, Rex Edmonson, Pam Forbes, Wilma Goddard, Bill Lullfitz, Max Meade, Ken and Brenda Newbey and John Watson (CALM) - have willingly given their time, enthusiasm and knowledge. Their contribution is gratefully acknowledged.

The dedication of the Fitzgerald River National Park Association, particularly Ken and Brenda Newbey and Andrew Chapman is gratefully recognised. The support and assistance provided by the Fitzgerald River National Park Rangers and their wives (Chris and Mary Hart, Bob and Pam Newlands and Geoff and Norma Keen) is also acknowledged.

Many other interested people and groups from inside and outside CALM have contributed to this plan. Officers from the Mines Department, Water Authority of Western Australia, Fisheries Department and Environmental Protection Authority have provided valuable information and advice. The assistance of Terry Maher, Hugh Chevis, Chris Haynes, Frank Batini, Rick Sneeuwjagt and Ian Herford from CALM, and Max Churchward from CSIRO is particularly appreciated.

The efforts of CALM's Peter Bowen, John Forster, Alan Clarke, Rod Properjohn and Chris Simms in preparing the maps for this plan, and Debbie Bowra for the typing, are also gratefully acknowledged.

SUMMARY

Fitzgerald River National Park covers an area of about 329 039 ha and lies on the central south coast of Western Australia, 420 km south-east of Perth, between Bremer Bay and Hopetoun in the Shires of Jerramungup and Ravensthorpe. It is one of the largest and most botanically significant national parks in Australia.

Fitzgerald River National Park (FRNP) represents an opportunity to maintain substantial parts of a large south coast national park in an undisturbed state. Without proper management and public support this important opportunity will be lost.

Values

FRNP is one of the richest areas for plants in Western Australia, with 1748 identified species. About 75 of these are endemic, that is, they are found nowhere else, and some 250 species are either very rare or geographically restricted. The Park contains 20% of the State's described species.,,

Although endemics occur throughout the Park, the highest concentration is in the Barren Ranges.

FRNP has a richer fauna than any other conservation area in the south-west of Western Australia. The following numbers of species have been identified: 184 birds (3 declared rare and 2 declared in need of special protection), 22 native mammals (7 declared rare), 12 frog species and 41 reptiles (I declared in need of special protection). The Park offers the best long-term survival prospects in Western Australia for the Ground Parrot and Dibbler. It is the only conservation reserve with the Heath Rat and the largest reserve with Tammar, Red-tailed Wambenger, Woylie, Western Mouse, Western Bristlebird and Western Whipbird. The rare animals are concentrated in the northern Part of the Park, which overlies the granitic shield of the southern wheatbelt.

The Park is one of only two International Biosphere Reserves in Western Australia (the other is Prince Regent River Nature Reserve). This status was originally conferred because of the Park's extremely high floral diversity. The Biosphere Reserve values are enhanced by local community interest and local adoption of the Biosphere concept.

The Park's diverse landscapes, with extensive vistas free of any signs of human disturbance, hold a particular appeal. These landscapes include a combination of windswept and protected beaches, rugged sea-cliffs, the steep Barren Ranges rising to 450 m, extensive plains and abrupt river valleys ending in inlets. The natural vegetation forms an important element in the appeal of the Park and is an integral part of its conservation and recreation values.

A range of recreation opportunities, based on natural settings, is provided in the Park. This includes sightseeing, bushwalking, swimming, camping, fishing and nature study.

The Park also has a rich human history, of both historical and archaeological importance.

Management Concerns

The greatest management concern in FRNP is dieback disease caused by soil fungi. Much of the regional flora is highly susceptible to the disease, and this problem is compounded by summer rainfall which provides warm, moist conditions favourable to the survival and spread of the dieback fungi. Dieback is most commonly introduced and spread in infected soil, mud or moist gravel on the wheels and underbodies of vehicles. Loss of vegetation to dieback will seriously reduce the Park's conservation and recreation values.

The future of the rare fauna is also a management concern. A number of these species appears to have very specific habitat requirements, such as periods greater than 15 years between fires and protection from introduced predators, such as foxes.

There is widespread concern about the effect large scale fires have on the Park's ecological and landscape values as well a's adjoining farmlands and nearby towns. Fire has been a feature of the Park's history over the last 40 to 50 years. Lightning-caused wildfires in December 1989 burnt 40% of the Park.

Another major issue is the increasing access to the coast for fishing, camping and beach activities. Many parts of the Park, and especially the coast, are fragile and cannot support the existing levels of use without environmental damage. These areas are likely to degrade further unless they are managed.

Management Goals

The principal management goal for FRNP is to conserve all flora and fauna, particularly the large number of rare species and those in need of special protection. A complementary goal is to conserve the Park's landscapes, in particular, the extensive vistas free of human disturbance.

The other important goal is to fulfil the recreation needs of visitors to the extent that they are compatible with flora, fauna and landscape conservation.

Management Prescriptions

INTERNATIONAL BIOSPHERE RESERVE STATUS

14 support the locally-based Fitzgerald Biosphere sphere Project Committee.

15 recognise the whole of FRNP as the "'core" of the Fitzgerald Biosphere Reserve. Such designation means minimum human interference.

MANAGEMENT ZONES

· designate and manage four management zones - special conservation, wilderness, natural environment and recreation.

The special conservation zone covers the northern part of the Park where there is a concentration of rare fauna. Vehicle access through this zone is by Hamersley and Pabelup Drives. There is usually no other motorised access, except for research and essential management. The level of management activity in this zone is high.

The wilderness zone covers the centre of the Park. Access' is non-motorised except in emergency situations and for essential management purposes. The level of management is low.

The natural environment zone covers much of the Park. Access is by designated 4WD tracks or on foot. Non-motorised access is preferred. The level of management is low to moderate.

The recreation zone is based on 2WD roads and recreation sites and includes almost all of the popular visitor destinations in the Park. The level of management is moderate to high.

CONSERVATION

Disease

1) regularly update maps of current dieback distribution and susceptible vegetation. Use these maps as the basis for disease management in the Park.
2) evaluate the consequences of introducing or spreading dieback, before approving any development or management actions in the Park.
3) exclude vehicles from the Dempster and "Lake Nameless" catchments and three small coastal catchments in the centre of the Park, to minimise the risk of further dieback introduction and spread. Allow vehicle access in these areas under strict permit, subject to NPNCA approval.
4) monitor known infections, while continuing to survey for additional infections.
5) request Park visitors to clean soil and mud off their vehicles and shoes before entering the Park.
6) continue to provide detailed training for rangers and other Park workers on dieback control and enforce such controls in day-to-day work practices.

7) widely disseminate information to increase the community's awareness and understanding of dieback.

Rare Flora

1) protect priority species by surveying, mapping and monitoring populations.
2) concentrate protective management and research on the Barren Ranges.

Rare Fauna

1) survey distribution and research habitat requirements, life history characteristics and effects of fire regimes and predation, on rare mammals, birds and reptiles.
2) concentrate research effort on the northern part of FRNP.
3) develop and implement- management programs to protect and enhance rare fauna habitats.

Fire

1) provide a combination of burnt buffers, mosaic burning within cells and areas from which planned fire is excluded for ecological reasons. The priority for buffers will be the Park boundaries, then the southern edge of the rare fauna zone. Other internal buffers should follow.
2) ensure all suppression strategies take full account of dieback risks.
3) aim to contain wildfires within a cell defined by buffers.
4) minimise direct attack in the wilderness and natural environment zones.
5) continue mutual aid arrangements with the local community, in carrying out prescribed burning and fire suppression.

RECREATION

Access

- maintain public access to designated parts of the Park, while controlling dieback to protect the Park's biological values.
- assess all roads, tracks (including management-only) and paths to determine treatments required to minimise dieback introduction and/or spread. Carry out required works consistent with landscape and safety requirements.
- provide two 2WD all-weather loop roads through the Park (Hamersley and Pabelup Drives) and several spur roads to the coast and other features. If necessary, these roads will be closed following rain to reduce dieback risk.
- provide a number of 4WD tracks (Fitzgerald Inlet, Quoin Head, Hamersley Dunes/Edwards Point and Moir Track). If necessary, close following rain to reduce dieback risk.
- provide a range of walking and hiking opportunities. For safety reasons, self-registration will be encouraged for walks into remote areas. Close Mid Mt Barren, Woolbernup Hill and Thumb Peak to all access, including walking, to keep these peaks and their rare plants free of dieback.

- retain provision in this plan for temporary or permanent closure, realignment or treatment of particular roads, tracks, paths or areas if a high risk of dieback introduction or spread is identified.
- keep Trigelow, Point Charles Bay, Fitzgerald and Hamersley Beaches open to 4WDs. All other beaches will remain closed to vehicles and foot access will be encouraged. 4WD use Of particular beaches will be monitored for impacts on wildlife, safety risks, and damage to foredunes.
- retain a minimum number of -management-only tracks. These will only be used in dry soil conditions in management vehicles from which all soil has been removed.

Recreation Sites

- continue to provide and maintain a number of day use/parking areas close to natural attractions such as beaches.
- provide a range of 2WD, 4WD and foot-only accessible campsites, plus selected sites for club and group camping. Sites are:
    1. 2WD-accessible camping: St Marys, The Peninsula (east of Quaalup on Gairdner River), Paperbark Flat (at the southern end of Pabelup Drive), Hamersley Inlet, Four Mile and Twertup.
    2. 4WD-accessible camping: Fitzgerald Inlet, Hamersley River crossing, Quoin Head and Hamersley dunes.
    3. backpackfoot-access-only camping: The Gorge, McCulloch's Crossing, "'Small Boondalup" River, Doggers Swamp and the eastern end of Fitzgerald Beach.
    4. vehicle-based group camping: The Peninsula, Wellstead Flats, Kybulup Pool and Hamersley Drive.
- close camping sites behind Trigelow Beach, at Point Charles, Edwards Point and West Hamersley because of erosion and degradation.
- change the use of Mylies and Point Ann from camping and day use to day use. Provide attractive camping alternatives. Both sites are highly degraded and eroding. They are limited in area and appear unable to sustain the pressures of camping in the longer term.

EDUCATION

- provide a range of interpretive opportunities and publications on Park values, including brochures.
- keep information bays at the Park entrances up-to-date, and provide theme-based information displays at key sites. Information on dieback and its control will be prominent.
- run seasonal interpretive programs.
- support use of Twertup by the FRNP Association.

RESEARCH AND MONITORING

1. establish a CALM Research Station in or near the Park. Jacup is a potential site.
2. implement an integrated survey, research and monitoring program for the Park which addresses both short and long-term information needs.

MANAGEMENT PRIORITIES

The six main priorities are:

1. determining practical procedures for dieback control to protect the Park's flora, particularly the priority species.
2. realigning and/or treating roads, tracks (including management-only) and paths designated in this plan, where necessary, to reduce dieback risks.
3. establishing (and relocating where necessary) boundary fire buffers.
4. changing Pt Ann and Mylies from camping and day use to day use only and providing attractive alternatives.
5. providing up-to-date Park publications, displays and signs.
6. conducting research into the habitat requirements of rare species such as the Ground, Parrot, Western Bristlebird and heath rat.

CONTENTS

MAPS

TABLES

PART A. INTRODUCTION

1.0 BACKGROUND

1.1 PARK OVERVIEW

Fitzgerald River National Park (FRNP) lies on the central south coast of Western Australia, 420 km south-east of Perth, between Bremer Bay and Hopetoun in the Shires of Jerramungup and Ravensthorpe (Map 1 a). The major values and attractions are the highly diverse flora, including rare species, rare fauna, extensive natural landscape including rugged coastal ranges, sea cliffs, gorges and inlets; and the opportunities for nature study, bushwalking, camping, fishing and swimming. The major management concerns are dieback disease, fire and soil erosion.

In Western Australia, a national park is 'a relatively large area set aside for its features of predominantly unspoiled natural landscape, flora and fauna, permanently dedicated for public enjoyment, education and inspiration and protected from all interference other than essential management practices, so that its natural attributes are preserved' (Jenkins, 1980). It is managed to allow such recreational use by the public as is consistent with the proper maintenance, restoration and protection of the environment. The significance of this area as a national park and its fulfillment of the dual conservation and recreation criteria are given in Section 2.0 Management Goals.

The Park names and features referred to in this plan are shown on Map 1b. It should be noted, however, that names on maps are not necessarily officially accepted nomenclature.

1.2 REGIONAL CONTEXT

FRNP is one of 13 national parks in CALM's South Coast Region. Parks closest to Fitzgerald River include Stokes (coastal, inlet and ocean), Frank Hann (inland heath and granite outcrops) and Stirling Range (inland peaks and wildflowers) (Map 1a). The south coast national parks offer a diversity of opportunities and experiences. Visitors come from overseas, interstate, Perth and locally. FRNP is being considered from a regional perspective in CALM's South Coast Regional Management Plan, which is currently being prepared (1991).

Numerous nature reserves are dotted throughout CALM's South Coast Region. Most are small and isolated amidst cleared farmland. Lake Magenta Nature Reserve (94 170 ha), which lies 40 km to the north-west of Fitzgerald River National Park, just outside the regional boundary, is the largest nature reserve near the Park. It is linked to the Park by a narrow corridor of uncleared vegetation in Crown reserves along the Fitzgerald River. Substantial areas of uncleared Crown land are still found around Ravensthorpe. One such area abuts the north-eastern boundary of the Park and links it to Cocanarup Timber Reserve (Map la).

1.3 NPNCA AND CALM MANAGEMENT POLICIES

This plan is based on NPNCA and CALM policies current at the time of writing (February, 1991). These policies derive from legislation, principally the CALM Act (1984), and associated regulations. Policies are published and distributed throughout CALM as policy statements. They are available to the public on request.

1.4 PRINCIPLES OF MANAGEMENT

This management plan is based on a number of "principles of management". The guiding principle is that the Park's ecosystem is composed of numerous interrelated parts. Damage or change to any part will ultimately affect the whole ecosystem. The following "principles" focus on dieback disease, fire, wilderness and recreational access.

Dieback Disease

Until recently, Fitzgerald River National Park was considered to be relatively free of dieback. In a sense this was an anomaly given the high impact of the disease along the remainder of the south coast of Western Australia, as far east as Cape Arid National Park. For example, the disease is widespread in the Stirling Range National Park, which is 120 km to the west of Fitzgerald River National Park.

In Fitzgerald River National Park the heavy rains of January 1990 appear to have stimulated a high level of disease activity. Dieback is now suspected to be more widespread than indicated in the draft management plan (published June, 1989). Many of the Park's plant species are potentially susceptible to dieback.

Areas which have been burnt by the recent wildfires will not now be interpretable for at least five to seven years; that is, the presence or absence of dieback can not be determined until susceptible plant species regenerate, allowing the dieback fungus to become reactivated in the soil. If soil conditions are not favourable to dieback activity it may take longer than five years for the disease to become active again.

Knowledge that more of the Park is infected with dieback than was previously thought means that extra care must be taken to protect the remaining uninfected areas. This may mean stricter control of access (including foot access) than was proposed in the draft plan.

Principles

1. Dieback remains the greatest single threat to maintenance of the Park's conservation values. It is the greatest management concern. It is essential to err on the side of caution when considering dieback.

2. Areas burnt by the December 1989 wildfires cannot be assumed to be either dieback free or dieback infected, and indications one way or the other are unlikely to appear for at least five years. However, those areas which are most likely to be uninfected include the remote coastal catchments and mountain ranges.

3. The more widespread occurrence of dieback, now confirmed within the Park, means that extra care must be taken to protect the remaining uninfected areas, and to minimise any further spread in areas already infected.

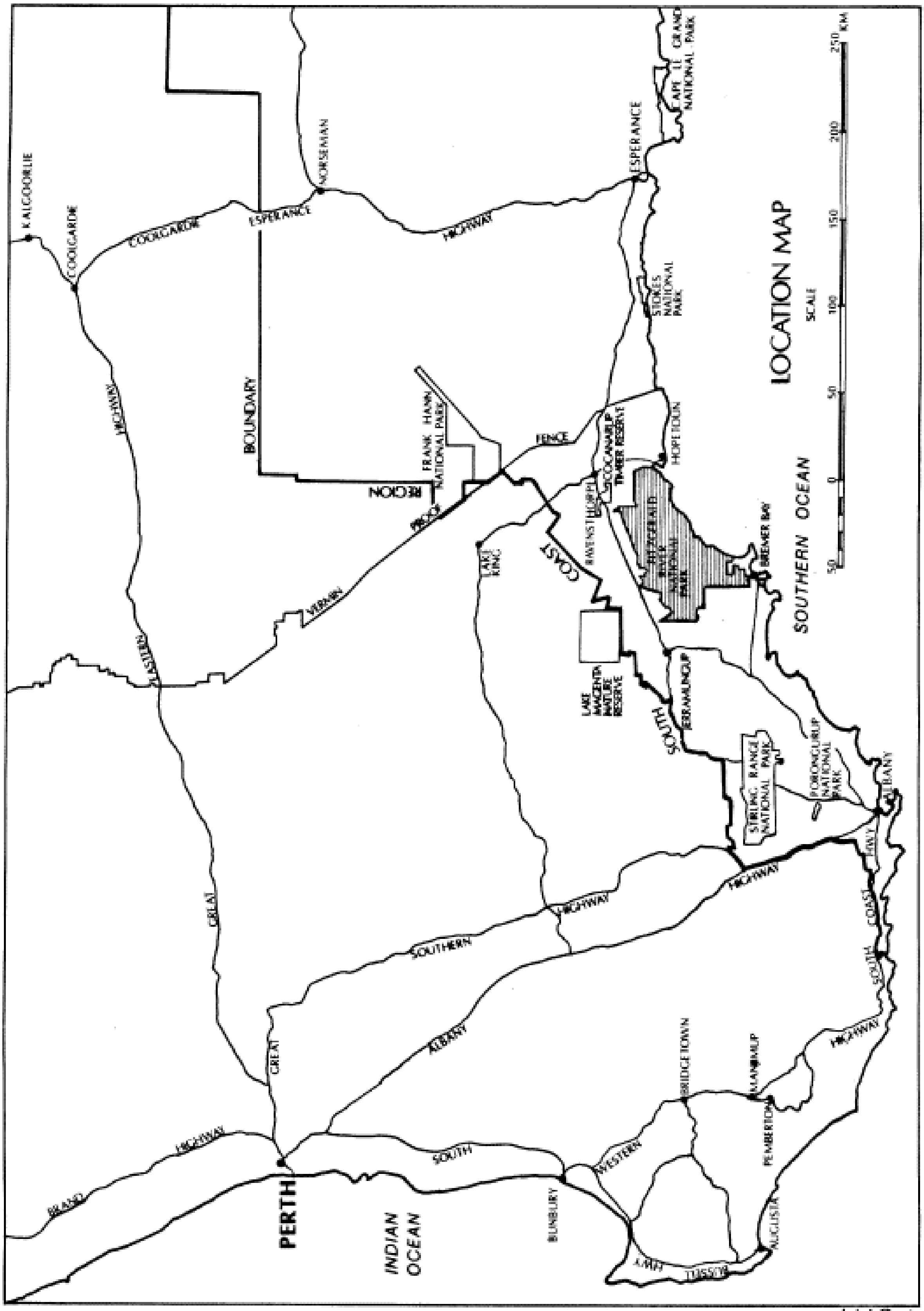
Fire

Fire management in Fitzgerald River National Park must meet the needs of both nature conservation and protection of the local community.

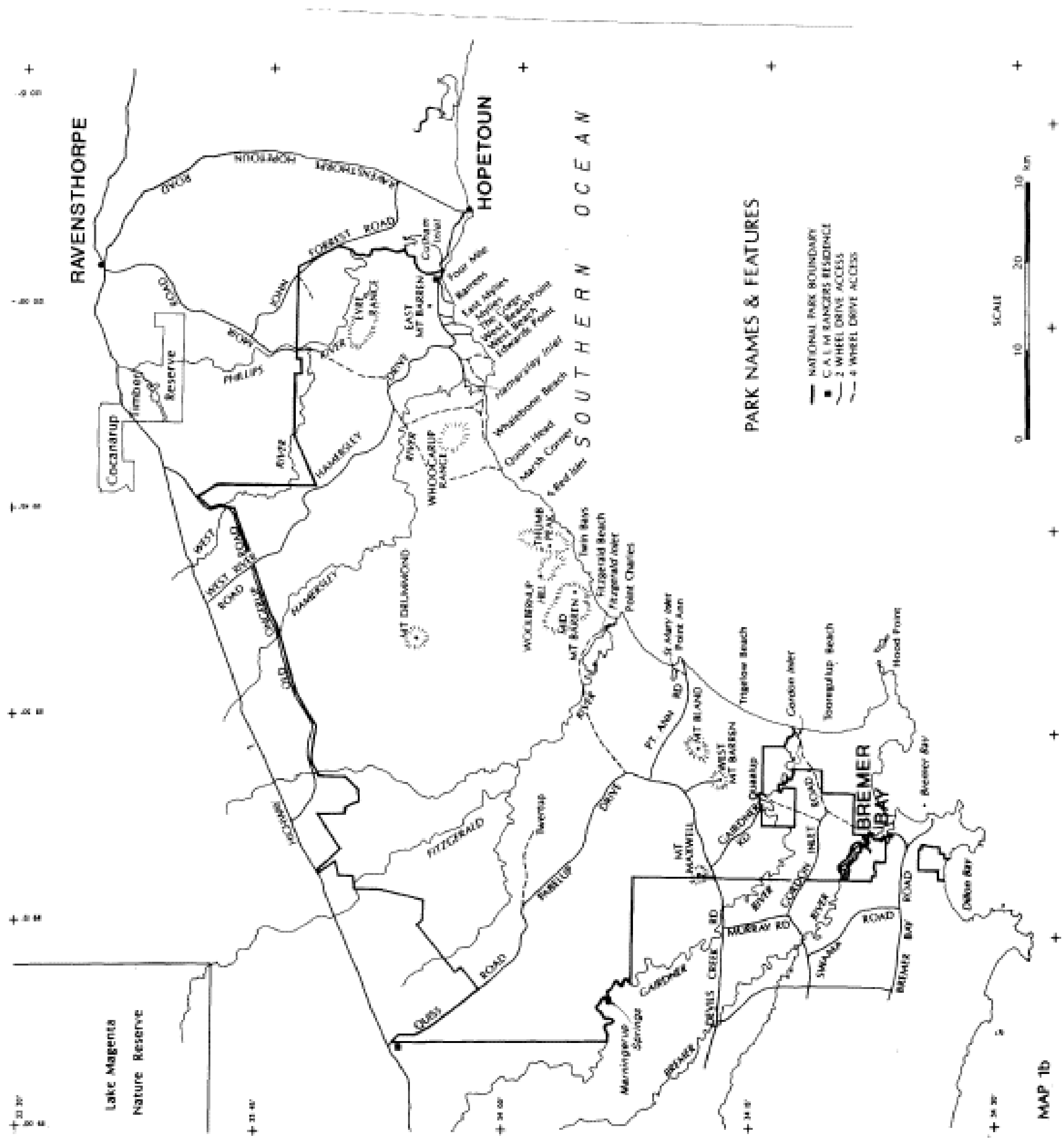
The major wildfires which occurred in December 1989 were, initially at least, natural phenomena. However, they were unacceptable from a nature conservation viewpoint given that Fitzgerald River National Park is an area of remnant vegetation. It is surrounded to the west and north, and partially to the east, by cleared farm land. Consequently if the entire Park was burnt at one time, re-colonisation by native fauna from surrounding areas would not be possible. Furthermore, burnt areas are not interpretable for dieback for five to seven years. The local community was also concerned about the magnitude of the fires and the damage incurred on neighbouring farms. Therefore, it is not acceptable, from either local community or nature conservation perspectives, to have large wildfires in Fitzgerald River National Park.

Although the December 1989 wildfires are the worst to have occurred in the Park area within living memory, and may not be repeated again for 50 or 100 years, they nevertheless showed that the proposal for fire protection in the draft management plan would not have greatly altered the end result.

Furthermore, the large unburnt north-west section of the Park now warrants even greater protection from future wildfires because it contains most of the Park's rare fauna.


LOCATION MAP
SCALE
50 0 50 100 150 200 250 KM
SOUTHERN OCEAN
INDIAN OCEAN
PERTH
KALGOORLIE
COOLGARDIE
NORSEMAN
ESPERANCE
CAPE LE GRAND NATIONAL PARK
STOKES NATIONAL PARK
HOPETOUN
FRANK HANN NATIONAL PARK
BOUNDARY
REGION
PROOF
FENCE
VERMIN
LAKE KING
RAVENSTHORPE
COCANARUP TIMBER RESERVE
FITZGERALD RIVER NATIONAL PARK
BREMER BAY
LAKE MAGENTA NATURE RESERVE
JERRAMUNGUP
SOUTH COAST HIGHWAY
STIRLING RANGE NATIONAL PARK
PORONGURUP NATIONAL PARK
ALBANY
GREAT EASTERN HIGHWAY
COOLGARDIE ESPERANCE HIGHWAY
SOUTHERN HIGHWAY
ALBANY HIGHWAY
BRAND HIGHWAY
GREAT
SOUTH WESTERN
BUNBURY
BRIDGETOWN
MANJIMUP
PEMBERTON
AUGUSTA
BUSSELL HWY
HWY

MAP 1a



RAVENSTHORPE
HOPETOUN
SOUTHERN OCEAN
PARK NAMES & FEATURES
NATIONAL PARK BOUNDARY
C.A.L.M. RANGERS RESIDENCE
2 WHEEL DRIVE ACCESS
4 WHEEL DRIVE ACCESS
SCALE
0
10
20
30 km
Cocanarup
Timber Reserve
PHILLIPS
RIVER
HAMERSLEY
FITZGERALD
WEST RIVER ROAD
OLD COACH
MT DRUMMOND
THUMB PEAK
WHOOGARUP RANGE
EAST MT BARREN
Culham Inlet
Four Mile
Hamersley Inlet
Whalebone Beach
Twin Bays
Fitzgerald Beach
Fitzgerald Inlet
Point Charles
Point Ann
St Mary Inlet
Trigelow Beach
Gordon Inlet
Tooregullup Beach
Hood Point
MT MAXWELL
MURRAY RD
GAIRDNER
DEVILS CREEK
Dillon Bay
Monjingerup Springs
BREMER BAY
Lake Magenta
Nature Reserve
MAP 1b

Principles

16 Excessively large wildfires which threaten environmental and human life values are not acceptable.

17 The unburnt north-west sector of the Park now has an even greater need for protection from large uncontrolled wildfires.

18 In retrospect, it appears clear that a more proactive approach to fuel reduction and vegetation/habitat management is required to minimise the risk of wildfires reaching similar proportions to those in 1989.

Wilderness

Fitzgerald River National Park is one of the few areas on the south coast of Western Australia that is of suitable size, terrain and condition to allow its designation as a wilderness area.

"Wilderness" is essentially an undisturbed area or a 'window into the past' where management intervention is kept to an absolute minimum and where the number of visitors is low because of the area's remoteness. Visitors travel on foot (NPNCA, 1990).

The "quality" of wilderness is often defined by the extent to which land or water is remote from, and substantially undisturbed by, the influence of modem technological society (CONCOM, 1986).

'Remoteness' and 'naturalness' are based on:

- remoteness from settlements or other points of permanent occupation
- remoteness from access, in particular constructed vehicle routes
- aesthetic naturalness or the degree to which the landscape is free from the presence of permanent structures
- biophysical naturalness or the degree to which the natural environment is free of biophysical disturbances caused by modem influences.

To be viable, it is generally agreed that wilderness areas need to be sufficiently large (minimum size of 10 000 ha or 5 000 ha on remote coastline) and should have a 'core' area which is at least 3 km from the zone boundary or any maintained road (Preece and Lesslie, 1987). The area potentially available for designation as a wilderness area in FRNP is much larger than this minimum (78 000 ha). This is the last opportunity to set aside a substantial wilderness area in southern Australia.

Existing 4WD tracks or firelines which are not actively maintained may be regarded as having no impact upon wilderness quality. Any road, track or fireline which is actively maintained would warrant a 3 km buffer zone.

Principles

8) Owing to the unique opportunity which exists in Fitzgerald River National Park, it is highly desirable to maintain a significant cross-section of the Park as a wilderness area including coastal areas, mountains and inland gorges.

9) The wilderness area should be of sufficient size and quality to meet nationally accepted criteria for wilderness designation.

10) Future management intervention within the wilderness zone should be strongly discouraged other than in exceptional circumstances.

Recreational Access

The principal management goal for Fitzgerald River National Park is to conserve all flora and fauna, particularly the species that are rare or in need of special protection. It is also vital to conserve the Park's landscapes. The other important goal is to fulfil the recreation needs of visitors to the extent that they are compatible with flora, fauna and landscape conservation. The Park has great appeal for visitors.

As a general strategy, CALM tries to provide for a range of recreational opportunities within any given national park. Where possible, visitors are provided with a choice of access types, from foot access in some areas to good sealed roads and carparks in other areas. Those with 4WD vehicles also like to be able to escape from the larger number of visitors who travel in conventional vehicles.

At first appearance Fitzgerald River National Park appears to be ideally suited to provide a range of access types. However, for dieback reasons, even 4WD tracks will need to be well formed and drained, and walkers may also be restricted from entry to remnant dieback-free areas, especially when these are located high in the landscape.

Recreational access should also be viewed from a regional perspective rather than in isolation. For example, other recreational opportunities may already exist in nearby areas, particularly along the coastline to the west (Doubtful Islands/Bremer Bay area) and east (Hopetoun-Starvation Boat Harbour).

Principles

3) The prevention of dieback introduction and spread should be the first consideration in any access provisions.
4) Recreational needs of visitors to Fitzgerald River National Park should be met to the extent that they are compatible with flora, fauna and landscape conservation.
5) Varied opportunities for recreation occur within the Park. As a general principle, a range of recreational access should be available so as to allow for personal choices to be made.
6) Recreational access should be viewed in a regional setting with due recognition of opportunities provided in nearby areas outside the Park.

The above principles provide the basis for the remainder of this plan.

1.5 PUBLIC PARTICIPATION

Preparation of this management plan has been based on consultation with the public between October 1987 and January 199 1. The following methods were used:

4) Fitzgerald River National Park Advisory Committee

The Committee was formed in October 1987 to provide advice on management plan preparation. The Committee took a lead role in preparation of the draft management plan and analysis of public submissions. Fifteen meetings were subsequently held as part of this preparation.

5) Pre-draft submissions

In response to a leaflet circulated to the community, organisations and Government, 39 written submissions were received over November-December, 1987 (Moore, 1988b).

6) Workshop

Forty-two people, representing a range of interests, attended a one-day workshop at Fitzgerald in March, 1988 (Moore, 1988a).

7) Visitor survey

Seven hundred and thirty questionnaire responses, data from eight traffic counters and survey details from 28 recreation sites were collected between November 1987 and April 1988 (Cavana and Moore, 1988). Some responses expressed concern that the visitor survey did not give a true indication of the number of local residents using the Park (Cavana, 1991).

8) Local government

Meetings were held with the Shires of Jerramungup and Ravensthorpe.

9) *Meetings*

Meetings were held with Ravensthorpe and Jerramungup District Soil Conservation Committees, South Coast Recreation Association, FRNP Association, Fitzgerald Biosphere Project Committee, Hopetoun Progress Association, W.A. Conservation Council and W.A. Wilderness Society.

10) *Government departments*

Numerous visits and discussions were conducted to gather information and develop prescriptions.

11) *Media releases*

Local and State-wide networks were utilised.

12) *Public submissions to the draft management plan*

A total of 178 submissions were received from individuals, community groups, Government departments and clubs/organisations. This includes 16 submissions which were received following an invitation for additional comments after the December 1989 wildfires.

The results of the above consultations are a vital component of this plan.

PART B. PRINCIPAL MANAGEMENT DIRECTIONS

2.0 MANAGEMENT GOALS

The management goals for Fitzgerald River National Park (FRNP) are based on those applicable to all national parks and on values and concerns specific to FRNP.

Management Goals for National Parks

The following management goals for national parks are derived from the Conservation and Land Management Act (1984) and Departmental policies. These goals are to:

6) Protect and conserve native plants and animals and their habitats.
7) Protect and conserve physical, cultural and scenic resources.
8) Provide opportunities and facilities for appropriate public recreation.
9) Regulate use to be consistent with the maintenance and protection of natural resource values and to minimise conflict between uses.
10) Promote visitor safety, awareness and appreciation of natural processes and the scientific and cultural attributes of park resources.
11) Provide information, education and interpretive programs.
12) Promote research and monitoring of the biological, physical and social environments to aid future management.

Values and Management Concerns

VALUES

- FRNP is one of Australia's richest conservation reserves for plants and animals. It is also an extremely important remnant, as much of the south-west has been cleared for agriculture. Some 20% of the known plant species of Western Australia occur within the 0. 1 % of the State occupied by the Park. At least 75 of these occur only within the Park. The Park also contains 10 species of declared rare mammals and birds.
- The Fitzgerald landscapes, with extensive vistas showing little to no evidence of human occupation or use, are a major attraction.
- The Park has a rich cultural history with numerous sites of historical and archaeological importance.
- The Park is one of only two international biosphere reserves in Western Australia. The biosphere reserve values are enhanced by local community interest in the Park, and local adoption of the biosphere reserve concept.
- Fitzgerald provides a range of recreation opportunities in a natural setting.
- The Park is well-placed to attract tourists travelling in the south-west and south-east of the State.

MANAGEMENT CONCERNS

- Until recently most of the Park was believed to be dieback free, which made it unique within the area of known dieback occurrence on the south coast of Western Australia. However, following

heavy summer rainfall in 1990, it appears that dieback is more widespread in the Park then previously thought. Furthermore, in areas burnt by the December 1989 wildfires, it will now be some five to seven years before signs of the disease occur, enabling disease mapping to be done.

- A number of the rare fauna appear to have specific habitat requirements, such as periods greater than 15 years between fires and protection from introduced predators, such as foxes.
- There is widespread concern about broadscale wildfires in the Park, especially lightning-caused wildfires. These have been a feature of the last 40 or 50 years in the Park. Wildfires in December 1989 burnt approximately 40% of the Park.
- Public use of the coast for fishing, camping and beach activities is increasing.
- Many areas in the Park, and especially those on the coast, are fragile and cannot readily support public use without environmental damage. Some coastal parts of the Park have already been damaged by visitor use and these areas are likely to degrade further unless they are rehabilitated and actively managed.

Management Goals for Fitzgerald River National Park

The following management goals for FRNP apply, based on the recognition that conservation is the highest management priority.

CONSERVATION GOALS

5. Conserve all native plant communities, animal communities, species, and the natural processes which sustain them, especially the large numbers of rare species and those in need of special protection.
6. Conserve the Park's landscapes, in particular the extensive vistas free of human disturbance.
7. Conserve the rich Aboriginal and European history of the Park, including numerous historical and archaeological sites.

RECREATION GOAL

3. Fulfil the nature-based recreation requirements of visitors to the extent that they are compatible with conserving the Park's flora, fauna and landscape values, wilderness qualities and cultural heritage.

EDUCATION GOAL

- Foster a sense of stewardship for the Park by the community at all levels - local, State, national and international - emphasising its special conservation, landscape, recreation, cultural and historic values.

RESEARCH AND MONITORING GOALS

- Promote and undertake the scientific study and monitoring of those physical, biological and social values and natural processes special to the Park.
- Measure and control impacts of management activities and human use on the Park environment.

3.0 LAND TENURE

3.1 NATIONAL PARK BOUNDARIES

The objective is to ensure that the Park and areas with high conservation values adjacent to it are adequately protected.

Background

Fitzgerald River National Park, comprised of two Class A reserves Nos 31737 and 31738, occupies an area of about 329 039 ha. Reserve No. 31737 (320 615 ha) occupies most of the Park area. Reserve No. 31738 (8 424 ha) occupies a 700 m wide strip along the coast. The Park extends to the low water mark of the Southern Ocean and includes Red Islet.

A small part of the Park lies separate from the remainder, on the northern edge of Dillon Bay. This part is relatively inaccessible and little used. The South Coast Regional Draft Management Plan (CALM, 1989) includes proposals for the broader Ravensthorpe-Jerramungup area. This plan deals only with Fitzgerald River National Park.

PRESCRIPTIONS

1. **Amalgamate Reserves 31737 and 31738 into a single Class A reserve for the purpose of national park.**

2. **Implement the changes in status for areas 1-10 in Table 1 and Map 2. These changes will lead to more effective management as they move the Park boundary to readily recognisable features, such as riverlines, roads or private property, and/or decrease the length of Park boundary.**

3. **Retain the provision that if future survey and assessment indicates that other adjacent public lands have high conservation and/or recreation values, a level of conservation and/or recreation management will be sought.**

TABLE 1. PROPOSED CHANGES TO THE PARK BOUNDARY

		CURRENT STATUS				
GENERAL LOCATION	**ID No. (Map 2)**	**RESERVE No.**	**PURPOSE**	**AREA (ha)**	**VESTING**	**PROPOSED STATUS**
Northern Boundary	1	C1029	Resting Place	229	Unvested	Add to FRNP
Western Boundary	2	VCL	---	---	---	Add to FRNP
Southern Boundary	3	C5055	Water	435	Unvested	Add to FRNP
	4	Pt C32666 (northern third)	Government Requirements	---	Unvested	Add to FRNP
	5	C23060	Public Utility	47	Unvested	Add to FRNP
	6	C21646	Recreation and Camping	405	Unvested	Add to FRNP
	7	Pt A31737	Dillon Bay section of FRNP	---	NPNCA	Change to Jerramungup Shire Reserve
	8	Pt A31737	Section of FRNP south east of Gordon Inlet Road	---	NPNCA	Change to Jerramungup Shire Reserve
	9	Pt A31737	Section of FRNP between Bremer Bay town and Bremer River	---	NPNCA	Add to Jerramungup Shire Reserve (C22355, recreation and camping)
	10	Pt C22355 (northern bank of Bremer River)	Recreation and Camping	---	Shire of Jerramungup	Add to FRNP

3.2 SHIRE RESERVES

The objective is to ensure that management of the Shire reserves and surrounding Park is coordinated.

Background

Two Shire reserves are surrounded by FRNP, one vested in the Shire of Jerramungup, the other in the Shire of Ravensthorpe (Map 2). The boundaries of both are poorly defined, particularly the Jerramungup Reserve which straddles the Bremer River. This Reserve of 372 ha, for recreation and camping, stretches for about 5 km along the lower reaches of the Bremer River. The Ravensthorpe Reserve of 97 ha, for camping, lies on the eastern edge of Hamersley Inlet.

Four unformed tracks currently provide access through the Park to the Jerramungup Reserve. These are generally water-logged and eroding, with numbers of detours evident and increasing. Access and camping sites appear to require resolution. Selection of stable access to the Reserve will require very careful planning and considerable expense, given the highly dissected nature of the river margins.

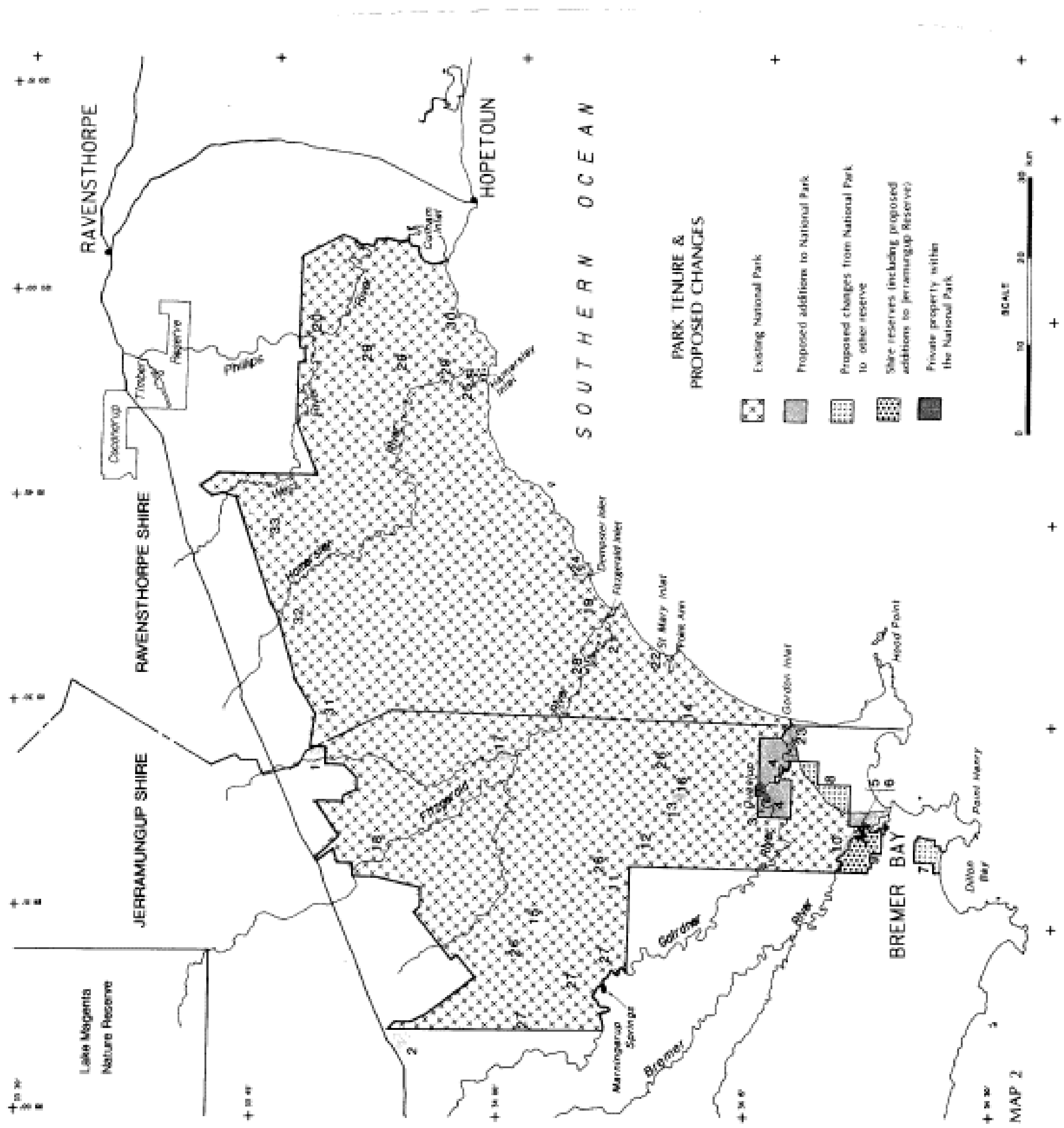
A recently formed road provides access to the edge of Hamersley Inlet in the northern part of the Ravensthorpe Shire Reserve. The southern beach end of the Reserve is accessible through the Park by 4WD vehicles via the mobile Hamersley dunes. This beach is a salmon-fishing destination during early autumn. There is no safe, stable alignment that will allow a road or track to be brought through the Reserve to the beach. Access to the two Shire Reserves is through FRNP. Any road development through the Park to the Shire Reserves must be approved by CALM and be consistent with management goals in this plan. In practice, approvals have been assisted by co-operative interaction between CALM and the Shire concerned.

PRESCRIPTIONS

1) **In consultation with the Shire of Jerramungup, adjust the Jerramungup Reserve so that its boundaries are delineated by natural features, that is Bremer River, Peters Creek and Wellstead Estuary in the north and east, and private property and a Crown reserve in the west and south (Map 2; area 9). This will increase the area of the Shire Reserve, while adding the relatively inaccessible northern bank of the Bremer River to FRNP.**

2) **Liaise with the Shires of Jerramungup and Ravensthorpe to ensure that the management of the two Shire Reserves is coordinated with management of the surrounding Park.**

3) **Encourage the Shires to prepare management plans for and allocate management resources to these Reserves.**


RAVENSTHORPE
HOPETOUN
RAVENSTHORPE SHIRE
JERRAMUNGUP SHIRE
Lake Magenta
Nature Reserve
SOUTHERN OCEAN
BREMER BAY
PARK TENURE &
PROPOSED CHANGES
Existing National Park
Proposed additions to National Park
Proposed changes from National Park
to other reserve
Shire reserves (including proposed
additions to Jerramungup Reserve)
Private property within
the National Park
SCALE
MAP 2

3.3 OTHER CROWN LAND WITHIN THE NATIONAL PARK BOUNDARY

The objective is to rationalise and simplify Park management by adding to the Park other Crown reserves (excluding Shire reserves), unused road reserves and inlets within the Park.

Background

Ten small unvested reserves lie within the National Park boundary (areas 11-20 in Table 2 and Map 2). Most were created to provide water points for maintenance crews working on the rabbit proof fence. The fence is no longer operational. These reserves are managed on a *de facto* basis by CALM. Addition of these areas to the National Park will formalise this arrangement.

There are four inlets within the Park: St. Mary, Fitzgerald, Dempster and Hamersley. None are currently managed by CALM. These inlets, plus Gordon Inlet, are proposed for management by CALM (areas 21-25 in Table 2 and Map 2). Their addition to FRNP and/or reservation as marine reserves will allow CALM to manage them to enhance their conservation values, maximise public safety and minimise conflict between different user groups. Potential marine parks off-shore from Fitzgerald River National Park are being assessed as part of a State-wide review.

Several unused road reserves and unmade road alignments are shown on maps of FRNP (areas 26-33 in Table 2 and Map 2). Most of these were created in the days when FRNP was vacant Crown land and there was a need to ensure access prior to the land being alienated. All are historic anomalies, given that access is now provided by Park roads. In addition, these proposed roads if constructed, would duplicate existing access, could compromise Park values and may not maximise available views.

To ensure that dieback risks are minimised and that road construction and maintenance are in sympathy with Park values, Park roads should be part of the National Park, not separate road reserves. This also means that CALM, rather than the local authority, meets construction and maintenance costs for roads used by a significant number of nonratepayers.

PRESCRIPTION

1) Implement the changes in status for areas 11-33 in Table 2 and Map 2.

TABLE 2. PROPOSED CHANGES TO CROWN LAND WITHIN THE PARK BOUNDARY

		CURRENT STATUS				
LAND TYPE	**ID No. (Map 2)**	**RESERVE No.**	**PURPOSE**	**AREA (ha)**	**VESTING STATUS**	**PROPOSED**
RESERVES	11	C12121	Water Rabbit Dept	4	Unvested	Add to FRNP
	12	C12122	Water Rabbit Dept	2	Unvested	Add to FRNP
	13	C12123	Water Rabbit Dept	2	Unvested	Add to FRNP
	14	C12124	Water supply, rabbit proof fence	8	Unvested	Add to FRNP
	15	C10133	Water supply, rabbit proof fence	130	Unvested	Add to FRNP
	16	C10135	Water supply, rabbit proof fence	121	Unvested	Add to FRNP
	17	C1406	Water	259	Unvested	Add to FRNP
	18	C20393	Water	40	Unvested	Add to FRNP
	19	512	Public Purposes	10	Unvested	Add to FRNP
	20	C10865	Water Act 56, Vic No 20	64	Unvested	Add to FRNP
INLETS	21	Fitzgerald Inlet	VCL	---	---	Marine reserve/ add to FRNP+
	22	St Mary Inlet	VCL	---	---	Marine reserve/ add to FRNP+
	23	Gordon Inlet	Government Requirements	---	Unvested	Marine reserve+
	24	Dempster Inlet	VCL	---		Marine reserve/ add to FRNP+
	25	Hamersley Inlet	VCL	---		Marine reserve+
ROADS	26	Rabbit Proof Fence Road	---	---	---	Add to FRNP
	27	Protected Road (Darlingup 1:50 000 Sheet)	---		---	Add to FRNP
	28	Road section (Dempster 1:50 000 Sheet)				Add to FRNP
	29	Road No. 6284	---	---		Add to FRNP
	30	Road Section (Whoogarup 1:50 000 Sheet)	---		---	Add to FRNP
	31	Road Section (Drummond Road)	---		---	Add to FRNP
	32	Road Section (Wooganup Road)	---		---	Add to FRNP
	33	Road Section (Hamersley Drive)	---	---	---	Add to FRNP

+ refer to Section 10.2 Commercial Fishing for details.

3.4 PRIVATE PROPERTY ENCLAVES IN THE NATIONAL PARK

The objectives are:

1. *Rationalise and simplify Park management by eventually adding existing alienated lands within the Park to it*
2. *Provide for the complementary management of the Park and adjoining private properties, particularly enclaves.*

Background

Following finalisation of changes to Park boundaries (see 3.1 National Park Boundaries), 13 private properties at Quaalup will be surrounded by National Park (Map 2).

The presence of private enclaves greatly increases management complexity. Some of the problems include domestic animals on private property wandering into the Park if the properties are not fenced, animals from the Park damaging crops and stock, weed infestation and fire control. The provision and use of roads and power, water and telephone lines may also place Park values at risk from dieback and weed introduction, soil erosion and landscape impacts.

PRESCRIPTIONS

1. **Prioritise all Quaalup properties in terms of lack of disturbance and natural and cultural environmental significance. Use this priority list to guide their purchase from willing sellers.**

2. **Purchase properties adjacent to the Park that have exceptional conservation or recreation values, or management benefits, or that could protect areas with these values within the Park, when they are available and subject to funds and a suitable selling price.**

3. **Encourage complementary management between the Park and enclaves or adjoining private land.**

4. **Use a co-ordinated approach between the relevant authorities, departments and landowners to ensure that land uses or sub-divisions on enclaves or adjoining private land do not adversely affect Park values.**

3.5 CROWN LAND ADJACENT TO THE NATIONAL PARK

The objective is to maximise the contribution that adjacent public lands can make to the values of the Park.

Background

Substantial areas of Crown land abut the National Park.

Existing reserves are associated with the Bremer, Gairdner, Fitzgerald, Susetta, Hamersley and West Rivers. Most of these linear, north-south orientated reserves touch the northern boundary of the Park. They are set aside for various purposes including water collection, rest, recreation, parklands, and Government requirements. Little is known of their conservation values, although the almost continuous corridor of vegetation along the Fitzgerald River serves to link the Park and Lake Magenta Nature Reserve. Parts of these corridors also have recreational values.

An extensive area of vacant Crown land links Cocanarup Timber Reserve (8 853 ha) to the north-eastern comer of the Park. A corridor reserved for Government requirements abuts the Park's western boundary. A smaller area of VCL abuts the Park's north-western comer. Surveys in both areas indicate high conservation values. The heath rat and western mouse (both declared rare) occur in the north-eastern VCL, while both areas contain the Western Whipbird (also declared rare) and poorly known plant species.

Cocanarup Timber Reserve is managed by CALM. No department or agency is formally responsible for day-to-day management of the other areas.

PRESCRIPTION

a. Liaise with relevant agencies to achieve management of Crown land adjacent to the Park which enhances the values of the Park. This means complementary fire management, recreational management, pest, weed and disease control, and research and monitoring.

4.0 INTERNATIONAL BIOSPHERE RESERVE STATUS

The objectives are:

- *Recognise the special significance of the Park as an International Biosphere Reserve and manage it accordingly.*
- *Promote integrated management of the Park and adjacent lands and waters.*

Background

The State Government nominated Fitzgerald River National Park as an International Biosphere Reserve (IBR) in 1978. 'Ibis nomination was accepted by the United Nations Educational Scientific and Cultural Organisation (UNESCO) in the same year. A biosphere reserve is a protected area of land and coast large enough to be an effective conservation unit, and to accommodate different uses without conflict. It should have special value as a baseline for measuring long-term changes in the biosphere as a whole.

The main technique used to minimise conflict within a biosphere reserve is zoning. The ideal biosphere reserve consists of at least one core area surrounded by one or more buffer zones. The central core area is the most 'natural' and must be of sufficient size to allow the flora and fauna of the ecosystem to self-perpetuate in a self-sustaining manner with minimum human interference (Anon., 1983). The surrounding buffer zones may contain human-modified examples of the ecosystem. The buffer zone may also contain degraded areas which are to be restored to more natural conditions.

Given the above definition of IBRs, the FRNP is not a typical biosphere reserve, since it represents only the core zone. To satisfy the IBR definition additional buffering areas and modified landscapes should become part of the Fitzgerald Biosphere Reserve. The locally-based Fitzgerald Biosphere Project Committee suggest that the Fitzgerald's ability to function as a genuine biosphere reserve, incorporating the Park and surrounding natural and modified landscapes, involves acceptance of a large 'zone of co-operation' surrounding the Park as part of the Biosphere Reserve. This Committee recognises the values to the Park of surrounding natural areas (Bradby *et al.,* in prep).

The Fitzgerald Biosphere Reserve (Fitzgerald River National Park) is currently managed by CALM for the National Parks and Nature Conservation Authority.

PRESCRIPTIONS

1. **Recognise FRNP as the "core" of the Fitzgerald Biosphere Reserve. Such designation is consistent with national park goals for the area.**

2. **Encourage the recognition and utilisation, by the Commonwealth and Western Australian Governments, the local community and other bodies, of a broader Fitzgerald Biosphere Reserve, incorporating buffer areas and a "zone of co-operation" beyond the Park boundaries.**

3. **Support activities which bring benefits of Biosphere Reserve status to the Park and surrounding areas.**

4. **Formalise links between the Fitzgerald Biosphere Project Committee and CALM.**

5. **Recognise the close interaction between the Park and its surrounds as a major influence on the prescriptions in this plan.**

5.0 MANAGEMENT ZONES

The objectives are to implement a system of management zones which:

1. *minimises conflict between conservation values and recreational use, and between different recreational uses.*
2. *specifies the type and extent of public access, recreational development, and interpretive, research and management activities, appropriate to maintaining the biological, physical and cultural resources, and natural processes of the Park.*

Background

Management zones establish a framework for the protection of conservation values and the provision of a range of recreation uses, and indicate the different levels of management required.

Management zones for Fitzgerald River National Park were identified using the following methods:

- Mapping and describing rare flora and fauna, landform and associated erosion hazard, Aboriginal and European cultural sites, and existing and potential access and recreation sites.
- Reviewing the conservation status of the Park's rare flora and fauna on an Australiawide basis.
- Reviewing recreation opportunities available elsewhere.
- Identifying the environmental effects of recreation use and the likely future public use through visitor surveys, public submissions, and a workshop.

Using the information collected, overlays of the mapped information and the management zone definitions given in Table 3, zones were delineated *which protect and enhance the conservation values of the Park while allowing for recreation use.* The zones maximise protection of the Park environment, particularly the rare flora and fauna; contribute to recreation diversity; minimise the adverse effects of any proposed change in recreational use on any one user group; and can be implemented feasibly.

The management zones used in FRNP are:

1. Special Conservation

   This management zone covers the northern part of the Park with its concentration of declared rare birds and mammals. A number of these species require habitat which has not been burnt for 15 years or more and protection from introduced predators, particularly foxes. Vehicle access through this zone is by Hamersley and Pabelup Drives. There is usually no other motorised access, except for research and management.

2. Wilderness

An extensive area in the middle of the Park (78 000 ha) is maintained in a wilderness state. No motorised access is permitted, except for emergency and essential management operations.

3. Natural Environment

Areas will be maintained as natural environments. Included are several 4WD accessible tracks (eg. Fitzgerald Inlet track, Quoin Head Track). Generally, motorised access is restricted. Facilities are semi-primitive and predominantly in natural settings.

4. Recreation

These are small areas associated with vehicle access routes and recreation and interpretation sites. In FRNP, this zone is based on roads and recreation sites accessible to 2WD vehicles. Facilities are basic and in natural settings which may show signs of modification.

Allocation of the above zones is based on information and prescriptions given in this Part, and Parts C, D, E and F.

PRESCRIPTION

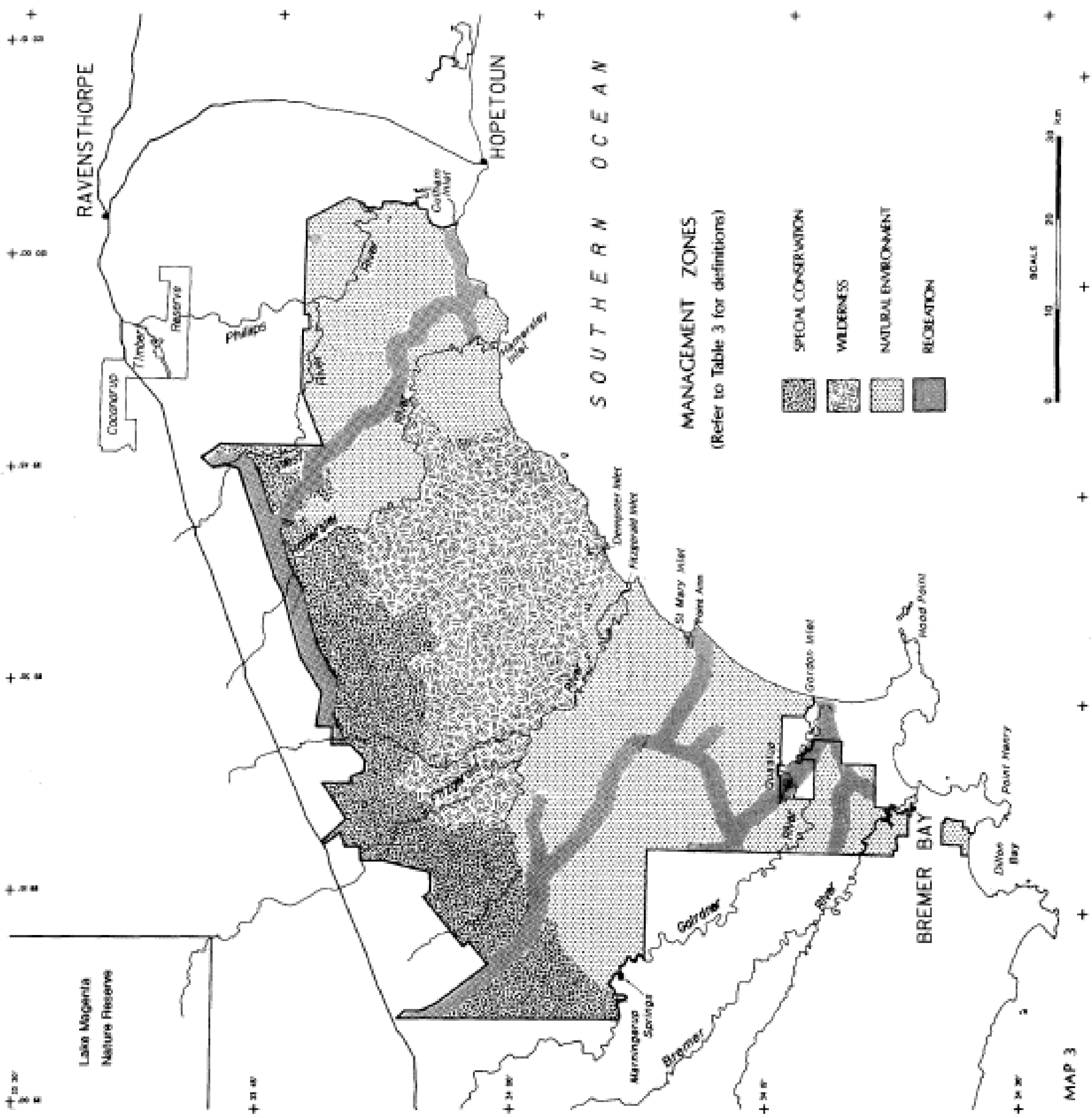
1. Use the above management zones (Table 3 and Map 3) as the basis for integrated management of FRNP.

Practical implementation of management zones may differ from the boundaries given on Map 3. Most communities and species have requirements which extend beyond these artificially delineated boundaries.

TABLE 3. FITZGERALD RIVER NATIONAL PARK MANAGEMENT ZONES

			MANAGEMENT FRAMEWORK		
MANAGEMENT ZONES	**GENERAL DESCRIPTION**	**BOUNDARY CRITERIA**	**RESOURCES**	**PUBLIC OPPORTUNITY**	**LEVEL OF MGT**
1. SPECIAL CONSERVATION	Specific areas which contain unique, rare or endangered features or the best examples of natural features.	'Me natural extent and buffer requirements of designated features.	Strict resource conservation.	- Usually non-motorised access, except for research and management purposes. - Visitor appreciation consistent with resources, conservation.	High
2. WILDERNESS	Extensive areas which will be maintained in a wilderness state.	The extent of natural systems in areas of 10 000 ha or greater.	Strict resource conservation.	- Non-motorised access only, except for emergency and essential management. - Primitive facilities, if any.	Low
3. NATURAL ENVIRONMENT	Areas which can sustain, with a minimum of impairment, a selected range of low-density outdoor activities with a minimum of related facilities.	The extent of natural environments and surrounding zones.	Conservation of the natural environment.	- Includes 4WD tracks; however, motorised access restricted. - Semi-primitive camping facilities.	Low to Moderate
4. RECREATION	Limited areas that can accommodate a broad range of outdoor recreation opportunities.	The extent of outdoor opportunities and facilities and their area of immediate impact.	Minimal impact of activities and facilities on natural landscape.	Access motorised and non-motorised. Basic camping facilities	Moderate to High

.


RAVENSTHORPE
HOPETOUN
SOUTHERN OCEAN
MANAGEMENT ZONES
(Refer to Table 3 for definitions)
SPECIAL CONSERVATION
WILDERNESS
NATURAL ENVIRONMENT
RECREATION
SCALE
BREMER BAY
Lake Magenta
Nature Reserve
MAP 3

PART C. MANAGEMENT FOR CONSERVATION

GOALS:

1. Conserve all native plant communities, animal communities, species, and the natural processes which sustain them, in the Park, especially the large numbers of rare species and those in need of special protection.

2. Conserve the Park's landscapes, in particular the extensive vistas free of human disturbance.

3. Conserve the rich Aboriginal and European history of the Park, including numerous historical and archaeological sites.

6.0 PHYSICAL RESOURCE MANAGEMENT

6.1 GEOLOGY

The objective is to protect important geological features in the Park.

Background

(Based on contributions by Geological Survey of Western Australia, Mines Department)

Fitzgerald River National Park lies on the southern edge of the Yilgarn Block and the adjoining Albany-Fraser Province.

The bedrock of the northern edge of the Fitzgerald River National Park is part of an ancient (2500 - 2900 million years old), essentially stable, crustal segment known as the Yilgarn Craton. Granite and gneiss are the predominant rock types with minor enclaves of altered sedimentary and mafic igneous rocks. One such form of mafic igneous rock is the West River greenstone belt south-west of Ravensthorpe.

The somewhat younger rocks (1100- 1800 million years old) of the Albany - Fraser Province form the bedrock across the southern portion of the Park. These rocks are dominated by the metasediments of the Mount Barren Group, with smaller enclaves of slightly older granitic gneiss appearing along the coast from Bremer Bay to Point Charles.

The Mount Barren Group forms the Barren Ranges which lie along the coast from Hopetoun to east of Bremer Bay. This group consists of a folded and faulted sequence of metasediments of quartzite, phyllite, dolomite and conglomerate which are generally slightly altered. Development of the Barren Ranges, through folding and faulting of the Mount Barren Group, is thought to have occurred between 1100 and 1400 million years ago. Subsequent changes in sea level have lead to the formation of elevated benches on various peaks within the Barren Ranges.

The Plantagenet Group was deposited in shallow, warm waters near sea level 40-50 million years ago (Eocene Period). Changing sea levels led to deposition under both marine and non-marine conditions. The Werillup Formation, the lower part of the group, is composed of grey and black clay, siltstone, lignite and carbonaceous siltstone. The lignite ranges up to 3 m thick and occurs in the Fitzgerald River area and around Nornalup Inlet. The Werillup Formation is overlain by the Pallinup Siltstone, a horizontally bedded white, brown or red siltstone and spongolite. The Plantagenet Group is exposed along all the major riverlines in the Park.

Laterite, a weathering product of the Tertiary Period (between 26 and 2 million years old), has developed over many of the rock types present through the Park. Also from the late Tertiary is a shell bed of considerable interest near the east side of Hamersley Inlet.

Sandplains and recent coastal deposits are a product of the Quaternary period (within the last 2 million years). Sandplains and associated swamps cover extensive areas between the rivers in the central and western parts of the Park. Sand-dunes and coastal limestone occur near Trigelow Beach, Point Charles and Hamersley Inlet.

The Kybulup Schist unit of the Mount Barren Group occurs within the Park, north of Culham Inlet on the Phillips River (Lat. 33•5 1'1 3 " S, Long. 120•04'41 "E).

Mining and mineral values are discussed in 10. 1 Mining.

PRESCRIPTIONS

1. **Provide interpretive information regarding the Park's diverse geology and geological history and its relationship with the flora and fauna.**

2. **Provide interpretive information on structural features such as the spongolite valleys (gorges), Mt Barren ranges and precipitous sea-cliffs.**

3. **Protect the Kybulup Schist unit from disturbance from Park management activities.**

6.2 LANDFORMS, SOILS AND EROSION HAZARD

The objectives are:

1. *Protect all landforms and the processes that sustain them, especially those that are unique to the Park.*
2. *Minimise changes to drainage patterns, erosion and waterlogging, resulting from management activities such as road works, fire control and the provision of recreation opportunities.*

Background

Landform

The landforms of the FRNP are a product of the underlying rock and their deeply weathered condition. Water erosion has partly removed this mantle of weathering, exposing fresh rocks beneath the Eocene sediments. Wind action has created dunes on the coast as well as on sands further inland.

Chapman and Newbey (in prep.) identified five major and two minor landforms in the Park. Table 4 lists the landforms and their characteristics, including soils. Map 4 shows the five major landforms. The five major landforms are the upland, plains, incised valleys, ranges and dunes.

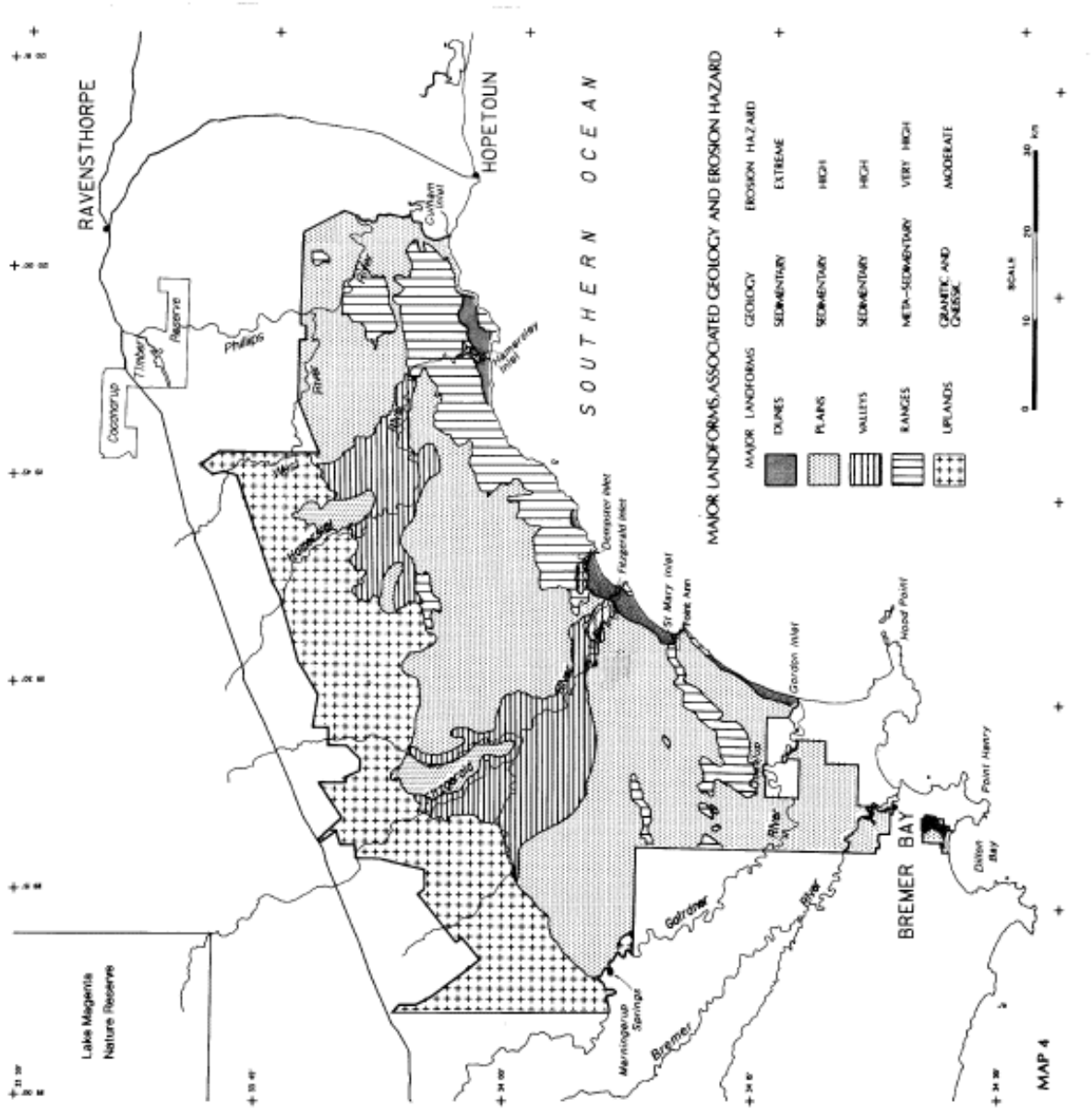
The upland is characterised by a gently undulating terrain on the Archaean granites which underlie the northern part of the Park. The plains, immediately inland from the coast, are flat, with numerous swamps, depressions and large areas with no run-off. They are developed on the deeply weathered Plantagenet Group of Eocene sediments. This is the most extensive landform. in the Park. Steep-sided valleys cut through the plain, creating the distinct, incised valley landform. The erosional scarp of the valleys is often capped by laterite. Flat mesaform hills also appear as relics on the plain.

TABLE 4. LANDFORMS, SOILS, VEGETATION AND EROSION HAZARD

LANDFORM	GEOLOGY	SOIL TYPE	VEGETATION	TOPOGRAPHY	DRAINAGE	EROSION HAZARD
Upland	granites, gneisses	• extensive areas of shallow loamy sand • skeletal soils associated with granite exposures	• Very open mallees of *E. redunca or E. tetragona* • Allocasuarina, Grevillea and Acacia scrub/heath associated with granite outcrops	• dominated by undulating plain: internal relief less than 10 m, slopes less than 2°. • V-shaped valleys: incised 100-160 m, 3-120 slopes	• undulating plain: dendritic and coarse • V-shaped valleys: single channel with flows in winter/spring • generally moderately well drained	**Moderate** • plain reasonably stable; skeletal soils associated with granite outcrops mod. susceptible to water erosion, V-shaped valleys moderately susceptible given slope and 1:5 year flooding
Plain	spongolite, siltstone	• duplex shallow sandy loams, colluvial sands and cracking clays • skeletal soils on bedrock exposures	• very open mallee of *E. decipiens* widespread • elsewhere open to very open shrub mallee	• flat plain: internal relief rarely exceeds 10 m, generally less than I* slope	• uncoordinated drainage: large areas with no run off, sumps and gilgais • dissected drainage on coast and river margins • water-logged winter/ spring at least, generally poorly drained	**High** • disturbance of water-logged areas leads to breakdown in soil structure and *pro* longed ponding, and/or increased run off. Fine silt soils susceptible to water and wind erosion, the latter particularly in coastal parts
Valleys	spongolite, siltstone	• sandy loam - shallow on walls, deeper on valley floor	• open shrub mallee of *E. conglobata* and *E. incrassata* on valley floors and drainage lines • low woodland on slopes and rims • open mallee on mesas	• steep-sided valleys cut into flat plain; flat, broad valley floors	• broad valleys, inter-mittent flow, small flow in winter/spring, generally small linear pools • moderately well drained in upper reaches to poorly drained near inlets	**High** • steep valley sides with shallow soils susceptible to water erosion; flat valley floors moderately susceptible

Table 4 cont.

LANDFORM	GEOLOGY	SOIL TYPE	VEGETATION	TOPOGRAPHY	DRAINAGE	EROSION HAZARD
Ranges	quartzite, phyllite, dolomite, conglomerates	• quartzite sand on quartzite • phyllitic loamy sand *or* schist duplex soils	• Banksia scrub and Adenanthos open low scrub on quartzite • Very open shrub mallee of *E. incrassata*, and Banksia and Allocasuarina low scrub on phyllitic schists	• rugged hills and stony rises 500 m ASL, slopes range from 45• to vertical	• rapid run-off • numerous short streams rapidly drain hills and rises • well drained	**Very High** unconsolidated soils and steep slopes with numerous drainage lines highly susceptible to erosion
Dunes	sand over spongolite or quartzite	• loose calcareous or siliceous sands	• mallee and shrubland becoming lower and denser heath closer to coast	• narrow sand-dunes occur on several coastal sections: 2-5 m high, varying slope depending on stability	• well drained • occasional areas of impeded drainage over limestone	**Extreme** • loose soils extremely susceptible to wind erosion (and wave erosion on occasions)
Inlets	incised in quartzite, spongolite or lime - stone	• saline soils next to inlet • narrow deposits of colluvium and alluvium spongolite, at some slope and cliff bases	• Melaleuca woodland or shrubland on edges • samphire heath on flats	• all major rivers in Park terminate in an inlet: incised to 100 m, only partially,filled expansive flat,floors generally fringed by steep slopes or cliffs	• water occupies only small portion of floor • generally barred from the sea • poorly drained	**High** • slopes and cliffs are highly susceptible to water and wind erosion (increases with proximity to the coastline); water logged soils of fine texture susceptible to degradation
Rivers, swamps and lakes	granites, spongolite, quartzite	• dependent on underlying rock	• *E. occidentalis* woodland dominant	• rivers generally single-channelled: v-shaped in upland; broad, cliffed meanders on plain • swamps generally on plain	• rivers moderately well drained • swamps poorly drained	**High** • silt soils, in particular, are highly susceptible to water erosion and degradation due to flood events and water-logging



The ranges landform is also distinctive as it is emergent above the gently sloping plain. It has developed on the Proterozoic quartzites. Narrow sand dune systems occur along several sections of the coastline.

The two minor landforms which together occupy only a small percentage of the Park area are inlets, and rivers, swamps and lakes. Many of the rivers terminate in an inlet which is closed to the sea for most of the time. Swamps and saline lakes are characteristic of the plains.

Soils and Erosion Hazard

The susceptibility of the soil to erosion and degradation has a major influence on management. This is dependent on geology, soil type, vegetation, topography and drainage. Likely hazard following

disturbance can be determined based on this susceptibility (Table 4). Most of the Park has a high erosion hazard.

The coastal dunes are the only landform to have an extreme hazard rating. They are readily eroded by wind, particularly when sparsely vegetated, or where wave action is likely to further decrease stability. The steeper, younger, more sparsely vegetated dunes closer to the coast are more susceptible than older stabilised dunes further inland. The ranges have a very high erosion hazard, given their steep slopes and coarse, poorly consolidated skeletal soils. Minor disturbances, such as footpaths, can lead to localised gully erosion.

The plains with their fine silty soils, are highly susceptible to water erosion, and to wind erosion closer to the coast. This landform is characterised by widespread impeded drainage. In these poorly drained areas, mechanical disturbance, such as firebreak and track construction, may lead to soil degradation, increased ponding and run-off. Dieback control is likely to be a particular problem. Boggy channels can develop over wetter months even with low levels of use. The valleys are also susceptible to erosion if disturbed, although the valley floors, if well-drained, are only moderately susceptible. Inlets, rivers and swamps also have a high erosion hazard, particularly in waterlogged situations and areas with fine silty soils or steep slopes.

When the soil surface is disturbed or vegetation removed, soil erosion can result in changes to the landform and soil structure. In national parks, the greatest effect on the soil resource occurs as a result of the construction and use of roads and facilities for public and management purposes. Soil erosion can also be exacerbated by reductions in plant cover through the spread of plant diseases, such as dieback, or by fire.

In FRNP, poorly located access routes, and camping areas in coastal areas are leading to localised water and wind erosion. Inland, erosion is largely restricted to tracks and firebreaks.

PRESCRIPTIONS

1. **Minimise management activities in, and public access to, the coastal dunes, all of which have an extreme erosion hazard. Where access is provided, plan according to specialist advice on prevailing wind direction, stabilisation and slopes.**

2. **During road and facility development and maintenance ensure that erosion hazards (Map 4 and Table 4) are a primary consideration, subject to specialist advice on a case-by-case basis. Carefully plan all developments. Any activity in the Ranges requires particular care as this landform has a very high erosion hazard rating.**

3. **Give particular attention, in any development and maintenance works, to drainage and ponding with respect to dieback.**

Research and Monitoring

4. **Use fixed points and aerial photography to monitor the movement of sand inland from unstable dunes, eg. Hamersley Inlet, Gordon Inlet.**

5. **Monitor beach access points, both footpaths and vehicle access points, and take remedial actions as required.**

6.3 HYDROLOGY

The objectives are:

1. *Ensure that, as far as possible, activities both inside and outside the Park do not harm the quality and quantity of the Park's water resources.*
2. *Minimise the effect of road construction and recreation development on natural drainage.*
3. *Ensure that roads and site developments are properly located and designed so that damage by heavy rainfall or unseasonal flow is minimised.*

Background

(Based on information supplied by the Water Authority of Western Australia).

There are four main rivers in FRNP: the Gairdner, Fitzgerald, Hamersley and Phillips. These run roughly from north-west to south-east through the Park. All have at least part of their catchments in cleared agricultural land. A number of shorter rivers and streams, most notably the St Mary and Dempster, have all of their catchment within the Park (Map 5). All rivers in the Park are intermittent, with the majority of flows occurring during winter and spring.

The Dempster, in particular, could provide a useful reference catchment. It is completely uncleared and lies entirely within FRNP (Map 5). As part of the wilderness zone, access will generally be on foot only (Map 3). Such limitations on access substantially reduce the risk of further introduction and spread of dieback.

FRNP has numerous swamps, particularly on the plains. They are covered wholly or largely by woodland and/or shrubland. At least part of their floor is covered by a few centimetres of water during winter and spring. Floods add up to 1.5 m of water which may remain for up to 18 months (Chapman and Newbey, in prep.). Water quality varies from fresh to brackish. A number of fresh (eg. Pabelup Lake) and saline (eg. Doggers Swamp) lakes also occur.

All major rivers in FRNP terminate in an inlet which is normally closed to the sea by a sand bar. Only occasionally is river flow sufficient to fill any of the inlets so they overflow into the sea. Once open, inlets remain so for days to many months (Hodgkin and Clark, 1990).

Water Quality

The majority of surface and groundwater in the Park is saline. However, a thin layer of freshwater, overlying brackish or saline water, is likely to be present in the coastal sediments (Geological Survey of W.A., pers. comm., 1988). Freshwater seeps occur at several places along the coastline. The Water Authority has suggested that fresh groundwater aquifers are present in certain parts of the Park, such as near the downstream end of the Hamersley River.

Management actions within the Park can affect water quality. Road works and road use can increase sediment loads through erosion. Boat use can result in fuel and oil spillage from motors and erosion of launching sites. Land-based facilities, such as camp grounds and toilets, can cause pollution and erosion.

Management actions outside the Park can also affect water quality, particularly given that the catchments of the Park's major rivers extend beyond the Park. In the Fitzgerald area, clearing for agriculture has increased salinity and sediment load of streams and rivers. The long-term effects on areas such as FRNP are uncertain. Replanting of parts of these catchments should help to counteract current water quality problems.

Water Supply Potential

Given the high salinity of water within the Park, it has limited potential for development of either surface or groundwater resources. In the past, the Water Authority proposed to carry out exploratory drilling to locate a new supply source for Hopetoun. The Environmental Protection Authority determined against the proposal and appears to have ruled out any water supply development within the National Park.

The Water Authority does, however, have interests in adjacent areas. The Bremer Bay Groundwater Area lies immediately south of the Park between Bremer and Dillon Bays. This Area incorporates Cardiminup Swamp, one of the few local, permanent, freshwater swamps. The Hopetoun Groundwater Area lies immediately east of the Park, abutting the eastern side of Culham Inlet. In the longer term, the Hunter River and Tooregullup Swamp, immediately north of Bremer Bay, and south of FRNP, have been identified as potential future sources of water supply.

Research and Facilities

One gauging station exists within the Park boundaries (Map 5). As the result of funding cuts it was closed in April 1987. Continued access to the site by Water Authority officers will be necessary if

monitoring resumes. Relevant hydrologic studies would require, as a minimum, a gauging station on the Fitzgerald, at or near the existing station, and one on either the Dempster or St Mary Rivers.

PRESCRIPTIONS

1. **Assist the Jerramungup and Ravensthorpe District Soil Conservation Committees and liaise with the Department of Agriculture, Environmental Protection Authority and local government to:**
   - **encourage land use practices upstream of the Park, such as tree planting or clearing limits, which will help ameliorate deterioration in water quality or changes in quantity;**
   - **achieve some improvements in water quality (i.e. a decrease in salinity).**

2. **Retain Dempster catchment and inlet as a reference area free from human disturbance. This means minimal vehicle access, motorised boat use or building structures.**

3. **Design roads, tracks, paths, facility areas and associated drainage to cater for occasional flooding.**

4. **Ensure developments avoid swamps, as they may retain water for up to 18 months following flooding.**

5. **Do not construct new structures or facilities on sand bars which periodically open to the sea.**

6. **Do not use machinery or other human-induced means to open the bars of any of the inlets in the FRNP, unless it can be shown to be desirable by competent scientific authorities.**

7. **Because fresh groundwater is very limited in the Park, drinking water cannot be provided at campsites. Maps for walking only areas may indicate the availability of limited fresh water.**

Research and Monitoring

8. **Support continued monitoring of river flow and quality, with particular emphasis on the Fitzgerald River. Continue to provide access for monitoring to the gauging station on the Fitzgerald River in the northern part of the National Park.**

9. **Encourage, in consultation with the Environmental Protection Authority, longer term research and monitoring of inlet dynamics, such as opening and closing of bars, water**

levels and rate of sediment accumulation. Use **the Dempster Inlet as an undisturbed reference.**

6.4 LANDSCAPE

The objective is to protect the Park's landscapes, particularly the extensive vistas, from visually intrusive human disturbances.

Background

One of the fundamental values of Fitzgerald River National Park is its spectacular landscapes, with coastal ranges, sandy beaches and extensive vistas free of any signs of human activity.

Two landscape character types have been identified in FRNP: the coastline and southern slopes (Map 6). For management purposes, differences in scenic quality within each landscape character type have been defined. Areas with outstanding features, or diversity of features, are identified as having high scenic quality. Those with the features and diversity commonly found in a particular character type are given a moderate classification. Areas lacking features and/or diversity are nominated as low scenic quality. Table 5 identifies high, moderate and low scenic quality classes; however, only high and moderate quality classes occur in the Park. This is because views throughout the Park are extensive and generally include the Barren Ranges.

View management in FRNP involves protecting' the landscape (including landform, vegetation and waterform) and locating and planning land-use developments so as to provide diverse views in a natural setting. The desired outcome is a positive response from visitors. In FRNP, the current alignment of a number of roads and tracks has a severe visual impact (refer to 13.0 Access for details). Their alignment and colour often contrasts sharply with natural landform and vegetation patterns, particularly in coastal landscapes.

TABLE 5. LANDSCAPE CHARACTER TYPES

LANDSCAPE CHARACTER TYPE	SCENIC QUALITY	LANDFORM	VEGETATION	WATERFORM	LAND USE
Coastline	**General Description**	• Extends to landward limit of marine influences. • Includes long wind-swept beaches, quartzite cliffs rising 80 m, extensive sand drifts (both consolidated and unconsolidated)and inlets.	• Low dense heath with very occasional patches of Melaleuca low woodland. • Mallee woodland associated with inlets.	• Inlets generally barred from the sea and associated riverlines, often steep-sided.	• Occasional site developments - low key day use and camping in carefully chosen locations only.
	High	• Cliffs and headlands. • Islands, stacks, off-shore sandbars and reefs. • Rock features, caves, faultlines, obviously banded sedimentary rocks. • Irregular coastline edges often emphasised by distinctive rock out croppings, bays, inlets, and sand deposition patterns. • Primary dimes which display areas of active weathering, steep slopes and/or sand blown edges.	• Windshaped, gnarled or dwarfed vegetation, unusual in form, colour or texture. • Single tree, shrubs or patches of vegetation which become focal points due to isolation or position in relation to rocks or water. • Strongly defined patterns of woodland, dune vegetation, Melaleuca scrub and/or barren rock.	• All estuaries, inlets, lakes and swamps • Unusual ocean shoreline motion such as eddies due to islands, reefs, surf zones and shoreline configuration.	• Human-imposed spot developments which are in harmony with naturally established forms, lines, colours and textures. • Harsh edge contrasts not evident.
	Moderate	• Expanses of beach of uniform width and colour without rock out croppings or focal features. • Regular coast edges without bays, inlets, promotories, stacks or cliffs.	• Predominantly heath or beach grasses with some variation in colour, texture or pattern. • Some contrast caused by different colours.	• Uniform ocean shoreline and motion characteristics with little diversity.	• Human-imposed spot develop ments in which form, line, colour and texture of introduced elements borrow significantly from natural factors but some discordant visual impacts are clearly apparent.

LANDSCAPE CHARACTER TYPE	SCENIC QUALITY	LANDFORM	VEGETATION	WATERFORM	LAND USE
	Low	• Expanses of uniform (indistinctly dissected) landform.	• Extensive areas of similar vegetation such as heath or beach grasses, with very limited variations in colour or texture.	• Waterforms absent.	• Developments in which form, line, colour and texture of introduced elements contrast sharply with natural features. • Severely disturbed area with little natural vegetation. • Transition between land-uses sharp and geometric, generally appearing as a line.
Southern Slopes	**General Description**	• Rugged hills rising to 500 m generally along the coastline. • Flat to undulating plain 80-300m in elevation, cut by steep-sided valleys.	• Scrub and low scrub of Banksia, Allocasuarina and Adenanthos on ranges. • Open to very open mallee on plain.	• Ranges: steep-sided short stream-lines only flowing after heavy downpours. • Plains: steep-sided valleys associated with major river lines, v-shaped valleys in northern part, elsewhere swamps.	• Main developments are roads and tracks to the coast, fire - breaks and limited number of walk trails.
	High	• Rugged hills and stony rises • Expanses of bare rock warped and folded. • Steep-sided valleys.	• Areas of high plant diversity which display distinctive colour and textural patterns. • Pockets of vegetation which become focal points due to isolation, unusual form, position in the landscape, or canopy variation. • Areas of colour which distinguish a plant group from its surroundings.	• Ranges: intermittent short steep streams which briefly flow following rain. • Plains: valleys with intermittent pools.	• Human-imposed spot developments which are in harmony with naturally established forms, lines, colours and textures. • Harsh edge contrasts not evident.

LANDSCAPE CHARACTER TYPE	SCENIC QUALITY	LANDFORM	VEGETATION	WATERFORM	LAND USE
	Moderate	• Flat to gently sloping areas with limited features of visual interest. • Rounded hills generally similar in gradient to surrounding landforms.	• Patterns evident in vegetation but lacking uniqueness or distinction relative to surrounding vegetation. • Transition from low ocean - side vegetation to heath and mallees gradual.	• Seasonal swamps and occasional shallow creeklines.	• Human-imposed developments in which form, line, colour and texture of introduced elements borrow significantly from natural factors but some discordant visual impacts are clearly apparent. • Transition between landuses combining both gradual and abrupt edges, seldom appearing as an unbroken line.
	Low	• Extensive flat areas with limited features of specific visual interest.	• Extensive areas of similar vegetation cover.	• Waterforms absent.	• Developments in which form, line, colour and texture of introduced elements contrast sharply with natural features. • Severely disturbed areas with little natural vegetation. • Transition between landuses sharp and geometric, generally appearing as a line.


Lake Magenta
Nature Reserve
RAVENSTHORPE
Cocanarup
Timber
Reserve
PHILLIPS
WEST
HAMERSLEY
FITZGERALD
DEMPSTER
EAST
MT
BARREN
QUOIN
MARSHES
WHALEBONE
HOPETOUN
GAIRDNER
ST MARY
*LAKE
NAMELESS*
TRIGELOW
BREMER
RUNTER
BREMER BAY
SOUTHERN OCEAN
HYDROLOGY
Gauging Station (Water Authority of Western Australia)
Catchment Boundary
Public Roads & Tracks
SCALE
0
10
20
30
km
MAP 5

PRESCRIPTIONS

1. **Incorporate the prescriptions given in Table 6 in all forms of management (eg. fire protection, gravel extraction).**

2. **Reduce or lessen existing negative visual impact by closing unnecessary roads and tracks. Rehabilitate and plant as necessary. Realign required tracks and redesign and/or relocate parking areas and campsites which are visually obtrusive. Details are provided in the access and recreation sections of this plan (Part D).**

3. **Seek advice on visual management of the Park, as required, from CALM landscape architects.**

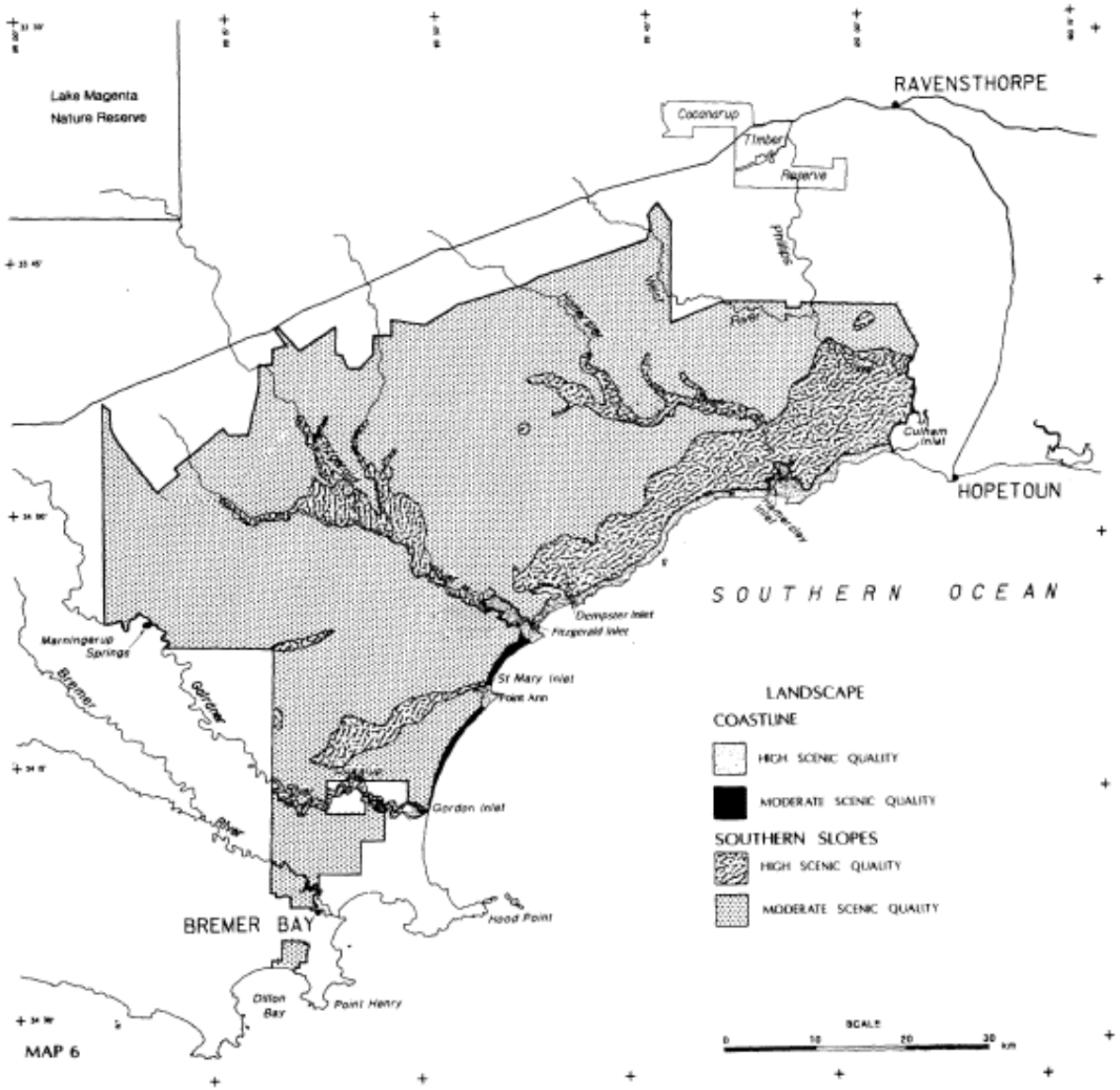

Lake Magenta
Nature Reserve
RAVENSTHORPE
Cocanarup
Timber
Reserve
Culham Inlet
HOPETOUN
SOUTHERN OCEAN
Dempster Inlet
Fitzgerald Inlet
Marringerup
Springs
St Mary Inlet
Point Ann
Gordon Inlet
BREMER BAY
Hood Point
Dillon
Bay
Point Henry
MAP 6
LANDSCAPE
COASTLINE
HIGH SCENIC QUALITY
MODERATE SCENIC QUALITY
SOUTHERN SLOPES
HIGH SCENIC QUALITY
MODERATE SCENIC QUALITY
SCALE
0
10
20
30
km

TABLE 6. PRESCRIPTIONS FOR LANDSCAPE MANAGEMENT

COASTLINE	SOUTHERN SLOPES
High Scenic Quality · alterations should remain subordinate to natural elements such as cliffs, dunes, inlets and wind-pruned vegetation, by borrowing extensively from their form, line, colour, texture and scale. · within one year of project completion alterations should not be evident. · activities which minimally disturb the environment should be encouraged, for example, walking, nature study, whale watching. · the number of roads and tracks should be minimised, with roads entering this landscape only to reach specific sites rather than following the coast east-west for long stretches. · firebreaks should not be constructed. Burnt buffers should be located so that they are visually unobtrusive from roads and tracks, beaches, headlands and inlets. · previously disturbed areas should be given the highest priority for rehabilitation until the desired standard of scenic quality is achieved. - gravel, sand and stone extraction should be excluded.	**High Scenic Quality** 7) alterations should remain subordinate to natural elements, such as the ranges, valleys, river pools and areas of high plant diversity, by borrowing from their form, line, colour, texture and scale. 8) within one year of project completion alterations should not be evident. 9) activities which minimally disturb the environment should be encouraged, for example, walking, wildflower appreciation, nature study. 10) road design, construction and maintenance should remain subordinate to landscape elements by using minimum clearing width, undulating edges, sensitive alignment and immediate revegetation of disturbed areas. 11) roads and tracks should be visually unobtrusive from vantage points. 12) firebreaks should not be constructed. 13) protection burning, where required, should be based on impact-minimising prescriptions. Burnt buffers should be located so that they are visually unobtrusive from travel routes and other vantage points. 14) previously disturbed areas should be given the highest priority for rehabilitation until the desired standard of scenic quality is achieved. - gravel, sand and stone extraction should be excluded where possible. If not, extraction should be limited in area and restricted to sites which can not be seen from travel routes and other vantage points.
Moderate Scenic Quality - alterations may be apparent but they should not dominate; they should borrow form, line, colour, texture and scale from natural elements.	**Moderate Scenic Quality** 13) alterations may be apparent but they should not dominate; they should borrow form, line, colour, texture and scale from natural elements. - the main visual appeal of this landscape is extensive vistas free of human disturbance. Roads, tracks~ firebreaks and burnt buffers should be visually unobtrusive where possible, primarily by borrowing from the natural form, line, colour and texture of the landscape.
Low Scenic Quality **8.** none of the FRNP landscape falls in this class.	**Low Scenic Quality** none of the FRNP landscape falls in this class

7.0 BIOLOGICAL RESOURCE MANAGEMENT

7.1 VEGETATION

The objectives are:

1. *Protect existing plant communities from impacts other than those arising from natural processes, except where necessary to provide an approved development, consistent with the goals for the Park (Section 2.0).*
2. *Rehabilitate plant communities which have been degraded.*

Background

Fitzgerald River National Park is dominated by open to very open mallee and shrubland. Heath is common throughout, while woodlands only occur along rivers and in swamps. There is a strong correlation between vegetation structure and distribution and the landform. and underlying soil or rock type.

The Park lies within the Eyre Botanical District of the South-West Botanical Province (Beard, 1980) and extends from the coast almost to the District's northern boundary. The Park is the only remaining uncleared, extensive, representation of the Eyre District. For most of the Park, the boundaries of the vegetation systems of Beard (1976) coincide with the boundaries of the landforms described by Chapman and Newbey (in prep.). These landforms, are given in Section 6.2 Landform, Soils and Erosion Hazard. The characteristics of the associated vegetation types are summarised in Table 4.

Most of the vegetation types in Fitzgerald River National Park are poorly represented in conservation reserves, particularly those associations found on the upland plains, valleys and ranges. Together these occupy about 90% of the Park area. Chapman and Newbey (in prep.) based the following comments on Newbey's field knowledge of other conservation reserves within the same climatic zone.

'The plains landform. is present only in FRNP. Large areas of upland are present in Frank Hann National Park and Lake Magenta Nature Reserve, with a small area in Corackerup Nature Reserve. However, these areas are dominated by undulating plain: they do not include v-shaped valleys as does FRNP. Although gorges are found in Corackerup, they do not match the extensive gorges of the Fitzgerald and Hamersley rivers. Ranges are an obvious feature of Stirling Range National Park; however, the coastal influences found on this landform. in FRNP are lacking in the Stirlings. Rivers, swamps and inlets are also poorly represented in the existing reserve system, although dunes are well represented in Stokes National Park' (Chapman and Newbey, in prep.).

PRESCRIPTIONS

1) **Protect the vegetation communities within the Park from dieback (see 9.1 Disease). Such protection is of paramount importance.**

2) **Protect the vegetation communities within the Park from introduced herbivores and weeds (see 9.3 Animal Pests and 9.4 Weeds). (Reducing the number of enclaves, and rationalising Park boundaries and numbers of management tracks will increase protection.)**

3) **Protect the vegetation communities within the Park from widespread human caused fires and frequent burning (see 9.2 Fire).**

4) **Minimise removal or damage to vegetation caused by development and maintenance of facilities and visitor use.**

5) **Rehabilitate degraded vegetation (refer to 9.5 Rehabilitation).**

Research and Monitoring

6. **Carry out research into management regimes (especially fire) required to maintain vegetation communities and fauna habitat.**

7.2 FLORA

The objective is to protect and maintain viable populations of all existing species, especially the rare species.

Background

With 1748 identified plant species, including 75 endemics, the Fitzgerald River National Park is one of the richest flora conservation areas in Western Australia. The Park contains 20% of known plant species (both named and unnamed) for Western Australia and 42% of the known species for the South-West Botanical Province. The number of species will continue to increase as surveying continues.

The Fitzgerald area is one of three nodes of high species richness in south-west Australia. FRNP also has a high proportion of endemic, geographically restricted and rare species. Although the flora is typical of the Eyre Botanical District it also contains some elements of the wetter forest and drier Goldfields flora (eg. *Gnephosis intosa* and *Ptilotus holosericeus).*

The flora of FRNP consists of 5 families of fern and 87 of flowering plants. The major families represented are Myrtaceae (220 species), Proteaceae (130), Asteraceae (108) and Cyperaceae (97). Dwarf shrubs are the dominant life-form, followed by annuals and small shrubs.

The upland and plains contain the highest numbers of plant species (Table 7). They are also the most extensive landforms identified in FRNP.

In FRNP, peak flowering occurs over August-November while the least number of species bloom in February. There is a rapid decline in the number of species flowering through the summer months. The most important summer flowering group is the eucalypts. Autumn-flowering species such as *Hakea laurina, Dryandra quercifolia* and *Banksia media* are important for the survival of honeyeaters and honey possums.

Rare Flora

Chapman and Newbey (in prep.) identified 250 plant species of very high conservation value. These species were geographically restricted or had populations of less than 1000 plants. Some plants were only present over small areas (eg. 1 ha or less) even though large areas of apparently suitable habitat existed. Their list is preliminary, having been prepared as part of a general flora survey, rather than a specific intensive survey for rare species.

Table 8 is derived from Chapman and Newbey's work. The Barren Ranges have the greatest number of priority plants (21 of the 42 priority species).

The Park contains 16 species of declared rare flora (declared rare under the Wildlife Conservation Act, 1950). A Ministerial permit must be obtained before disturbing or removing declared rare flora.

TABLE 7. NUMBER OF PLANT SPECIES PER LANDFORM

LANDFORM	AREA (ha)	FLORA (No. of Sp.)	% TOTAL FLORA	PRIORITY FLORA (No. of Sp.)
Upland	87300	877	50	7
Plains	166400	763	44	6
Valleys	45300	213	12	5
Ranges	39000	230	13	21
Dunes	6760	255	15	2
Inlets	negligible	197	11	1
Rivers, swamps and lakes	negligible	519	30	3

PRESCRIPTIONS

1. **Protect priority species (Table 8), especially those susceptible to dieback and those growing in locations known to be susceptible to erosion.**

2. **Set up an herbarium, with emphasis on the priority flora, within the Park.**

3. **Ensure that all information regarding the flora in FRNP, particularly the priority species, is stored in the CALM district office at Albany. Ensure that these records are consulted and appropriate action taken before development or management actions are undertaken.**

4. **Develop an ongoing exchange of information with the public regarding rare flora management, given the proviso that CALM is obliged to keep the location of rare flora confidential.**

5. **Plant nursery-raised specimens, with due regard for dieback hygiene, if necessary to enhance a rare species' chance of survival.**

Research and Monitoring

6. **Survey areas proposed for management activities for rare flora prior to the activity commencing.**

7. **Carry out detailed surveys within the Park and adjacent areas to locate other populations of priority flora (Table 8). Give priority to the Barren Ranges and areas likely to be disturbed.**

8. **Research the response to disturbance (such as dieback, fire, soil disturbance, weeds, grazing), reproductive biology and taxonomy of the priority flora.**

9. **Encourage surveys of the distribution, and research into the taxonomy, of the 250 important species identified by Chapman and Newbey (in prep.).**

TABLE 8. PRIORITY FLORA

1. Endemic, possibly rare, known from 5 or less populations and probably susceptible to dieback (Nos. of populations given In brackets)

SPECIES	LOCATION
**Adenanthos dobagii (3)*	*SP*
**Adenanthos ellipticus (1)*	QR
Brachyloma sp. KRN 11111 *(2)*	CD, IN, QR
Grevillea fistulosa (3)	QR
**Grevillea infundibularis (2)*	QR
Leucopogon lloydiorum (1)	*UP*
Leucopogon sp. KRN *4038 (5)*	QR
Leucopogon sp. KRN *4389 (1)*	*SV*
Styphelia sp. KRN *8266 (1)*	*SP*
**Verticordia aff. helichrysantha* (KRN *2763)*	*(2) SV*

2.Endemic, possibly rare and known from 1 population.

SPECIES	LOCATION
Acacia phlebopetala var. *pubescens*	*PS,* QR
Charnelaucium sp. KRN *2650*	*SP*
**Coopernookia georgei*	QR
Dampiera sp. KRN *11143*	QR
Gonocarpus hispidus	QR
Goodenia barilletti	QR
Goodenia sp. KRN *11369*	*UP*
Goodenia sp. KRN *1726*	RS
Goodenia stenophylla	QR, UP
Gyrostemon sessilis	*SV*
Kunzea sp. KRN *11119*	QR
Mirbelia sp. KRN *11203*	*UP*
Olearia sp. KRN *10843*	CD
Pimelea longiflora ssp. eyrei	QR
Plalysace sp. KRN *4852*	QR
Pomax sp. KRN *11459*	QR
Pultanaea sp. KRN *11012*	*SP*
Spyridium sp. KRN *5007*	*UP*
Styphelia sp. KRN *8266*	*SP*
**Verticordia helichrysantha*	*SP*
Verticordia cf. *helichrysantha* (KRN *9739)*	*SV*
Verticordia aff. harveyi (KRN *11120)*	QR

3. Endemic, declared rare and known from 5 or fewer populations.

SPECIES	LOCATION
**Acacia argutifolia (5)*	QR
**Eremophila denticulata (2)*	RS
**Eucalyptus burdettiana (2)*	QR
**Eucalyptus coronata (3)*	QR
**Lechenaultia superba (4)*	QR
**Stylidium galioides (5)*	QR

4. Declared rare, not endemic and known from 5 or fewer populations in the Park.

SPECIES	LOCATION
**Eremophila serpens*	RS
**Myoporum salsoloides*	*UP*
**Ricinocarpus trichophorus*	*SV*
**Thelymitra psammophila*	*UP*

	No. of Priority Sp.	%
SP: Plains	*6*	*14*
SV: Valleys	*5*	*12*
QR: Ranges	*21*	*50*
RS : Rivers, swamps and lakes	*3*	*7*
UP: Upland	*7*	*17*
CD: Dunes	*2*	*5*
IN : Inlets	1	*2*

* :declared rare

Endemic: 100% of known populations confined to FRNP

Possibly Rare : fewer than 1000 plants known in conservation reserves or few populations (K. Newbey field data)

KRN : collection number of K. Newbey for a voucher specimen deposited in the W.A. Herbarium.

7.3 FAUNA

The objectives are:

1. *Protect existing species, in particular those declared rare and in need of special protection.*
2. *Re-introduce native animals that once occurred within the Park if resources are available and if research findings indicate no disadvantages to the Park.*

Background

The Park has more species of vertebrate fauna than any other conservation reserve in south-west Australia. It has 22 species of native mammals (7 declared rare), 184 species of bird (3 declared rare and 2 declared in need of special protection), 41 species of reptile (1 declared in need of special protection), 12 species of frog and 4 species of inland fish (Chapman and Newbey, in prep.).

The very high number of vertebrates present is partially due to an overlap of and region species and those adapted to moister conditions. The Park also forms part of a corridor of uncleared vegetation from the coast to the southern wheatbelt and Goldfields (Watson, 1991). The large size of the Park and lack of widespread habitat degradation, such as frequent burning and grazing by stock, enhance these values (Chapman and Newbey, in prep.). Habitats can be degraded by dieback.

There is a concentration of rare fauna in the northern upland (Table 9). This faunal richness is associated with three factors (Chapman and Newbey, in prep.). First, the upland corresponds with the Archaean shield which underlies much of the wheatbelt. Much of the fauna is a remnant of a formerly widespread and richer wheatbelt fauna. Second, habitats exist in a tight mosaic of soil/vegetation types due to the presence of granitic outcrops and numerous minor watercourses. Third, some of the soils are not as extensively weathered and leached as those on the southern plains, and thus have a higher nutrient status.

Therefore, the northern part of FRNP is a small remnant of a formerly widespread and rich faunal area. Today, it is likely that species continue to disperse, perhaps via river valleys, from the upland to the southern plains and elsewhere.

A Ministerial permit must be obtained before rare fauna can be disturbed or removed.

Mammals

The mammals of the Western Australia wheatbelt have declined considerably since European settlement. This decline has been attributed to a number of factors, including clearing, feral cats, foxes, grazing, introduced diseases and changes in fire regimes. The loss of 40% of mammal species from FRNP is comparable with an overall loss of 42% in the whole wheatbelt (Kitchener *et al.,* 1980).

However, in the case of FRNP all remaining fauna species are on one piece of land managed by a single authority.

Of the 22 species of native mammal still present, eight are at risk according to Burbidge and McKenzie (1989). These are the seven declared rare species (Table 10) plus Mitchell's Hopping-mouse *(Notomys mitchelli).* This last species appears to be rare in FRNP. Research elsewhere in Western Australia has implicated the fox as an important factor adversely affecting the conservation of mammals (J. Kinnear, CALM Research Division, pers. comm., 1989).

Rare Mammals

The status and known habitat requirements of the seven declared rare species are given in Table 10.

TABLE 9. NUMBER OF NATIVE VERTEBRATE SPECIES PER LANDFORM

LANDFORM	AREA	BIRDS		MAMMALS+		REPTILES		AMPHIBIANS
	(ha)	No. Sp.	Dec. Sp.	No. Sp.	Dec. Sp.	No. Sp.	Dec. Sp.	No. Sp.
Upland	87300	77	3	16	6	27	1	9
Plain	166400	70	2	9	2	24	---	12
Valleys	45300	64	2	9	1	21	---	8
Ranges	39000	42	3	5	1	24	1	4
Dunes	6760	47	1	7	---	21	1	8
Inlets	negligible	102	2	7	---	---		--
Rivers, swamps and lakes	negligible	123	3	7	---	2	---	11
TOTAL		**184**	**5**	**22**	**7**	**41**	**1**	**12**

+ excludes bats

TABLE 10. DECLARED RARE MAMMALS

COMMON NAME	SCIENTIFIC NAME	GENERAL DISTRIBUTION AND STATUS	FRNP DISTRIBUTION AND STATUS	LANDFORM	HABITAT PREFERENCES FRNP
Woylie	*Bettongia* penicillata	Restricted to isolated pockets in southwest W.A. and eastern QLD. Rare.	Only one record from north-west comer of FRNP.	Upland	Clumped low, woody scrub.
Tammar Wallaby	*Macropus eugenii*	Disjunct populations in south west W.A. and southern S.A. Also found on several offshore islands. Common, limited.	Occur in very low numbers, and are scarce in the northwest of FRNP.	Upland	Tight mosaic of woodland and denser, low vegetation associated with watercourses. Often associated with *Allocasuarina campestris* ssp. *campestris* shrubland.
Dibbler	*Parantechinus apicalis*	Limited populations in south west W.A. Colonies known from Boullanger Island, Cheyne Beach, Torndirrup, FRNP and Ravens-thorpe Ranges. Rare, limited.	Readily located at several sites. Moderately common resident at these limited sites.	Upland Plains	Very open mallee over loamy sand, long unburnt vegetation (greater than 37 yrs) (Chapman and Newbey, in prep).
Red-tailed Wambenger	*Phascogale calura*	Known from several localities in the southern wheatbelt of of W.A. Common, limited, at risk.	Recorded from two locations in northwest of FRNP.	Upland	Long unburnt stands of *Allocasuarina huegliana.*
Western Mouse	*Pseudomys occidentalis*	Endemic to southwest W.A. Limited distribution in south-east wheatbelt north to Hyden, east to Ravensthorpe and west to Tambellup. Common, limited, at risk.	Occur in small area in northwest of of FRNP. Moderately common resident.	Valleys Upland	Very open mallee over loamy sand or fine sandy loam.
Heath Rat	*Pseudomys shortridgei*	Restricted to dry heathlands in	Present in low numbers in east	Upland	Very open mallee or heath

		southwest Victoria, and Ravensthorpe Range and FRNP in southwest W.A. Rare, limited.	and northeast FRNP. Uncommon resident.	Plains	over loamy sand, or mallee over loamy sand, long unburnt vegetation (greater than 37 yrs) (Chapman and Newbey, in prep).
Southern Brown Bandicoot	*Isoodon obesulus*	Restricted to dense scrub in south-west W.A., southern Victoria and Tasmania. Common, limited.	One record from northern FRNP and another from near West Mt Barren.	Upland Ranges	Dense, scrubby habitat or low ground cover. Also open mallee on sandy loam.

Chapman and Newbey (in prep.) found a correlation between the presence of rare fauna, time elapsed since last fire and areas underlain by granite (ie. the northern part of the Park Table 9). More research is required before definitive conclusions are drawn.

Birds

One hundred and eighty-four species of bird have been recorded in the Park. Bird richness is due to the wide diversity of habitats. The areas with the most birds are the wetlands, (coastline, rivers and inlets) followed by the upland and plains (Table 9). The wetlands are dominated by woodland, which has been identified by Kitchener *et al.* (1982) as being particularly important to birds in the Western Australian wheatbelt.

Although woodlands occur on all landforms in FRNP, they are very limited in distribution. The woodlands of swamp yate (*Eucalyptus occidentalis)* in drainage lines offer the only possible nesting sites for a number of species including owls, parrots and striated pardalotes. These areas are also favoured for camping.

The Barren Ranges do not appear to provide any unique habitat for birds.

In FRNP, birds appear to have a protracted breeding season (Chapman and Newbey, in prep.). The peak breeding months of October and November correlate with peak flowering in October (Section 7.2 Flora). May and June are the only months with no recorded breeding activity.

The high salinities of the Park's water bodies are tolerated by most species of duck, particularly the Chestnut Teal. The only exceptions are the Hardhead, Pink-eared Duck, and Blue-billed Duck which have only been recorded from the large, permanent, fresh waters of the Hunter River and Cardiminup Swamp outside the Park.

Rare Birds

Five species of birds declared rare or in need of special protection occur in FRNP. Their distribution and status are given in Table 11. The most vulnerable are the Ground Parrot, Western Bristlebird and Western Whipbird. The largest numbers of all three have been recorded in the northern upland of FRNP (Chapman and Newbey, in prep.).

Reptiles

The reptile fauna of the Park is less diverse than that of similar sized areas in the semi-arid and and zones, with 41 species in the Park, compared with 60-70 species elsewhere. Chapman and Newbey (in prep.) implicate the south coast climate, with its rapid temperature changes and frequent summer cloud cover, as the limiting factor. These rapid changes can result in reptiles, particularly the young of that season, dying. The species present are probably those that can grow fast enough to reach a

sufficient body weight to survive summer temperature changes and maintain metabolism during winter hibernation.

In the Park, the upland contains the greatest number of reptile species (Table 9) followed by the plains and ranges. Very open mallee across all landforms contains more species than any other vegetation, due probably to its occurrence on deep sandy soils.

Fallen timber is also important as it creates structural complexity and refugia for reptiles (Chapman and Newbey, in prep.). Thus, cool and patchy fires outside the breeding season favour reptiles. Reptiles have considerable capacity to survive wildfires by burrowing or using non-flammable refuges.

Rare Reptiles

Only the Carpet Python is declared in need of special protection, but it is considered secure within its range (Table 11).

The Long-necked Turtle *(Chelodina oblonga)* occurs at its most easterly limit in the Park. Normally regarded as a freshwater turtle, this species is known to tolerate, but only for short periods, brackish and even saline water with salinity levels as high as 13 200 mg/L (Chapman and Newbey, in prep.). Present salinity levels in the Park's rivers are close to this species' upper limit of salinity tolerance. Increases in salinity are, therefore, likely to cause its local extinction.

Amphibians

Twelve species of frog have been recorded from the Park. This richness is a result of an overlap of and region species and those adapted to moister conditions. Ten of the twelve species are endemic to the south-west of Western Australia. None of these is declared rare.

The plains and rivers, swamps and lakes support the greatest number of species (12 and I I respectively). This is because of the presence of deep sands for burrowing and swamps with ephemeral freshwater. Frog distribution and abundance is controlled more by these factors than by vegetation type. Although all species disperse widely, even into habitats without water, all except *Myobatrachus gouldii* require ponded water for breeding.

The size of the Park and its relative integrity seem to provide adequate conservation protection for its frogs.

TABLE 11. BIRDS AND REPTILES DECLARED RARE OR IN NEED OF SPECIAL PROTECTION

COMMON NAME	SCIENTIFIC NAME	GENERAL DISTRIBUTION AND STATUS	FRNP DISTRIBUTION AND STATUS	LANDFORM	HABITAT PREFERENCES FRNP
DECLARED RARE					
Western Bristlebird	*Dasyornis longirostris brachypterus*	W.A. subspecies restricted to area between Two Peoples Bay and Hopetoun in south-west W.A. Rare, limited, at risk.	Present in low numbers on the northern boundary of FRNP. Uncommon resident.	Upland Valleys	Very open mallee or heath with a dense shrub layer between 30 - 100 cm, long unburnt vegetation (greater than 15 yrs) (Smith, 1985).
Ground Parrot	*Pezoporus wallicus flaviventris*	W.A. subspecies restricted to Fitzgerald River and Cape Arid National Parks. Rare, limited, at risk.	Present in very low numbers. Scarce resident in FRNP. FRNP appears to contain majority of W.A. population.	Upland	Very open mallee, with mid-dense under storey (less than 1m high), and low sedge with at least 10% canopy cover, long unburnt vegetation (greater than 16 yrs) (Chapman & Newbey, in prep).
Western Whipbird	*Psophodes nigrogularis nigrogularis*	W.A. subspecies restricted to area between Two Peoples Bay and Ravensthorpe Range. Rare, limited, at risk.	Readily located in FRNP. Common resident in FRNP.	Upland	Varied habitat of mallee, very open mallee shrubland and tall heath. Usually 25 - 50% canopy cover of plants in 40 - 60 cm height range. Long unburnt veget ation (greater than 20 yrs) (Smith, 1985).
DECLARED IN NEED OF SPECIAL PROTECTION					
Peregrine Falcon	*Falco peregrinus*	Distributed over the greater part of the continent but is nowhere abundant. Common, at risk.	Only one record from upper Fitzgerald River. Rare, vagrant to FRNP.		Inland tree-lined watercourses, mountainous country and cliffs.
Red-eared Firetail	*Stagonopleura oculata*	Endemic to southwest W.A. north to the Darling Range and east to Cape Le Grand. Common, limited.	Readily located in FRNP. Common resident.	Rivers, swamps and lakes	Densely vegetated gullies, heath where there is thick, damp vegetation, river complex and creek fringes.
Carpet Python	*Morelia spilota imbricata*	Southwest W.A. north to Geraldton, Yalgoo, east to Pinjin, Norseman and Cape Le Grand. Also found on several offshore islands. Common, limited.	Uncommon restricted species known from several locations in FRNP.	Upland Ranges Dunes	Varied habitat preferences.

Fish

Species found in the Park include the Spotted Minnow *(Galaxias maculatus),* Hardyhead *(Atherinidae sp.),* Swan River Goby *(Pseudogobius olorum)* and Black Bream *(Acanthopagrus butcheri).* All are salt water species.

The Fitzgerald, Hamersley and Phillips Rivers support all four species. The Swan River Goby is the most widespread and abundant inland fish. Hardyheads and bream are more dependent than the other two species on deeper, less saline and more permanent pools.

The introduced Mosquito Fish *(Gambusia affinis),* which has the potential to outcompete native fish, is present in Western Australia from the Hutt to Pallinup, Rivers (Mees, 1977), but is not yet present in the Park. In the Pallinup it can withstand salinities to 13 000 mg/L (Scott, 1975). As the Pallinup and Gairdner Rivers share a common watershed in the vicinity of Jerramungup, there is potential for its spread into the Park's rivers.

Invertebrates

Past surveys for invertebrates in the Park have focused on specific orders of insects, or occurred as part of more widespread collection efforts over the region. Specific orders collected include ants and bees (Hymenoptera), flies (Diptera), moths and butterflies (Lepidoptera), beetles (Coleoptera) and grasshoppers (Orthoptera). Some collection of land snails, molluscs and spiders has also been carried out.

An extensive survey of all invertebrate types has not been conducted; however, the Park is known to contain at least 43 families from various orders. The Buprestidae (jewel beetles) are protected and a Ministerial permit is required for their collection.

PRESCRIPTIONS - GENERAL

1. **Protect habitats from dieback (Section 9.1), inappropriate fire regimes (Section 9.2) and human disturbance.**

2. **Control introduced species which are damaging, or could potentially damage, native fauna (9.3 Animal Pests and 9.4 Weeds).**

Research and Monitoring

3. **Identify and research keystone species (these are species that, if removed, will precipitate community collapse) to develop knowledge of community response to disturbances such as dieback, fire, recreation use and management actions, and of general community changes over time.**

PRESCRIPTIONS - RARE SPECIES

4. Priorities for the protection of rare mammals are the heath rat, dibbler, woylie, tammar and western mouse. Priorities for rare birds are the Ground Parrot, Bristlebird and Whipbird. These priorities are based on each species' status and distribution in FRNP and elsewhere.

5. Use the results of the investigations in Prescriptions 7 and 8 below to determine and implement the processes required, such as predator control and fire management, to maintain or improve populations of rare species.

6. Reintroduce former known rare fauna inhabitants if resources are available. Before any reintroductions are considered, the likely impact on existing fauna should be thoroughly understood.

Research and Monitoring

7. Investigate habitat requirements and ecology of rare species by:

a. conducting comprehensive surveys to determine broader distribution

b. studying each species to determine which habitats, including vegetation structures, compositions and fire ages, are used

c. studying life history characteristics of each species

d. determining the appropriate fire regime for each species.

8. Investigate the impacts of predation by introduced carnivores by baiting foxes in part of the Park for 3-4 years. Monitor small mammal and fox populations in both baited and unbaited parts of the Park to determine the effects of baiting. Identify prey species from fox stomach and gut analyses. Determine effective control mechanisms. Use the research findings to guide future management.

9. Update existing data on the Park's invertebrates. Subject to resource availability, carry out invertebrate surveys, and investigate the effects of fire and dieback on invertebrate communities.

8.0 CULTURAL RESOURCE MANAGEMENT

8.1 ABORIGINAL

The objectives are:

1. *Protect Aboriginal cultural features within the Park.*
2. *Allow for involvement of Aboriginal people as is consistent with the South Coast Regional Management Plan.*

Background

The Park area was extensively used by Aborigines. Tribes known from the region included the Mongup, Corackerup, Quaalup and Bremer Bay groups. Ethel Hassel of Jerramungup wrote in the 1870s of the 'Wheelman tribe' who centred their traditional area around "Jarramongup" Station, including the Twertup area.

The majority of known sites are archeological, mostly artefact scatters. These vary in size from isolated single artefacts to major sites with up to 1 000 artefacts. Most sites are located on level ground or on small rises with all-round views. Sites are either on the coast or associated with watercourses and swamps (Bird, 1985). Stone arrangements also exist. Limited information can be drawn from surface scatters. There is a need to locate and excavate stratified sites. These would give a better understanding of Aboriginal occupation in the area.

Recently, Aboriginal people have shown an interest in reestablishing cultural links with areas on the south coast that their ancestors previously inhabited. Closer cooperation and involvement of Aboriginal people should lead to a better understanding of the spiritual links and cultural aspirations in the area.

PRESCRIPTIONS

1. **Promote opportunities for continued consultation with Aboriginal people on matters of cultural interest as is consistent with the South Coast Regional Management Plan.**

2. **Survey for Aboriginal sites any areas to be developed prior to work commencing. Protect all identified sites during all operations.**

3. **Report immediately to the W.A. Museum any artefacts or materials found. The confidentiality and management of all sites is subject to guidelines and procedures established by the W.A. Museum.**

4. **Incorporate information on Aboriginal occupation and use in interpretive programs for the Park (see 16.0 Information, Interpretation and Education).**

Research and Monitoring

5. **Continue to investigate traditional Aboriginal knowledge of the area.**

6. **Encourage the W.A. Museum and other professional archaeologists to further study Aboriginal occupation and use of FRNP.**

8.2 EUROPEAN

The objective is to protect European cultural features within the Park.

Background

A number of European activities have focused on the Park area, including sealing and whaling, pastoralism, mining and agriculture.

In the early 1800s, whaling and sealing concentrated on the Doubtful Islands and Bremer Bay areas. In 1848, James Drummond travelled through the area and recognised its botanical value. At about the same time, Roe found lignite (brown coal) deposits in the Fitzgerald valley, beginning over a century of interest in the area's potential for mining.

Pastoralism and grazing in the Fitzgerald area began when John Hassell acquired "Jarramongup" in 1850. Soon after, John Wellstead squatted at "Quaalup". He built Quaalup homestead, which is located just outside the Park's boundary, in 1858. Ruins of a shepherd's hut, built by the Wellsteads, still remain near Fitzgerald Inlet. Sheep were regularly grazed along the Fitzgerald River. The Phillips and Gairdner Rivers were used as stock routes to the coast. In 1868, John and George Dunn brought the first sheep to Cocanarup and began permanent settlement.

Ruins of various homesteads, including the Parsons, King, Neil and Waters families can be found in the eastern end of the Park.

The Western Australian section of the East/West Telegraph Line was completed in 1877 after commencement in 1875. Sections of the accompanying service track are still in use today for access to parts of the Park. The Bremer Bay station was closed down in 1929 when the telegraph line was re-routed inland from Balladonia direct to Perth.

The search for prospective mineral fields brought many people to the area. The Ravensthorpe mineral period commenced in 1898 when the Dunn brothers found gold in the Phillips River. Copper and gold production in Ravensthorpe increased in the early 1900s. The remains of a copper and manganese mine on Copper Mine Creek are still visible. The remains of an early twentieth century (c. 1910-1920) head frame, associated with the search for oil is located near Jonacoonack on the Fitzgerald River. Nearby are a number of hut sites and a small dam. The Depression signalled the closure of smelters, however, and many people left the district. Some stripping of mallet bark occurred near Point Charles in the 1920s. In the 1930s, a temporary revitalisation of the mining industry around Kundip occurred with the establishment of a number of mines.

The No. 2 Rabbit Proof Fence was completed in 1905. It was abandoned in the 1960s, with the length between Nyabing and Point Ann being the last persisting section. The Fence ran from Point Ann on the south coast, 1 158 km (724 miles) to north of Yalgoo, where it swung north-east to join the No. 1 Fence. Although no longer functional, parts of the fence still remain in the Park (L. Sandiford, 1988).

Grazing leases were held along the Phillips and West Rivers and there was considerable grazing of bush areas. Farming around Hopetoun commenced with the first farm on the east bank of Culham Inlet. There was little further agricultural expansion in the area until the 1950s.

Following World War II, the era of clearing and broad acre cultivation saw an average of over 400 000 hectares State-wide released for farming every year until 1969. Most of the land allocated by the War Service Land Settlement authorities was in the Gairdner region. In light of this rapid clearing, the W.A. Naturalists' Club suggested that the area now comprising the National Park should be given legal protection. In 1950, the Minister for Lands gave his approval for the creation of the Fitzgerald Flora and Fauna Reserve and in 1954 the reserve was gazetted and given Class C status.

In 1965, a mining claim for building stone was granted on the western edge of the Fitzgerald River, near Twertup Creek. Horry Worth, a local identity, quarried blocks of spongolite out of the gorge wall. A small house, now the Twertup Field Study Centre, was built from spongolite at the quarry site.

A local commercial fishermen, D B Collett, applied for a fishing lease at Point Charles in 1968. Prior to this application, Collett cleared 12 km of track through what subsequently became the Park. The remains of his large concrete trough used for cleaning salmon can still be seen at Fitzgerald Inlet.

The late 1960s saw a Statewide boom in the mining industry and in 1970, a temporary ban was imposed withholding vacant Crown land from pegging. This ban did not include national parks and nature reserves. Consequently, about 12% of the Reserve was pegged for various minerals: kyanite, coal, copper, kaolinite, diatomite, quartzite and mineral sands. After a period of negotiation and

debate, particularly over the claim by Jupiter Minerals to mine coal for its montan wax content, the mining claims were disallowed and Fitzgerald River National Park was declared an A Class Reserve in 1973, and vested in the National Parks Board.

PRESCRIPTIONS

1. **Provide interpretive material on-site regarding the history Twertup house and quarry, the Wellstead ruins and other sites of historic interest. If use of any of these sites appears to be leading to site degradation take the necessary management actions.**

2. **Assess the condition of existing historic sites and take action as necessary to preserve them.**

3. **Reconstruct parts of the rabbit proof fence and telegraph line. Incorporate their interpretation and enjoyment as part of broader interpretive programs and systems of footpaths.**

4. **Incorporate information on structures associated with the area's mineral history in the Park's interpretive programs (16.0 Information, Interpretation and Education).**

5. **Implement safety measures, where possible, at potentially hazardous locations such as abandoned mine shafts.**

9.0 PROTECTION MANAGEMENT

9.1 DISEASE

The objectives are:

1. *Prevent the introduction of dieback and other diseases into disease-free areas.*
2. *Control the spread and intensification of, and where possible eradicate, dieback and other diseases where they are already present.*

Background

Dieback Disease

The greatest management concern in FRNP is dieback, the common name given to the disease caused by introduced microscopic soil-borne fungi, principally *Phytophthora cinnamomi.* The fungus produces small motile spores which are spread in water and wet soil. It will also survive in soil and plant material. The fungus infects plant roots and as the fungus establishes it rots the roots and stem tissue, resulting in death due to water stress. Plants such as banksia die rapidly after infection, but trees such as jarrah often die slowly, hence the common name for the disease -"dieback". The most likely way in which dieback is spread is in infected soil. This soil may be moved by earthworks, or on the wheels and underbodies of vehicles. It can also be spread by other means, such as in mud on shoes, or flowing water.

FRNP is at risk from dieback disease for several reasons. First, the area's warm, relatively moist climate favours the production of fungal spores, particularly after summer rains. The average number of raindays for Bremer Bay and Ravensthorpe is 118 and 109 respectively and occasional summer storms can bring 100 mm. of rain to both coastal and inland areas. This means that if dieback is introduced, it is highly likely to survive and spread rapidly in the warm moist conditions.

Second, clays which are a significant component of the soils, particularly the duplex soils of the southern plains, impede drainage. Subsurface ponding provides a suitable environment for the production of spores. Ponding also results in muddy conditions which cause infected soil to adhere to vehicles. An impeding clay layer also means that water tends to drain laterally, spreading the fungus further.

Third, the fungus is known to attack a wide range of plant species. The Proteaceae, Epacridaceae, Myrtaceae and Papilionaceae families, which together dominate many of the Park's plant communities, are particularly susceptible. Various members of these families are known only from Fitzgerald River National Park. For example, the Barren Ranges have a number of susceptible species known only from the Ranges.

Fourth, the Park has substantial populations of honey possums and honeyeaters. Both rely on flowering plants, many of them from the above families, for food. The honey possum, being far less mobile than the honeyeaters, is particularly dependent on a continuing local supply of nectar and pollen.

Fifth, the Park is generally reached via gavel roads of uncertain dieback status and management. CALM has no control over the dieback status of roads outside the National Park and therefore has no control over the potential of vehicles to carry dieback and infected soil under wet conditions. This makes vehicle cleanliness a critical issue.

Cost-effective techniques for eradication once the fungus is well-established are as yet unknown. Therefore, every effort must be made to protect the flora in the areas still free from dieback. The only effective protection, other than quarantine, is the continued use of measures designed to limit the artificial introduction and spread of the disease (hygiene measures).

A dieback hazard map for the Park has been produced. This map shows the different susceptibilities of different vegetation communities to dieback. Most of the Park has at least a moderate to high dieback hazard rating (Map 7b). This map should be regarded as a general guide, as detailed information is not yet available regarding the degree of susceptibility of many individual plant species in FRNP. Also, the interaction between the fungus and the environment (eg. position in the landscape, effects of impeded drainage and soil parent material) is still poorly understood on the south coast.

Therefore, a very conservative and consistent approach needs to be adopted. Every possible measure must be taken to preclude further spread, or spread to presently uninfected areas in the Park. It can not be stressed too strongly that the vegetation and recreation values of the Park are largely dependent on retention of the vegetation, much of which is susceptible to dieback disease. Experience in other areas of the south-west has shown that spore survival is minimised on well-drained, hard-surfaced roads. They limit the opportunity for infected soil to be picked up or spread by vehicles.

All south coast national parks from Walpole to Cape Arid are infected by dieback to some degree. Current knowledge indicates that Fitzgerald River National Park is the least infected Park in south-west of Australia.

Three species of *Phytophthora* are known from the area (Map 7b). These are *P. cinnamomi, P. citricola* and *P. megasperma* (var. *megasperma* and var. *sojae).* The most aggressive of these appears

to be *P. cinnamomi.* Until more is understood of the potential of each species, it should be assumed that all have equal destructive ability.

There are two confirmed *Phytophthora cinnamomi* infections, two confirmed *P. megasperma* infections and one confirmed *P. citricola* infection within the Park (Map 7b). *P. cinnamomi* has been identified near the Ranger station at Jacup, in association with the old rabbit proof fence. A major infection is located on Bell Track which was illegally constructed in 197 1. The area infected is greater than 6 km long and was originally described as a. linear infection. However, it has spread considerably and is now present in the Dempster catchment to the east and the Susetta Creek catchment to the west of Bell Track. *P. megasperma is* present at two locations along Hamersley Drive. The infection which originated in the old gravel pit on East Mount Barren has severely affected the *Banksia speciosa* population in this area. The disease has also spread along the southern side of East Mount Barren, along the old track alignment. *P. citricola* has been positively identified on Pabelup Drive near Twertup Track turnoff.

In addition, there is now considerable concern regarding widespread distribution of dieback in the Park. Much of the early survey and sampling conducted in the Park was based on experience from elsewhere in the south-west. This approach required considerable time on some sites to positively establish that *Phytophthora* was causing plant death. Methods more appropriate to the Fitzgerald, for confirming the presence of dieback fungus, are being developed. Areas in the Park, originally identified as potential dieback infections but not confirmed by early sampling, will continue to be regarded as suspect (Map 7b).

There are also other known *Phytophthora* infections adjacent to the Park. *P. cinnamomi* occurs in a disused gravel pit on Highway 1, to the east of Mallee Road, and in a pit on Mallee Road. *P.* citricola is also present in the pit on Mallee Road. These infections are in the catchment of the Fitzgerald River.

P. megasperma is present in Dunn Swamp on the eastern side of the Hopetoun-Ravensthorpe Road and along the Southern Ocean West Road on the eastern access to the Park.

Honey-Fungus (*Armillaria luteobubalina)*

This fungus has spores borne on gills, similar to a mushroom. The fruiting body is 12-15 cm across and golden yellow, generally growing in clumps on tree bases or stumps. A white mycelium mat is formed under the bark at the base of the affected tree. The fungus appears in the wetter months of the year (June/July). *Armillaria* spp. feed on new wood and bark, eventually girdling and killing their host. They have a large host range and are widespread throughout the world.

Unlike *Phytophthora cinnamomi, A. luteobubalina is* naturally occurring in the southwest. However, the method of spread is not. In an undisturbed environment the fungus spreads by infected roots growing towards and touching uninfected roots or by fungal hyphal growth, both slow processes. Air-borne spores landing on damaged bark may also establish infections. However, with the advent of large scale movement of soil and associated root material and wood, as part of management and construction works, the probabilities of spread are greatly increased. This enhanced spread involves the movement of fist-sized or larger pieces of root or infected woody material.

Armillaria luteobubalina has been recorded from Dunn Swamp and from two locations in the Park (Map 7b). Surveys for its presence are continuing.

PRESCRIPTIONS

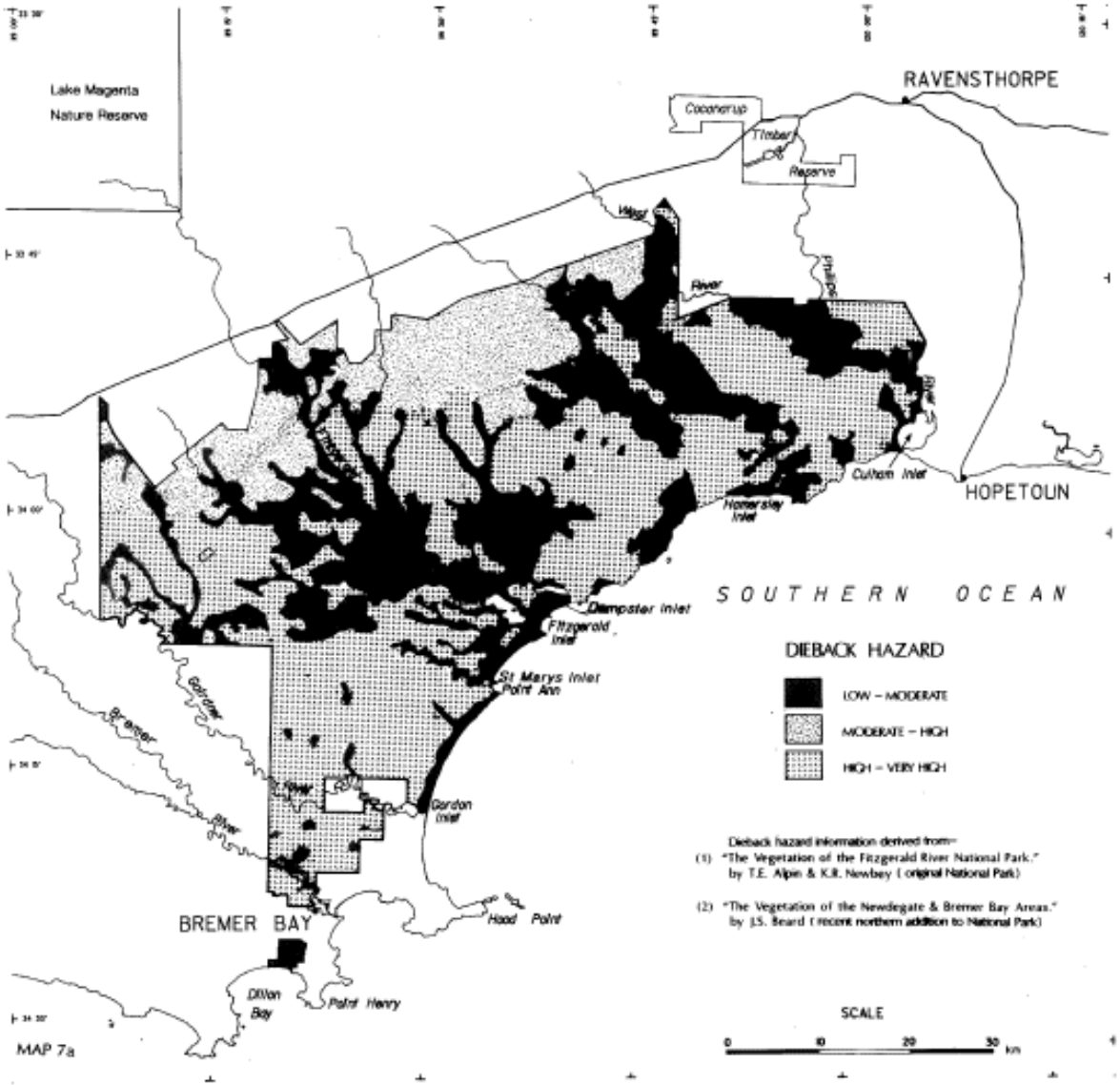
1. **Produce a dieback hygiene map (a map showing dieback distribution and risk of natural spread) for the Park, with particular emphasis on roads, tracks and paths. Use research and monitoring findings to regularly update this map.**

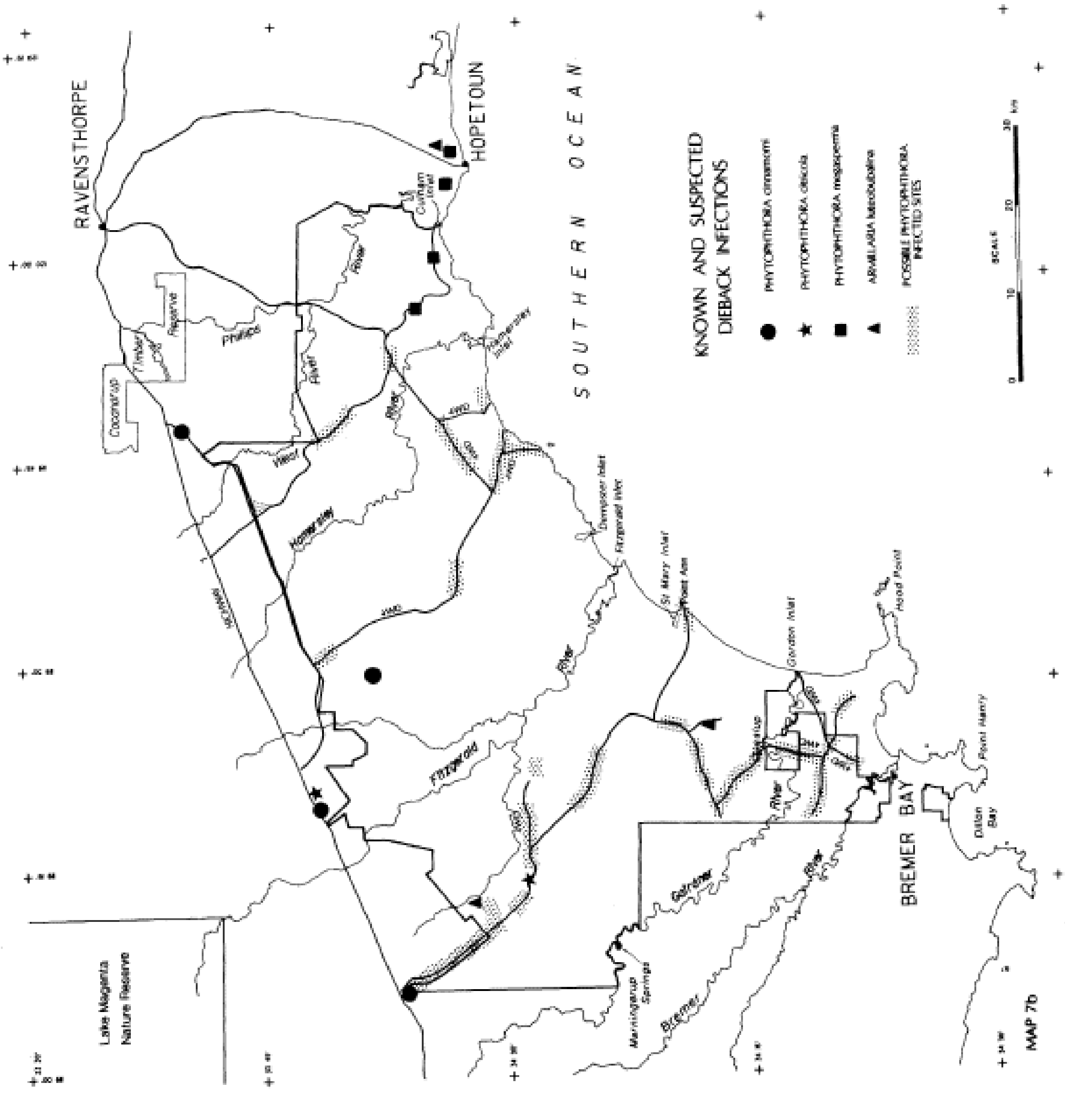
2. **Use this hygiene map and the hazard map (likely impact of dieback on the vegetation) given in this plan (Map 7a) as the primary consideration in any management activities undertaken in the Park. Use these maps as the basis of access management (refer to 13.0 Access). Use research and monitoring findings to regularly update the hazard map.**

3. **Subject all proposed maintenance and development activities to an evaluation of consequences of the activity (CALM Seven Way Test).**

4. **In all operations follow the hygiene practices given in the CALM Dieback Hygiene Manual. Continue to ensure that all staff and visiting scientists working in the Park follow dieback hygiene procedures. Develop new procedures as necessary.**

5. **Continue to ensure that staff associated with the Park are comprehensively trained in dieback recognition, sampling and management techniques.**


Lake Magenta
Nature Reserve
RAVENSTHORPE
Cocanarup
Timber
Reserve
River
Culham Inlet
HOPETOUN
Hamersley
Inlet
SOUTHERN OCEAN
Dempster Inlet
Fitzgerald
Inlet
St Marys Inlet
Point Ann
Gairdner
River
Gordon
Inlet
BREMER BAY
Hood Point
Dillon
Bay
Point Henry
MAP 7a
DIEBACK HAZARD
LOW – MODERATE
MODERATE – HIGH
HIGH – VERY HIGH
Dieback hazard information derived from:-
(1) "The Vegetation of the Fitzgerald River National Park."
by T.E. Alpin & K.R. Newbey (original National Park)
(2) "The Vegetation of the Newdegate & Bremer Bay Areas."
by J.S. Beard (recent northern addition to National Park)
SCALE
0
10
20
30
km


RAVENSTHORPE
HOPETOUN
SOUTHERN OCEAN
KNOWN AND SUSPECTED DIEBACK INFECTIONS
PHYTOPHTHORA cinnamomi
PHYTOPHTHORA citricola
PHYTOPHTHORA megasperma
ARMILLARIA luteobubalina
POSSIBLE PHYTOPHTHORA INFECTED SITES
SCALE
0
10
20
30 km
BREMER BAY
Lake Magenta Nature Reserve
MAP 7b

6. **Exclude public vehicles from the Dempster, 'Lake Nameless' and three small coastal catchments (Twin Bays, Red Islet and Marshes) in the centre of the Park to reduce the risk of dieback introduction and/or spread to the lowest possible levels. For further details refer to 9.2 Fire and 13.0 Access.**

7. **Ensure that 2WD roads, 4WD tracks and paths are well-located and welldrained to minimise the chances of disease survival and spread. Ensure 2WD roads are all-weather. Treat as a priority upgrading sections of road which do not meet these standards.**

8. **Close roads, tracks and footpaths in the Park during/following rain, if they present a dieback risk. Implement closure in accordance with guidelines developed by District staff based on when vehicles can pick up soil/mud from road, track and path surfaces.**

9. **Close Mid Mt Barren, Woolbernup Hill and Thumb Peak to walkers because of the potential dieback risk and the botanical importance of these areas. Prescription 9 in 13.0 Access gives a more detailed explanation. Place explanatory signs at appropriate points.**

10. **If dieback is found on roads, tracks or footpaths, one or more of the following actions will be undertaken:**
    a. **closure (temporary after rain as outlined in Prescription 8, or permanent);**
    b. **resurfacing to decrease water ponding;**
    c. **drainage to prevent ponding in side drains;**
    d. **relocation lower in the landscape, where possible, to minimise the area infected.**

    Access should be based on accurate hygiene and hazard maps.

11. **Erect permanent signs at Park entrances which can be used to indicate which roads and tracks are open or closed and the reasons why.**

12. **Place signs at the beginning of paths, particularly up peaks, asking walkers to ensure that their boots are free of mud and earth; any soil should be scraped off into a waterproof rubbish bin provided for the purpose. Close paths in high hazard areas following rain using the criteria given in Prescription 10. Use signs to explain why closures are necessary.**

13. **Establish a 'Code of the Coast' in conjunction with local associations such as the South Coast Recreation Association and Fitzgerald River National Park Association. The 'Code' should include cleaning vehicles, particularly the underbody, before entering the Park and avoiding wet soil conditions which result in soil pick-up.**

14. Ensure that publications and displays associated with the Park explain why it is important to minimise the introduction and spread of dieback disease. Provide interpretation at a confirmed dieback site (such as East Mt Barren).

15. Provide washdown facilities at ranger stations. Continue to investigate means by which cost effective and efficient washdown can be achieved at all Park entrances.

16. Retain the provision in this plan for closure of particular areas, roads, tracks and footpaths if the presence of dieback is suspected or confirmed or if a high risk of dieback introduction or spread is identified.

Research and Monitoring

17. Continue developing techniques which will enable the rapid confirmation of the presence or otherwise of *Phytophthora* species in plant communities on the south coast.

18. Accurately determine boundaries of, and regularly monitor, known infections. Continue using aerial photography and any other image enhancement techniques which are shown to be effective in monitoring disease distribution.

19. Develop a comprehensive description of infected areas, including information on species affected, vegetation association, area and rate of spread, soil profile, topography and threat to ground and surface waters.

20. Continue to survey and sample roads, tracks (including management-only) and footpaths within the Park for signs of dieback disease.

21. Quantify the impact of each *Phytophthora sp.* This information is necessary in order to assign and predict hazard ratings for all vegetation associations in the Park.

22. Investigate control and eradication procedures while ensuring that they do not place other areas or values at risk. Eradication of isolated infections should be of the highest priority.

23. Focus research effort on determining practical methods for preventing dieback introduction and spread and accurately identifying high hazard locations. Effort should also be directed towards developing effective ways of controlling soil and water movement, particularly in relation to development and maintenance of roadworks and facilities. This work, although focusing on FRNP, should complement similar research across the CALM South Coast Region.

9.2 FIRE

The objectives are:

1. *Protect the lives of visitors, neighbours, staff and firefighters.*
2. *Protect community values in or near the Park, including settlements, private property, recreation facilities and public utilities.*
3. *Provide for the survival of populations of rare or restricted flora and fauna species by the maintenance of required habitat.*
4. *Where possible, restrict fires to a single cell.*
5. *Maintain an effective system of firebreaks and buffers, while minimising the construction of new firebreaks and the introduction and spread of disease and weeds by fire management operations.*
6. *Protect landscape values from damage and vulnerable soils from the risk of erosion as a result of wildfires, inappropriate fire regimes, firebreak locations or machinery activity.*
7. *Reduce the incidence of unplanned fires.*

Background

Fire History

Information on Aboriginal burning practices in the Fitzgerald area is not well documented.

More is known of early European practices. Records show that the coastal strip near Bremer and the granite valleys of the northern Fitzgerald were burnt to improve pasture. Between 1954 and 1969 a number of escapes from clearing bums burnt large areas of the northern part of the Park. A number of very small unburnt patches remained. Local farmers also lit fires during this time to 'open up' the bush. They encouraged the fires to bum for as long as fuels were available (G. Keen, pers. comm., 1988). Fires also occurred in the Barren Ranges during this time and were often started by lightning. They were generally small and confined to gullies and flanks on the western sides of the Ranges.

Approximately 157 000 ha of the Park were burnt in summer wildfires in 1989 as a result of four lightning strikes (Maps 8a and 8b) (McCaw *et al.*, 1991). Despite the extent of these fires, at least one third of the Park contains vegetation unburnt for at least 20 years. This includes much of the northern uplands which supports most of the known rare fauna populations.

Risk of fires generally increases with increasing visitor numbers. This problem will grow in FRNP if visitor numbers continue to increase. It will be offset to some degree by the decreasing risk of fires originating from agricultural areas as less and less new land is brought into production and clearing bums are no longer required. In some years, lightning can be a significant source of fires.

Fire Behaviour

Weather conditions suitable for the ignition and spread of fires typically occur on a regular basis from October until the latter part of April each year. Rainless periods during the cooler winter months may also provide opportunities for fire spread, particularly in drought years.

Northerly and north-westerley winds associated with the development of pre-frontal low pressure troughs have a pronounced influence on fire weather in the Park. During the summer months, the advent of a hot, dry northerly airflow frequently results in severe fire weather conditions. Analysis of fire weather forecasts for the Western South Coast forecast district indicate that, on average, Very High and Extreme fire danger may be expected to occur on 20 and seven days each fire season, respectively. Under such conditions, intense and fast-moving fires are possible in all fuel types, with the exception of areas with vegetation less than three years old. Direct suppression action on fires is neither effective nor safe in these conditions. The passage of a cold front typically brings south-westerly winds which may then result in a major run by the eastern flank of a fire. This situation occurred during the wildfires of December 1989 when some 100 000 ha of the Park were burnt in a ten-hour period (McCaw *et al*, 199 1).

During the cooler winter months, pre-frontal northerly winds may provide suitable conditions for prescribed burning, with fires usually being extinguished by the moist south-westerly winds that follow.

Major fuel types within the Park include open mallee-heath, scrub-heath and thicket, and woodland. Important differences in fire behaviour characteristics between these fuel types influence the conduct of fire management operations. Mallee-heath fuels are discontinuous and require specific threshold conditons of fuel moisture and wind speed in order to sustain fire spread. Forward spread rates for established mallee-heath fires are generally in excess of 1 km/hour, and may exceed 5 km/hour under severe weather conditions. Because of the erratic nature of fire behaviour in mallee-heath fuels, prescribed fires cannot readily be confined to narrow buffer strips between parallel tracks unless the vegetation has first been scrubrolled. The more continuous nature of fuels in scrub-heath and thicket communities allows for a greater range in the weather conditions under which fire spread is possible, and fires may sustain overnight and in the absence of wind. Woodland fuel types are distinguished by the presence of a layer of leaf litter and accumulations of woody material such as fallen branches and dead stumps. These fuels may remain alight for extended periods and generally require substantial rain before they will extinguish. Consequently, areas of woodland may provide ready sources for reignition of fires.

The potential for aerially ignited strips within cells to produce mosaics of burnt/unburnt vegetation on a large scale has been successfully demonstrated in the Ravensthorpe area in the summer of 1990. Mosaics can be produced over a range of vegetation types.

This technique requires clearly defined cell boundaries, some of which may need preparation such as scrubrolling, prior to burning. The benefits of this technique include a reduction of tracks within cells and the opportunity to complement the existing mosaic by prescribe burning at a later date.

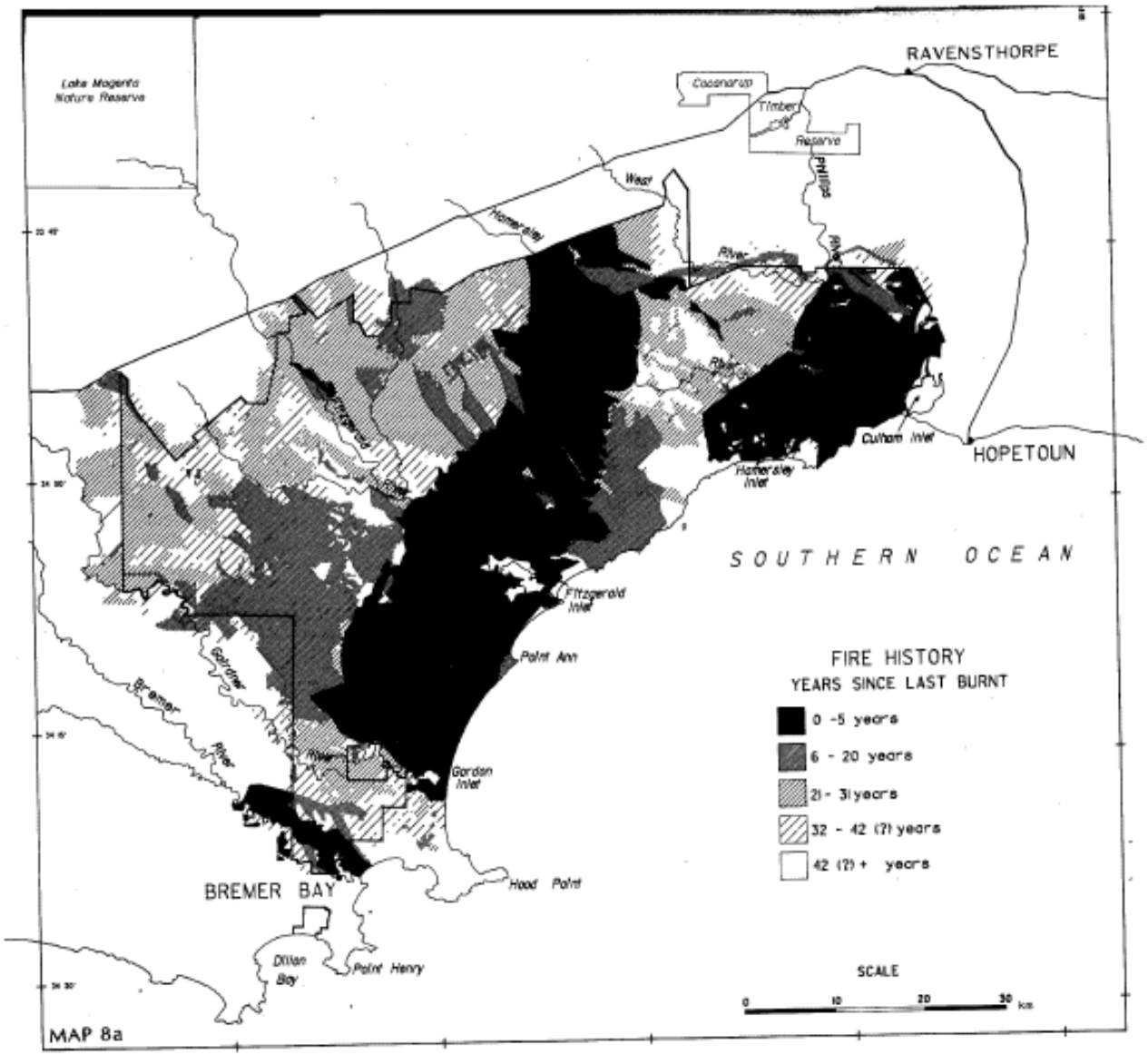
The reduction of tracks is a positive step in reducing dieback risks. Additionally, a mosaic of vegetation ages on a large scale should help to prevent the development of large bushfires and reduce the need for use of heavy machinery during suppression operations.

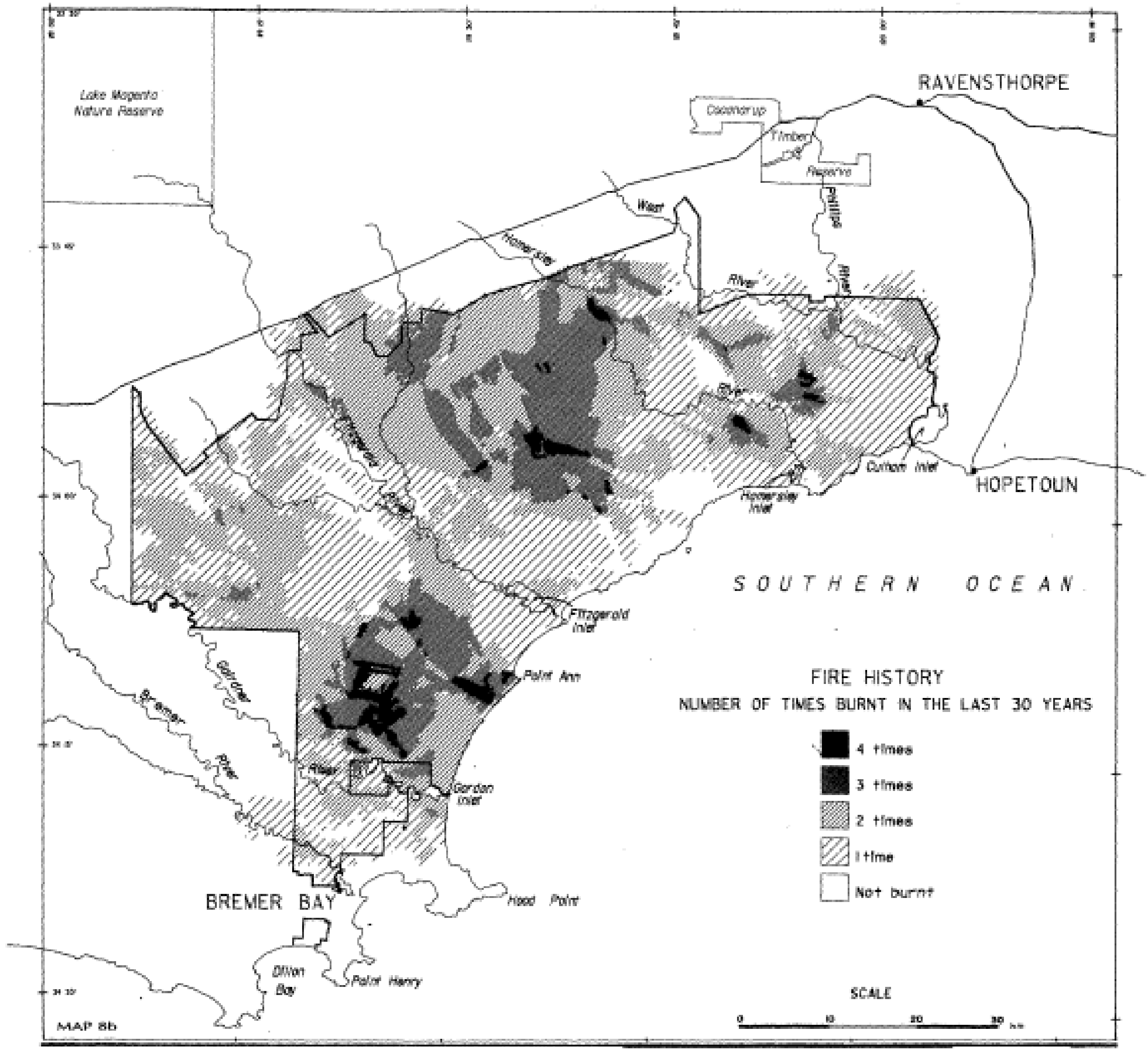
There has been some experimentation with the use of wind-driven fires to establish unconfined buffer strips during the cooler winter months, and good results have been obtained in scrub-heath and thicket fuel types (G. Duxbury, pers. comm., 1991). To date there has been little success in open mallee-heaths, probably due to moist fuel conditions at the time of lighting. Successful wind-driven fires could no doubt be achieved in mallee-heath fuels by burning under drier conditions, although this would have to be balanced against the risk of fires failing to extinguish completely. Reliable weather forecasts and a sound understanding of fire behaviour are essential elements in the implementation of this technique. This technique deserves further development because it offers the potential to establish fuel-reduced buffers in trackless areas.

Fire Ecology

Few studies have addressed specific aspects of the response of plants and animals in FRNP to different fire regimes. However, some tentative conclusions can be drawn from work by McNee (1986), Muir (1985), Newbey and Chapman (1985) and Watkins (1985). All researchers found a strong correlation between areas containing rare mammal and bird species, vegetation unburnt for at least 15 years and areas underlain by granite (the northern part of the Park).

In terms of fire, Chapman (1985) found that bird richness in FRNP mallees reaches a maximum at around 15 years after fire. Species restricted to 15 years plus vegetation are resident-insectivores such as the Grey Shrike Thrush and Blue-breasted Wren. The situation with mammals is very different, with numbers of species being greatest in five year old vegetation, declining at 15 years old and rising again in old vegetation (tentative conclusion only) (Chapman, 1985). Reptiles show a similar trend. Although these conclusions support the use of fire to maintain a range of habitat ages, a study in the Ravensthorpe Ranges reported abundant and rich fauna in mallee unburnt for at least 30 years (Chapman, 1984, in Chapman, 1985).


RAVENSTHORPE
Lake Magenta Nature Reserve
Cocanarup Timber Reserve
Phillips River
Hamersley Inlet
Culham Inlet
HOPETOUN
SOUTHERN OCEAN
Fitzgerald Inlet
Point Ann
Gairdner River
Gordon Inlet
BREMER BAY
Hood Point
Dillon Bay
Point Henry
FIRE HISTORY
YEARS SINCE LAST BURNT
0 -5 years
6 - 20 years
21 - 31 years
32 - 42 (?) years
42 (?) + years
SCALE
0 10 20 30 km
MAP 8a


RAVENSTHORPE
HOPETOUN
BREMER BAY
Lake Magenta Nature Reserve
Cocanarup
Timber Reserve
Phillips River
West River
River
Culham Inlet
Hamersley Inlet
SOUTHERN OCEAN
Fitzgerald Inlet
Point Ann
Gordon Inlet
Hood Point
Gairdner
Bremer River
Dillon Bay
Point Henry
FIRE HISTORY
NUMBER OF TIMES BURNT IN THE LAST 30 YEARS
4 times
3 times
2 times
1 time
Not burnt
SCALE
0
10
20
30
MAP 8b

Following fire in mallee over shrubland vegetation associations at Marningerup in 1984, Chapman and Newbey (in prep.) noted that approximately a quarter of the plant species recorded regenerated only from seed. If the frequency of fires is similar to, or shorter than, the time necessary for these species to flower and set viable seeds, then these species may decline.

Further information is required on the effects of fire season and intensity, and the relationship between underlying geology (or the land surface type) and rare fauna distribution and population sizes.

The effects of treatments involving scrubrolling and burning have been investigated in scrub-heath and woodland communities similar to those within the Park (McCaw and Schneider, in prep.). Low growing plants and those with flexible stems were largely unaffected by the scrubrolling and, therefore, exhibited their normal responses following fire. Tall woody species were affected to a greater degree by the scrubrolling; some decline was evident in the populations of obligate seed regenerating species with capsulestored seed. This was attributed to the destruction of seed released in the interval between scrubrolling and burning. Seed losses would be minimised by burning buffers within a few weeks of scrubrolling. All treatments resulted in increased species richness due to the regeneration of plants from soil-stored and dispersed seed stimulated by disturbance.

Other Considerations

Preventing the introduction and spread of dieback is the greatest management concern in the Park. Areas which have been burnt are not interpretable for at least five to seven years; that is, the presence or absence of dieback can not be determined until susceptible plant species regenerate, allowing the dieback fungus to become reactivated in the soil. A number of existing fire buffers are high in the landscape and cross numerous subcatchments, placing large areas of the Park at risk if dieback is introduced. In the longer term, spread of diseased soil is likely to have a much greater deleterious effect on the Park ecosystem than wildfires. In addition, machinery movement on fragile soils and hillsides could lead to severe water and wind erosion and decreases in visual quality. Also, foxes appear to use firebreaks as "access ways" (A. Chapman, pers. comm., 1989); therefore, firebreak construction into or around known rare fauna populations requires careful consideration.

Another management concern associated with perimeter buffers and firebreaks adjoining farmland is weed invasion. Pasture grasses readily invade disturbed areas, displacing native understorey species and leading to rapid build-up of hazardous fuels. This problem is aggravated if perimeters are burnt at a frequency that does not allow native vegetation to fully re-establish. The problem can be reduced by retaining a narrow strip of bush between agricultural lands and Park perimeter firebreaks or buffers.

The rare fauna species present in the special conservation zone are only known at this time to occur in vegetation unburnt for at least 15 years. Additionally, this zone has high life and property values adjacent to it. The wilderness and natural environment zones havelow life and low property values, but high conservation values. The recreation zone has high life and low property values.

Fire suppression is currently based on a combination of direct and indirect attack. Access for suppression forces and equipment to the fire front is usually a slow process, given the distances involved and rugged nature of the country. Where possible, fires are contained by existing firebreaks and roads. Boundaries of cells have been scrubrolled to enable back burning to be undertaken to contain wildfires. Firelines have been cut where no other opportunities for suppression were available, or risks associated with using existing firebreaks were too high. Mosaic burning will reduce the need to use heavy machinery.

A range of different roading is available for fire management from 2WD to 'fire emergency' access. Use of 'fire emergency' access will be strictly controlled. Section 13.0 Access provides further details.

Strategy - Fire Master Plan

The basic strategy proposed for the Park is to provide a network of fuel reduced areas so as to reduce the likelihood of remaining tracts of mature vegetation being burnt at the one time. Some areas will not be prescribe burnt in the long term and be retained as reference areas, that is, long unburnt areas with which burnt areas can be compared.

The existing network of roads, tracks, buffers and recently burnt areas will be used to provide cell boundaries in the Park. Firelines constructed in the 1989 fires will also be incorporated as cell boundaries where appropriate.

It will be at least five years before fire hazards develop in areas burnt by the December 1989 wildfires. A major review will be conducted in 1995. The management intent in the longer term is to carry out fuel reduction burning by aerial ignition. This will be considered in the review.

Four broad prescriptions for fire management will be used:

- narrow fuel-reduced buffers
- prescribed burning within cells
- no planned bum
- vegetation/habitat management

1. Buffers

Separation of cells by narrow, low-fuel buffers (up to 400 m wide) provides protection for individual cells and a basis for more extensive use of prescribed fire within cells. Scrub rolling supported by

prescribed burning will be used to establish buffers. These buffers by themselves are not capable of stopping large wildfires burning under severe conditions; however, they do provide positions from which to conduct suppression operations. Such buffers will help reduce the probability of large fires burning across the Park. This technique helped to control wildfires in the Park, under extreme conditions, in December 1989. Consideration will be given to widening some of the buffers within the life of the plan.

2. Prescribed Fire Within Management Cells

In areas designated, prescribed burning on a cell basis will be undertaken as indicated in Map 9. Approximately 30-70% fuel reduction will be sought using aerial ignition to develop a mosaic of vegetation ages within cells. Prescribed burning operations will most likely be carried out in late spring and autumn.

3. No Planned Burn

These areas will not be prescribe burnt for the duration of this plan. The intent is to retain these areas for reference in the long term. If a wildfire occurs in a 'no planned bum' area, consideration will be given to designating an alternative 'no planned bum' area. This should be part of the annual review by the fire advisory group (Prescription 8).

4. Vegetation/Habitat Management

To protect the high conservation value of the northern cells, some prescribed burning may be necessary. This will ensure this area is not completely burnt in a single wildfire. In addition, research may indicate the need for prescribed burning to maintain rare fauna habitat.

Cell boundaries will be protected by wide, open-edged buffers. Prescribed burning within cells will only occur after careful assessment to ensure rare fauna are not at risk. Consideration will be given to the use of aerially ignited mosaic burns.

PRESCRIPTIONS

General

1. **The following sources of information should be used in an ongoing commitment to determine the best fire regime for the Park:**
   a. **fire behaviour and ecology research and monitoring results achieved through implementation of the research and monitoring prescriptions given in this section;**
   b. **research results from areas with similar environmental conditions.**
   c. **experience and observations from fire-righting by bushfire organisations, members of the local community and CALM.**

Prescribed Burning

2. **Implement the fire master plan (Map 9). Fire access will be along managed buffers and these are either management only (no public access) or 2WD/4WD as specified in Section 13.0 Access.**

3. **Continue to apply standard Departmental requirements for an approved prescription prior to initiating planned fire. The prescription should take particular account of environmental values, especially the need for dieback control, landscape planning and visual assessment procedures.**

4. **Fire management tracks will be maintained according to CALM 7-way test guidelines and appropriate levels of approval.**

5. **Scrub-roll buffers prior to burning. Currently scrub-rolled buffers need to be tracked either side to ensure only the buffer strip is burnt. For this reason, scrub-rolling will be undertaken along existing roads/tracks. Investigation will continue to define the conditions under which scrub-rolling can be burnt without the need for tracking either side. Consideration will be given to landscape impacts and erosion potential before works are undertaken. Scrubrolling will only be carried out under dry soil conditions, following survey for rare flora and an assessment of impact on any known rare fauna**

6. **Carry out fuel reduction within cells only after consideration of the effects on the flora and fauna. Emphasis should be given to the development of practical aerially ignited mosaic burns which provide protection from large wildfires, minimise the need for on-ground suppression and meet the divergent needs of public safety, biological management and wilderness protection.**

7. **Carry out perimeter prescribed burning in conjunction with local volunteer fire brigades and neighbouring landholders.**

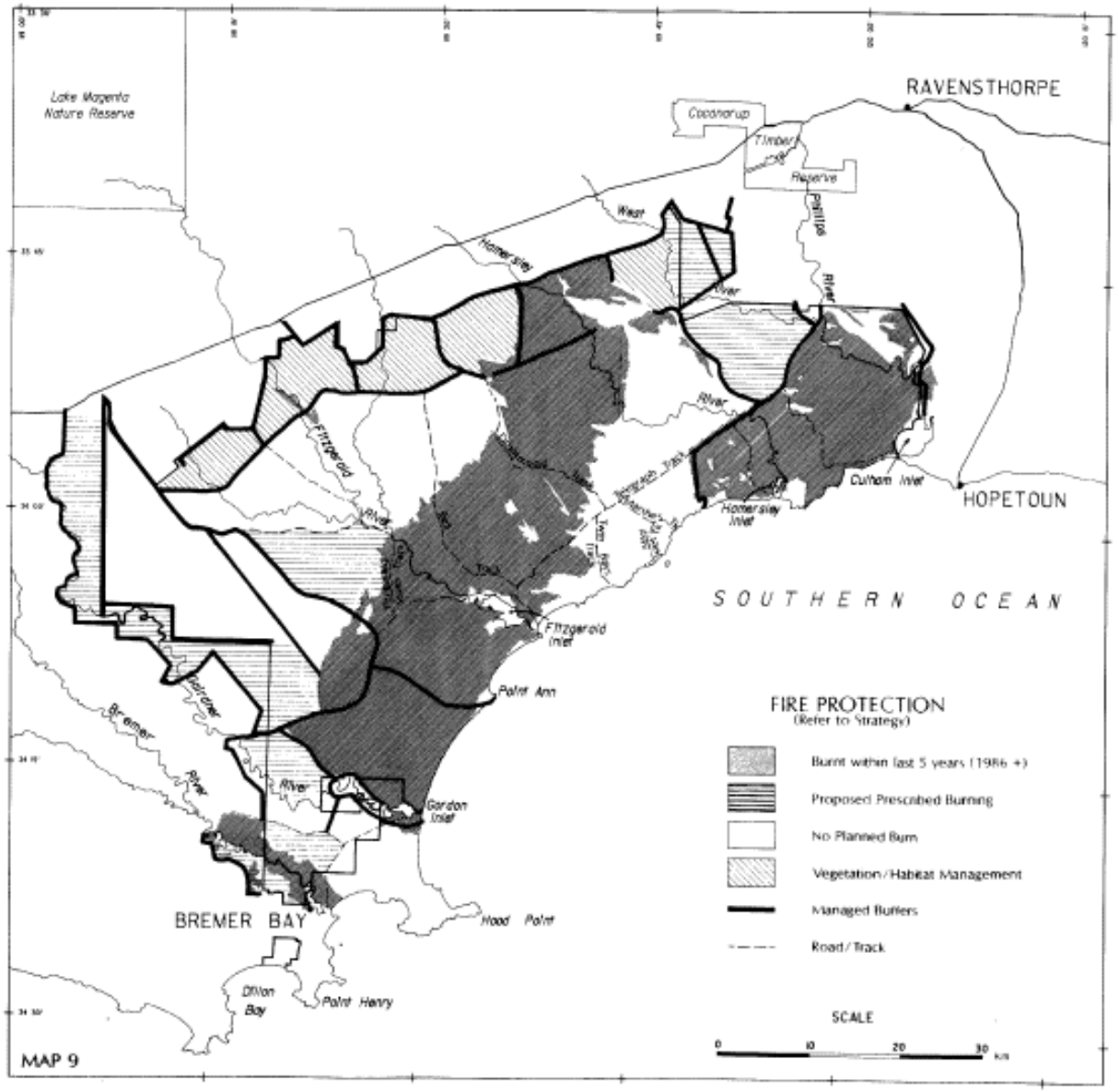
8. **Establish a fire advisory group with representatives from the two local bush fire organisations, Shires, Bush Fires Board and CALM to meet at least annually and review implementation of the fire plan and priorities. This group has the responsibility to set the program for the next year. CALM undertakes to implement each annual program so set out. This group will consider the introduction of new technica) knowledge and its application in fire management of the Park. The group shall report to the Shires, NPNCA, Bush Fires Board and CALM in a format determined by consultation with the respective organisations.**

9. **As it will be at least rive years before fire hazards develop in areas burnt in the December 1989 wildfires, Telegraph Track (between Fitzgerald Inlet and Quoin Head turn-off), Drummond Track (south of the northern buffer), the southern half of Bell Track, the fireline between Mt Drummond and Red Peak, and the Fitzgerald South Track will not be accessed for fire management prior to July 1995 when a major review shall be completed. This would include the need for provision of fuel reduction burns to separate the coastal range system from the heath in the central section of the Park. Access to assess the dieback and fire management status will only be undertaken under strict permit, subject to NPNCA approval. The review shall include consideration of aerially ignited mosaic burns. If a life-threatening emergency arises requiring the use of vehicles within this area, entry will be authorised by the South Coast Regional Manager or a nominated representative. If the review described above recommends significant changes to this plan, amendments will be undertaken through the processes prescribed in the CALM Act (refer to Section 22).**

10. **Consideration will not be given to implementing prescriptions for fire management within areas burnt during the December 1989 wildfire, until the review has been completed (1995).**

11. **Review the fire plan after any major wildfire. The review group should comprise members of the fire advisory group listed in Prescription 8 above. If the review recommended significant changes to this plan, amendments will be undertaken through the processes prescribed in the CALM Act (refer to Section 22).**

12. **Local staff should maintain surveillance for fire on days of extreme risk and have fire fighting equipment on standby.**


Lake Magenta
Nature Reserve
RAVENSTHORPE
Coconarup
Timber
Reserve
Pallinup
River
West
Hamersley
River
Fitzgerald
River
Culham Inlet
Hamersley
Inlet
HOPETOUN
SOUTHERN OCEAN
Fitzgerald
Inlet
Point Ann
Bremer
River
Gordon
Inlet
BREMER BAY
Hood Point
Dillon
Bay
Point Henry
MAP 9
FIRE PROTECTION
(Refer to Strategy)
Burnt within last 5 years (1986 +)
Proposed Prescribed Burning
No Planned Burn
Vegetation/Habitat Management
Managed Buffers
Road/Track
SCALE
0
10
20
30
KMS

Wildfire Suppression

13. **In the event of a major wildfire in the Park, CALM is to establish a control point and, by negotiation with all involved agencies, nominate one person as controller. Fire suppression must be in accordance with the gazetted fire plan (ie. this management plan). The expertise and resources of the volunteer bush fire brigades, local authorities and the Bush Fires Board are an integral part of the suppression force.**

14. **Endeavor to contain wildfires that enter or start in the Park within a cell defined by the strategic buffers given in Map 9. Depending on values at risk, dieback risk, fire behaviour, resources available and presence of buffers and tracks, suppression will involve: allowing the fire to burn out to low fuel buffers, backburning from existing tracks or direct attack.**

15. **Develop water points adjacent to roads and tracks for fire suppression. They will be located so as to minimise dieback risk and landscape impacts but must be no greater than 16 km apart on main access ways. Base their development on improving access to existing water, excavation, and limited use of demountable tanks. Water points should contain a minimum volume of 15 000 litres. The water points are to be developed as a matter of priority. The need for water points in the central area will be reviewed by July 1995.**

16. **Monitor water points to ensure they are not infected by Phytophthora species. Where appropriate, treat water at time of use with approved fungicide.**

Liaison

17. **Work with the local authorities and brigades, adjacent landowners and the Bush Fires Board to ensure an effective fire management force is in place. Arrange regular exercises with local brigades and the Bush Fires Board on cooperation techniques. Locate fire equipment within the local Bush Fire Brigade system. Station a heavy duty fire unit in the Ravensthorpe Shire. Continue mutual aid arrangements in carrying out burns and suppression activities in accordance with the Shire District Fire Plans.**

18. **Obtain UHF radios for CALM officers involved in fire management in FRNP to improve communications between CALM and local brigades.**

19. **Implement programs to inform and educate Park visitors regarding this fire management program, and fire safety and survival. This program will include information on campfires in the Park (refer to Section 14.2).**

Research and Monitoring

20. **Continue to investigate the practicality of using aerially ignited mosaic burns.**

21. **Record and analyse details of all fires, including available fire behaviour information.**

22. **Instigate a research and monitoring program to determine the level of environmental impact resulting from the prescribed fire regimes, fuel modification and wildfire suppression activities, and wildfires; and to examine the effectiveness of prescribed burning and wildfire suppression procedures.**

23. **Continue to strongly support the need for a geographic information system for the recording and analysis of information on fire in the Park.**

24. **Continue to investigate the use of computer modelling to aid fire management.**

9.3 ANIMAL PESTS

The objectives are:

1. *Control or eradicate species of animals causing major conservation problems.*
2. *Minimise the detrimental effects of control mechanisms on the Park environment, particularly its native fauna.*

Background

Feral animals present in the Park include foxes, cats, rabbits, cattle and horses. All species are present in low densities through the Park, the only exception being horses, which are only found in the northern FRNP, in very low numbers.

Honey possums, tammars, dibblers, bush rats, rabbits, house mice and a number of reptile species are eaten by foxes. Chapman and Newbey (in prep.) conclude that foxes in high numbers are a serious threat to native fauna. Many foxes are present in the Park and adjacent farmland (A. Chapman, pers. comm., 1989). This places the rare fauna in the northern FRNP at risk. No data are available from the FRNP regarding predation by cats. They most probably have a similar effect on small mammals to that of foxes.

At low densities, rabbits are unlikely to do much damage in FRNP (Chapman and Newbey, in prep.). The only exception is coastal areas where rehabilitation is underway. In these areas (eg. Mylies Beach) rabbits browsing on new shoots inhibit regrowth.

Feral bees occur throughout the Park. They are prolific swarmers and, in good seasons, are likely to be serious competitors for nest hollows which are rare in the Park. They may also adversely affect pollination in native flora. However, current infestations are impossible to control given current finances and resources. It is only possible to try to stop the situation worsening.

PRESCRIPTIONS

1. **Liaise with the Agriculture Protection Board, adjacent landholders and local authorities regarding pest control throughout the Park, especially on boundaries, in enclaves and on adjacent properties.**

2. **Remove feral cattle and horses where possible.**

3. **Implement appropriate control measures for foxes throughout the Park. (Refer to Prescription 6 under Rare Species in 7.3 Fauna for more details.)**

4. **Control cats. If research indicates that cats are a threat to rare fauna, implement further control measures.**

5. **Where necessary, control rabbits in coastal areas that are being rehabilitated.**

6. **Prevent invasion of the Park by other pest animals (eg. pigs, goats).**

Research and Monitoring

7. **Record the general extent and location of pest animals. Document control measures implemented and evaluate the success of these measures. Request the Agriculture Protection Board to do likewise.**

9.4 WEEDS

The objectives are:

1. Control or, if possible, eradicate weeds causing major conservation problems.

2. Minimise any detrimental side effects of control procedures on the Park environment.

Background

The Fitzgerald has at least 100 weed species. This is 6% of the Park's flora compared with 10.5% for the State as a whole. Weed infestation in the Park is not extensive and is essentially confined to rivers, swamps and lakes, uplands and coastal dunes (Newbey, in prep.).

Watercourses generally have the greatest biomass of introduced species, as well as the highest number of species, for the following reasons. First, many introduced plants are present on farmland and all major rivers in the Park have the upper part of their catchment in farmland. Second, riverine soils tend to provide more favourable soil moisture and fertility conditions than surrounding plain or hill soils. In the uplands, most introduced plants occur on skeletal or shallow soils associated with granite exposures. Human use is probably the main factor in the spread of introduced plants into coastal dunes. Most species are concentrated in areas of disturbance associated with camping, parking and tracks. Most of the introduced species are annuals, less than 30 cm high, with a small biomass.

Most introduced plants are unlikely to spread beyond their present distribution in FRNP, or are capable of only minor spread. Three weed species, cape weed *(Arctotheca calendula),* annual veldtgrass *(Ehrharta longiflora)* and bridle creeper *(Myrsiphyllum asparagoides),* are capable of

rapid establishment and major spread into natural areas. These three species, plus saffron thistle *(Carthamus lanatus),* doublegee (*Emex australis),* (both declared noxious species) and African boxthorn (*Lycium ferocissimum),* are of the highest management priority.

Cape weed is found in most of the vegetation types across the Park, while annual veldtgrass only occurs along rivers and swamps. Bridle creeper is spreading along the river flats of the Gairdner around Quaalup and Marningerup. Saffron thistle and African boxthorn are present in small numbers on the Gairdner, Phillips and West rivers. Saffron thistle is also found on farmland north-west of the junction of the latter two rivers.

A further four species are also of high management priority as they readily spread into disturbed areas and would almost certainly become established. These are flaxleaf fleabane *(Conyza bonariensis),* smooth cat's ear *(Hypochoeris glabra), common* sowthistle *(Sonchus oleraceus)* and rat's tail fescue *(Vulpia myuros).*

The worst area of weed invasion is along the Phillips River. Parts of the Fitzgerald and Gairdner Rivers also have high numbers of weeds.

PRESCRIPTIONS

1. **Liaise with the Agriculture Protection Board, adjacent landholders and local authorities regarding weed control on Park boundaries and adjacent properties.**

2. **Where possible, in fire management operations, retain a strip of bush between private property and perimeter firebreaks to slow down weed invasion.**

3. **Liaise with adjacent landholders, and local groups, to minimise fertiliser drift into the Park.**

4. **Control and, if possible, eradicate saffron thistle and doublegee (both declared noxious plants). Record treatment. Monitor to determine success or otherwise of management actions.**

5. **Accurately determine the distribution of and monitor the other eight priority weed species. If any are spreading rapidly, implement control measures. Record methods of treatment and monitor results.**

6. **Avoid unnecessary disturbance associated with management actions such as road construction and maintenance, and repeated burning.**

7. **Avoid unnaturally high nutrient build-ups by controlling rubbish and effluent disposal.**

Research and Monitoring

8. **Monitor known priority flora populations for weed invasion. Take control measures as necessary.**

9.5 REHABILITATION

The objective is to rehabilitate areas degraded by humans and their activities.

Background

The majority of the Park is relatively undisturbed. The greatest level of disturbance has occurred on or adjacent to the coast where uncontrolled access and camping on highly erodible sandy soils have led to removal of the vegetation and subsequent erosion. Camping has focused on small stands of melaleucas and many of these have become very degraded, with extensive gully erosion and tree loss.

The extensive wildfires of December 1989 have exacerbated the problems of erosion, particularly along the coast where burnt campsites were completely denuded.

In the eastern end of the Park, 2WD access has been provided to most beaches and numerous 4WD tracks have been closed and covered with brush. In some areas rehabilitation has been slow and the scars are still visible.

In the western end, a number of closed tracks in the Point Ann area and old sections of the re-aligned Pabelup Drive require brushing. Earthworks are also necessary on slopes to minimise erosion.

Several camp sites have been re-developed and the areas no longer required have been closed, ripped and brushed. Regeneration in some areas, and particularly behind part of Mylies Beach, has been slow. Soil erosion and heavy grazing of new shoots by rabbits are probably responsible.

PRESCRIPTIONS

1. **Use locally occurring native species from the same or similar sites for all rehabilitation work. This is important, not only because of the Park's biosphere status, but also because local species are adapted to local conditions and have a good chance of survival. Direct seeding is preferred. Use known dieback free nurseries if propagation is required.**

2. **Encourage members of the local community to propagate local native plants for rehabilitation, with due regard for dieback hygiene measures.**

3. **Foster and supervise volunteer programs to undertake rehabilitation work.**

4. **Rehabilitate disused tracks with appropriate techniques.**

Research and Monitoring

5. **Monitor, evaluate and record the success of rehabilitation techniques used. Experiment with a range of rehabilitation techniques.**

9.6 GRAVEL, SAND AND STONE

The objectives are:

1. *Limit the extraction of gravel, sand and stone from the Park to areas where such activity will have minimal impact on the spread of dieback, public use and the Park's flora, fauna and landscape.*
2. *Ensure that dieback is not spread by the movement of gravel, sand or stone.*

Background

Many road building and recreation site materials (ie. gravel, sand, limestone and stone) required for Park management are available from within the Park. Gravel resources, however, are limited and in many places are inaccessible, being covered by deep layers of sand. These materials may only be extracted from the Park for use within the Park.

PRESCRIPTIONS

1. **Map potential gravel and limestone sources in the Park to ensure coordinated extraction.**

2. **An up-to-date dieback hygiene map must be available before raw materials are extracted. Extraction of gravel, sand or stone will not be permitted from dieback-infected or suspected dieback-infected sites.**

3. **Limit pits supplying gravel, sand or stone to recreation and natural environment zones (see Map 3 and 5.0 Management Zones). Ensure they are not visible from roads, tracks, footpaths or other view points. Minimise pit size and the number of active pits. Develop an extraction plan for each site.**

4. **Accommodate requests for gravel, sand and stone from the Park provided that their use is necessary for the management of the Park. Issue of a lease by CALM is required.**

5. **Rehabilitate all pits as soon as material extraction is complete. Topsoil should be separately removed and stored for later rehabilitation work. Encourage excavation and stockpiling of gravel resources and immediate rehabilitation of the remainder of the pit. Locally occurring native species should be used.**

Research and Monitoring

6. **Conduct a survey prior to material extraction to ensure that no conservation values, particularly rare plants or Aboriginal sites, will be disturbed.**

9.7 DOMESTIC ANIMALS (PETS)

The objective is to continue to exclude domestic animals (pets) from the Park.

Background

Domestic animals, and particularly dogs, can create problems in national parks. Often they disturb other users. They may also create health problems by defecating in recreation areas and carrying diseases such as hydatids. While management arrangements can be made to overcome these problems, the status of this Park is such that any disturbances and potential problems should be avoided.

There are many other coastal areas near Bremer Bay and Hopetoun where domestic animals are allowed.

PRESCRIPTIONS

1. **Continue to follow a policy of prohibiting domestic animals from FRNP.**

2. **Provide Park users with information as to why domestic animals are not allowed in the Park.**

10.0 MANAGEMENT OF COMMERCIAL RESOURCE UTILISATION

10.1 MINING

The objective is to implement Government policy on exploration and mining in national parks.

Background

In accordance with current Government policy on mining, Fitzgerald River National Park is closed to exploration and mining.

Minerals known from the Park include (Geological Survey of W.A., pers. comm., 1988):

- mineral sands near Gordon and Dempster Inlets
- manganese in the gorge of the Hamersley River near the Eyre Range, along Copper Mine Creek and at Naendip
- cobalt and graphite in the gorge of the Hamersley River near the Eyre Range
- greenstone near the junction of the Phillips and West Rivers
- lead associated with manganese at the Hamersley Inlet
- kyanite 10 km west of Hopetoun
- building stone at Twertup
- lignite along the Fitzgerald River.

All of these minerals are available from deposits elsewhere, particularly mineral sands, which occur along much of the old coastline of south-west Australia. Mining in the area centres on Ravensthorpe where minerals of economic interest include copper, gold, silver and nickel.

Due to the Park's international status as a biosphere reserve and its exceptionally high conservation values, it is essential that, should a change in Government policy eventuate, applications for mineral exploration remain actively discouraged. If exploration and/or mining is ever approved, it should be subject to, and meet with, conditions which will ensure minimum impact on the biological, physical, cultural and landscape values of the Park. The prescriptions in Section 9.5 of this plan should be used as the basis for any rehabilitation program. Rehabilitation should be to CALM's specifications and at the proponent's expense using the most up-to-date techniques available.

PRESCRIPTION

1. **Follow Government policy on mining.**

10.2 COMMERCIAL FISHING

The objective is to provide for commercial fishing in a manner compatible with national park objectives.

Background

Commercial fishing associated with FRNP has been both inlet and ocean beach-based. All inlets associated with FRNP are described as intermittent fisheries. Commercial fishing is controlled by the Fisheries Act and Regulations. Limitations are placed on species caught, 69 number taken, areas that fish can be taken from and type of fishing involved as well as seasons in which catches may be taken. CALM works co-operatively with the Fisheries Department. There has been limited inlet-based commercial fishing in the Gordon, Dempster and Hamersley Inlets (Fisheries Department, pers. comm., 1987). The St Mary and Fitzgerald Inlets are not used for commercial fishing (advice from Fisheries Department).

In terms of ocean beach-based commercial fishing, some salmon netting occurred near Fitzgerald Inlet during the 1970s. However, the majority of the Park's coastline is not suitable for netting. The beaches are too exposed to safely launch a boat and use nets, while rocky headlands and offshore reefs push salmon offshore. Trigelow Beach is currently used by commercial fishermen.

Commercial fishermen basing their operations in, or transporting their catch across, national parks can lead to conflict with other Park visitors, particularly with regard to competition for space, such as campsites. This problem can be alleviated by providing separate camping facilities, or by allowing commercial fishing only when visitor numbers are low (ie. over winter). In FRNP, the former option is difficult to achieve as suitable campsites are very limited. The latter approach can only be used where inlets are accessible on 2WD roads, as all 4WD tracks in the Park are closed following rain (ie. for most of the winter). Both options require additional Park management and financial resources. Public camping is available at Hamersley Inlet Shire Reserve and on public land at the mouth of the Gordon Inlet.

PRESCRIPTIONS

1. **Inlet fishing: Allow commercial fishermen access to Gordon and Hamersley Inlets and permission to transport their catch from these two inlets across the Park, subject to the conditions given in Prescription 3 and provided that licences are held under the Fisheries Act.**

2. **Ocean beach fishing and access: Continue to allow commercial fishermen access to Trigelow Beach and use of Park roads to access the Doubtful Islands area. Permission to transport their catch across the Park is subject to the conditions given in Prescription 3. Do not issue**

permits for other beaches for one or more of the following reasons : access problems, potential conflict with other Park visitors, impact on shoreline birds.

3. **Access conditions: Issue permits to commercial fishermen for transporting their catch across the Park or using the Park as a land-base, subject to other Park values and prescriptions. The conditions associated with the permits will include:**
   - **use of designated public access**
   - **observing same road closures as general public**
   - **if necessary, introduction of a ballot system to control numbers of commercial fishermen to minimise impact on other Park users and on small recreation sites**
   - **inlet-based commercial fishing restricted to the winter months, where necessary, to minimise conflict with other Park users**
   - **ocean-based commercial fishermen restricted, where necessary, to 70**

4. **Do not issue permits for Fitzgerald, St Mary or Dempster Inlets and the river systems. The Fitzgerald Inlet is generally inaccessible over the winter months. Also the equipment associated with commercial fishing is generally incompatible with the area's designation as a natural environment zone. St Marys Inlet is part of a major recreation zone, focusing on a very limited, small site. Commercial fishing would likely conflict with recreational use. Dempster Inlet is part of the wilderness zone and is not accessible by vehicle. It is also part of a reference catchment which will not be disturbed.**

5. **Liaise with Fisheries Department to declare Fitzgerald, St Mary and Dempster Inlets closed waters (ie. closed to netting).**

6. **Based on the findings of Prescriptions 7 and 8 below, re-assess use of the area by commercial fishermen in rive years, in consultation with the South Coast Licenced Fisherman's Association and Fitzgerald River National Park Advisory Committee.**

Research and Monitoring

7. **Monitor the effect of commercial fishing on access routes and points, and other Park users.**

8. **Develop, with the Fisheries Department and the Fitzgerald Biosphere Project, a monitoring program of the impacts of commercial fishing on fish stocks, the inlet and river systems.**

Administrative Details

Two administrative courses of action are available to provide for management of these inlets by CALM and achieve the above prescriptions. The course of action depends on the current status of the inlets as defined by the Department of Land Administration.

If the inlets are regarded as being open to the sea and are, therefore, part of State internal waters, then all inlets can be proposed as marine parks to high water mark under the CALM Act (1984) and zoned accordingly. Hamersley and Gordon Inlets should include a general use zone to allow for commercial fishing. The remainder should only include recreation and sanctuary zones (ie. no commercial fishing).

If the inlets are regarded as inland waters and, therefore, vacant Crown land, then they can be added to FRNP under the Land Act (1933). This automatically precludes commercial fishing. Ile only exceptions are Hamersley and Gordon Inlets which should be reserved as marine parks to high water mark and zoned to allow for commercial fishing.

10.3 UTILITIES AND SERVICES

The objectives are to:

1. *Keep the Park free of utility corridors and assist relevant agencies to find alternatives outside the Park.*
2. *Ensure that if utility corridors are approved they are constructed and maintained so as to minimise impacts on the Park.*

Background

There are no State Energy Commission, Telecom or Water Authority service lines, highways or main roads transecting the Park. Except for road construction, the landscape is undisturbed. This is one of the great values of the Park.

The only location where State Energy Commission and Telecom lines enter the Park is the short distance required to service the ranger's residence at East Mount Barren. Provision of power or other services to Quaalup would necessitate traversing about 7 km across the National Park. Similarly, development of either of the water reserves immediately to the south of the Park may necessitate constructing water pipelines and powerlines across the FRNP.

A number of trig points, generally on the highest points in the landscape, have been established by the Department of Land Administration and Australian Survey Office. These are used on an irregular basis for mapping requirements. Given their location high in the landscape, dieback could infect large areas of the Park if introduced. Therefore, use of these points has been restricted to summer under strict hygiene conditions.

PRESCRIPTIONS

1. **In general, no utility corridors will be provided through the Park. Any proposals should be based on physical, biological, social and visual considerations, analysis of alternatives outside the Park, and alternative methods of service provision. Where they are absolutely necessary, they should follow routes with the least environmental and landscape impact.**

2. **Apply environmental assessment procedures according to the Environmental Protection Act (1986) to any proposals for utility corridors through the Park.**

3. **Any construction or maintenance of utilities or utility corridors in or adjoining the Park must be undertaken with strict dieback hygiene and an awareness of the need to minimise erosion and visual intrusion. Strict dieback hygiene procedures should be followed by the Department of Land Administration when servicing trig points, with access by helicopter or on foot preferred.**

4. **If State Energy Commission lines must traverse the Park they should be placed underground along existing access routes. Assess the feasibility of placing the East Mt Barren SEC line underground.**

10.4 BEEKEEPING

The objective is to exclude beekeeping from the Park.

Background

Much controversy exists regarding the impact of introduced honey bees on native plants and animals. There are few published data. Bell (1985) concludes that 'concentrated use by large numbers of commercial hives could have a negative effect on the continued, long-term survival of certain native bees, wasps and/or birds through competition for nectar and pollen by honeybees'. Swarms of feral bees may also affect birds such as parrots and pardalotes by occupying nest-holes which are scarce in the Park. However, it can be expected that some plant species will be unaffected and some benefitted by the impacts of bees. Hopper (1985) concluded, as did a number of other scientists, that 'it is in the interests of both the beekeeping industry and land managers to have the relevant research undertaken as soon as possible'.

Given this lack of information, and concerns about the impacts of beekeeping on native communities, beekeeping has been excluded from a number of national parks and nature reserves. The presence of a number of rare and little known plant species in FRNP makes it particularly important that

beekeeping is excluded. There are currently three apiary sites in the Park, two in the north-west of the Park near Twertup Creek and one approximately 4 km north of Mt Drummond.

PRESCRIPTIONS

1. **Liaise with the Department of Agriculture and the apiarists concerned to transfer all of the current sites out of FRNP to sites of similar value elsewhere.**

2. **Do not approve any new apiary sites in the Park.**

PART D. MANAGEMENT FOR RECREATION

GOAL:
Fulfill the nature-based recreation requirements of visitors to the extent that they are compatible with conserving the Park's flora, fauna and landscape values, wilderness qualities and cultural heritage.

11.0 RECREATION MANAGEMENT PHILOSOPHY

The continuing attraction of national parks depends on the retention of the natural vegetation and other conservation values. National parks are for people seeking different experiences to those offered elsewhere within any given region. In general, these experiences are of a low key nature and emphasise passive interaction with the natural environment (Sheppard, 1988).

The visitor survey carried out, as part of the preparation of this management plan, indicated that the features most **enjoyed about Fitzgerald River** National Park were the scenery, views, wildflowers, wildlife and unspoilt natural beauty. Management for visitor use should continue to protect these features.

The key factor in managing visitor use while maintaining the Park's values is dieback control. Any provisions for public access and use must consider dieback risk as the highest priority. Another point of relevance is the Park's very high susceptibility to erosion. This high susceptibility means that the Park has a limited capability to support recreational use without careful management. High levels of use are likely to require high levels of management. This is expensive and generally changes the features (such as "unspoilt beauty") which attracted visitors in the first place.

Therefore, the management philosophy for the Park in terms of public use is to provide low-key facilities and services which minimise changes to, and complement, the natural environment. This means low key camping facilities, a limited number of roads and extensive, untouched areas. Facilities should only be placed in areas where the soils and landform are sufficiently stable to support the facilities and their use in the longer term. Dieback should be the fundamental concern in any planning and management of public use. This philosophy is consistent with the Recreation Opportunity Spectrum of Parks as presented in the South Coast Regional Draft Management Plan (CALM, 1989).

12.0 RECREATION OPPORTUNITIES

12.1 THE REGION

The objective is to ensure that development of recreational opportunities within the Park complements rather than competes with attractions and facilities elsewhere.

Background

The CALM South Coast Region, which stretches from west of Albany to the South Australian border and up to 150 km inland in places, offers a diverse range of naturebased recreation opportunities. These include national parks, Shire reserves, other reserves and vacant Crown land.

Most places on the south coast can be reached in a day's drive or less from Perth, and within two or three hours from Albany or Esperance. Spectacular coastal scenery can be enjoyed at Cape Arid, Cape I le Grand, Torndirrup and West Cape Howe National Parks. Most of these Parks offer beaches and a range of fishing opportunities (eg. beaches, rock, estuarine/inlet). Inland parks such as the Stirling Range, Porongurup and Peak Charles offer scenery dominated by peaks and ranges, and spectacular shows of spring wildflowers.

Between them these parks offer a combination of 2WD, 4WD and foot-only access, formal and informal camping, and day-use sites (Table 12).

TABLE 12. NUMBERS OF CAMPING AND DAY USE AREAS IN MAJOR NATIONAL PARKS IN THE CALM SOUTH COAST REGION

PARK	FORMAL CAMPING			INFORMAL CAMPING			DAY USE SITES		
	2WD	4WD	TOTAL	2WD	4WD	TOTAL	2WD	4WD	TOTAL
Cape Arid	2	1	3	1	*2	3	4	2	6
Cape Le Grand	2		2	*1	*1	2	4		4
Stokes	2		2		4	4	1	3	4
Peak Charles				1	1	2	1	1	2
Frank Hann							2		2
Fitzgerald River	1	1	2	2	4	6	5	1	6
Stirling Range	1		1				8		8
Porongurup							2		2
Torndirrup							7		7
West Cape Howe				1	1	2	1	3	4
William Bay							3	1	4
TOTAL	**8**	**2**	**10**	**6**	**13**	**19**	**38**	**11**	**49**

* sporadic beach camping

Source: T. Passmore, CALM South Coast Region, pers. comm., 1988

A range of recreation sites are provided in the Shires of Jerramungup and Ravensthorpe, apart from FRNP (Table 13). There are two caravan parks in each Shire and a number of coastal sites, both with and without facilities. The Shires are responsible for the management of some of these, while the remainder lie on other reserves (either unvested or managed by another agency) or vacant Crown land.

TABLE 13. RECREATION SITES IN THE SHIRES OF RAVENSTHORPE AND JERRAMUNGUP (EXCLUDING FITZGERALD RIVER NATIONAL PARK)

RAVENSTHORPE	JERRAMUNGUP
Caravan Parks (2):	**Caravan Parks (2):**
Ravensthorpe	Jerramungup
Hopetoun	Bremer Bay
Day Use (22):	**Day Use (more than 10):**
Surf Beach	Doubtful Island beaches
Moylans	Bremer Bay beaches
Two Mile Beach	Wellstead Peninsula beaches
Look-out 2	Cape Knob beaches
Look-out 3	Point Irby beaches
Look-out 4	
Five Mile Beach	**Camping with Facilities (1):**
Six Mile Track	Miller's Point
Twelve Mile Beach	
Phillips, Jerdacuttup and Oldfield Rivers	**Camping without Facilities (more than 10):**
Dunn Swamp	Doubtful Island beaches, Four Mile Beach (east of FRNP)
Four Mile Beach (east of FRNP)	Cape Knob beaches
"Creeping Dunes"	(Fosters, Reef and Pallinup)
Castle Rock Beach	
Thirteen Mile Beach	The majority of the above sites (camping without facilities and day use) are only accessible by 4WD. All sites are within 45 Ian of Bremer Bay.
Fourteen Mile Beach	
Mullet Bay	
East of Mullet Bay	
Tuckeys Hole/Abalone Track	
Mason Point	
Camping with Facilities (4):	
Twelve Mile Beach	
Starvation Boat Harbour	
Mason Bay	
Hamersley Inlet	
All the above sites are accessible by 2WD and within 45 km of Hopetoun.	

Sources: Shires of Ravensthorpe and Jerramungup, pers. comm., 1988; Craig *et al*, 1984; DCE, 1984a; van Steveninck and Burkin 1984.

Strategy

It is most important that recreation developments in the Park complement rather than compete with other recreation opportunities on the south coast and in the Shires of Jerramungup and Ravensthorpe. This plan provides for an increase in the camping use of FRNP. Over the next 10 years there will be a doubling of the number of campsites and hence camping opportunities in FRNP. Detailed prescriptions for access, recreation sites and activities are given in Sections 13.0, 14.0 and 15.0 respectively.

12.2 THE PARK

The objectives are:

1. *Provide a range of recreational opportunities based on a range of natural settings, with minimal damage to the environment.*
2. *Direct recreational use into those areas which are suitable and can sustain the type and intensity of use they are likely to receive.*

Background

The Park provides a range of access types, from 2WD to 4WD to foot access only. Levels of development range from camping areas with toilets and marked camping bays to sites with no facilities. However, emphasis is on a natural setting with minimal development. This low key approach is strongly supported by the majority of current users (Cavana and Moore, 1988).

Current use of the Park focuses on the coast over summer and early autumn, and the inland and its wildflowers over the spring months. Visitor numbers peak in January, with 8 030 visitor days+ recorded in January 1988 (Cavana and Moore, 1988). Activities include sightseeing, bushwalking, photography, camping, swimming, fishing and nature study.

Visitor numbers are greatest where vehicle access is easiest, particularly access to 2WD vehicles. The eastern end of the Park, close to Hopetoun, is the most heavily used, particularly beaches which are accessible by 2WD. Most of this is day use, with people returning to Hopetoun or further afield for the night.

In the western end of the Park camping is more common than day use. Beaches close to Bremer Bay, rather than areas in the Park, meet the day-use needs of this population centre. At the western end, use is highest at Point Ann which is accessible to 2WDs, followed by Fitzgerald Inlet which is accessible only to 4WDs.

+ A visitor day is defined as the aggregation of time spent by persons making a recreation visit to a recreation resource or facility into units of 12 visitor hours.

A visitor survey, carried out from November 1987 to April 1988, showed most people were visiting the Park with their families (51%) or friends (27%). The majority of Park visitors came from Perth (39%) and country areas surrounding the Park (29%). Few visitors appeared to come from the Shires of Jerramungup and Ravensthorpe (14%), while 18% were from interstate and overseas. The survey did not cover the full wildflower season. Also, a number of local Park users did not fill in survey forms as they did not feel that they were visitors.

The best way to meet the needs of the different Park users is to continue to provide a range of choices, in terms of access, levels of development or facilities in particular areas, and the amount of interaction with other users. Some visitors may have a strong preference for camping opportunities providing little or no interaction with other groups, while others are more gregarious. To ensure that users know where and how to reach the recreation site most suitable for their needs, readily accessible information is essential.

Four caravan parks on the edges of the Park provide accommodation for people requiring more developed facilities. These are the most popular form of accommodation outside the National Park.

FRNP, as with many south coast areas, does not have a great capacity to support camping in natural settings. This results from an exposed coastline with unstable soils and very few areas with vegetation of sufficient height to provide shelter from the wind and sun. Those areas that have sheltering trees or shrubs are generally limited in size and can only cater for one or two groups. They are generally associated with melaleucas which are particularly susceptible to degradation (see 14.0 Recreation Sites). Small patches of mallee are potentially suitable for camping if they are of sufficient height to provide shelter, and are on stable soils.

Strategy

It is important that future management is based on the need to provide a range of low-key recreation opportunities while retaining a predominantly natural setting, and to provide for recreational use in only those areas which can sustain such use in the longer term.

PRESCRIPTIONS

Detailed management prescriptions are given in 14.0 Recreation Sites and 15.0 Recreation Activities.

Research and Monitoring

1. **Monitor visitor numbers and patterns of use, using traffic counters, site surveys and questionnaires.**
2. **Monitor visitor perceptions regarding Park management, using surveys.**

13.0 ACCESS

NOTE. Throughout this plan a "4WD track" is defined as a track which can only be used by vehicles with high clearance and where 4WD may be required in exceptional circumstances. These tracks should have a surface which has minimal dieback risk. All 4WD tracks (and other unsealed roads within the Park) are generally closed after rain.

The objectives are:

1. *Ensure that dieback control receives the highest priority in any access considerations.*
2. *Ensure that the conservation and landscape values of the Park are recognised in all access provision and changes.*
3. *Provide and/or maintain 2WD, 4WD and foot access to a variety of coastal and inland features within the Park, while ensuring that the natural environment and other Park users are not adversely affected.*
4. *Ensure that all forms of access are constructed and maintained to a standard able to safely support current and expected use levels.*

Background

The Park is accessible, via all-weather gravel roads, from Highway 1, Bremer Bay Road and Hopetoun-Ravensthorpe Road.

Two 2WD loops provide access within the Park (Map 1b). In the east, Hamersley Drive enters the Park from Hopetoun and links in the north with Old Ongerup Road. The western loop, Pabelup Drive, may be reached from the South Coast Highway via Devil's Creek Road in the west or Quiss Road in the north. 2WD roads provide access to Point Ann, West Mt Barren, Mt Maxwell, Hamersley Inlet, West Beach, West Beach Point, Mylies and East Mylies, Barrens and Four Mile Beach. The remaining roads and tracks are suitable for 4WD only. There is also an extensive network of firebreaks, particularly on the Park perimeter. All are 4WD and are for management access only.

The track system in the Park evolved from the original alignment of the transcontinental telegraph line and associated service track, constructed in 1875. Other tracks were established to provide coastal access for fishermen. Access tracks were also associated with the rabbit proof fence and the mineral boom of the late 1960s (Smith, 1977).

All tracks were in place prior to gazettal of the National Park (in 1973). Landscape design or protection of the environment were not considered in their placement. The most critical problem is the possible introduction and further spread of dieback from roads and tracks placed high in the landscape. Many tracks also traverse extensive low-lying waterlogged areas. Other problems include

safety, erosion and soil degradation, and tracks cutting across and intruding on extensive natural views or not optimising available views.

4WD tracks and sections of some 2WD roads present an added dieback risk as many have pools of water lying across them in winter, and in summer following rain. These pools provide an ideal environment for dieback spores to survive, multiply and spread. Recent "forming" of these tracks without realignment and/or sheeting or stabilisation has resulted in some sections of their surfaces becoming slippery following 20 mm or less of rain. Water also ponds in some sections of the adjacent drains.

A number of short footpaths (less than 1 day) provide access to the peaks of East and West Mt Barren and to the river valley and several low hills near Twertup. An unmarked coastal walk traverses the coast from Bremer Bay to Hopetoun. Walks up peaks present a substantial dieback risk, as they may lead to its introduction high in the landscape. Further comments on management of footpaths are given in 15.3 Bushwalking.

When full of water, some of the inlets are accessible by small boat. Boats can be launched on the Hamersley Inlet most of the year. The lower reaches of the Fitzgerald, Hamersley and Phillips Rivers can be explored by canoe. All inlets and rivers are generally too shallow to be easily or safely used by large power boats.

Some of the problems that can result from the provision and use of access, both public and management only, include the introduction of dieback and weeds, vegetation damage, soil compaction which may initiate wind and water erosion and blowouts in sensitive areas, and the impairment of scenic amenity. In addition, access may concentrate activity in areas with a limited ability to support public use or where the public is not easily safeguarded.

Much of the Park is sensitive to erosion and soil degradation (Map 4). In a number of places on the coast mobile dune-fields occur, interspersed with areas of recently consolidated wind-blown sand. The steep Barren ranges are highly susceptible to water erosion once the vegetation has been removed (eg. on footpaths). The plains suffer damage from vehicles under wet conditions. Even the more stable granite-derived soils of the northern Fitzgerald are susceptible to water erosion.

Strategy

Future access to the Park will be based on the two existing 2WD loops, Hamersley Inlet and Pabelup Drives, with 2WD spurs to Point Ann - St Marys, West Mt Barren and Mt Maxwell in the west, and Hamersley Inlet and a number of beaches between Four Mile and West Beach in the east (Map 10). The 4WD spurs to Fitzgerald Inlet and Quoin Head will also be retained, although restricted if necessary.

In the following prescriptions, dieback is the greatest management concern. Section 9.1 Disease provides further details on dieback, the extreme vulnerability of FRNP to this disease and relevant management prescriptions. If the presence of dieback is suspected or confirmed on or adjacent to the roads, tracks (including management-only) or footpaths proposed in this plan, future management of the particular access way should be carefully considered. Generally, evaluation should include consideration of further hardening of the road, track or path surface by adding gravel or limestone or, if appropriate, sealing. If required, consideration should also be given to re-assessing and altering the drainage, and realignment to reduce the area of catchments affected. Closure will also be considered.

Generally, every effort should be made to keep open the 2WD roads and 4WD tracks. All or parts of the Park may be closed following rain, using the same criteria presently applied to 4WD tracks. That is, closed when sufficient rains allow vehicles to pick up mud and soil.

Six classes of road are recognised:

Class 1. sealed through roads
Class 2. sealed spurs
Class 3. gravel through roads
Class 4. gravel spurs
Class 5. 4WD - dry weather access only
Class 6. management-only - dry weather access only.

Safety through the application of consistent standards will be a priority in all access provisions.

PRESCRIPTIONS

1. **Retain public access to most parts of the Park. The recreation and natural environment zones will be accessible by vehicle and on foot, and the special conservation and wilderness zones by foot only (except for management purposes) (Map 3).**

2. **Maintain, upgrade, realign or dose roads and tracks as indicated in Table 14. Roads and tracks will not be upgraded, except for dieback hygiene, unless resources are available to provide adequate facilities (e.g. car parks, camping areas, walkways to the beach) at the road/track end.**

3. **Road and track location and realignment must be based on selection of the best road or track corridor. The guidelines for selection are:**

a. **the corridor minimises the risk of disease spread, based on up-to-date hygiene and hazard maps, position in the landscape and landform;**
b. **the corridor is cost efficient to construct and maintain;**
c. **the corridor offers a diversity of views, including some panoramic views;**
d. **the corridor has minimal impact visually; and**
e. **the corridor allows for a given design speed.**

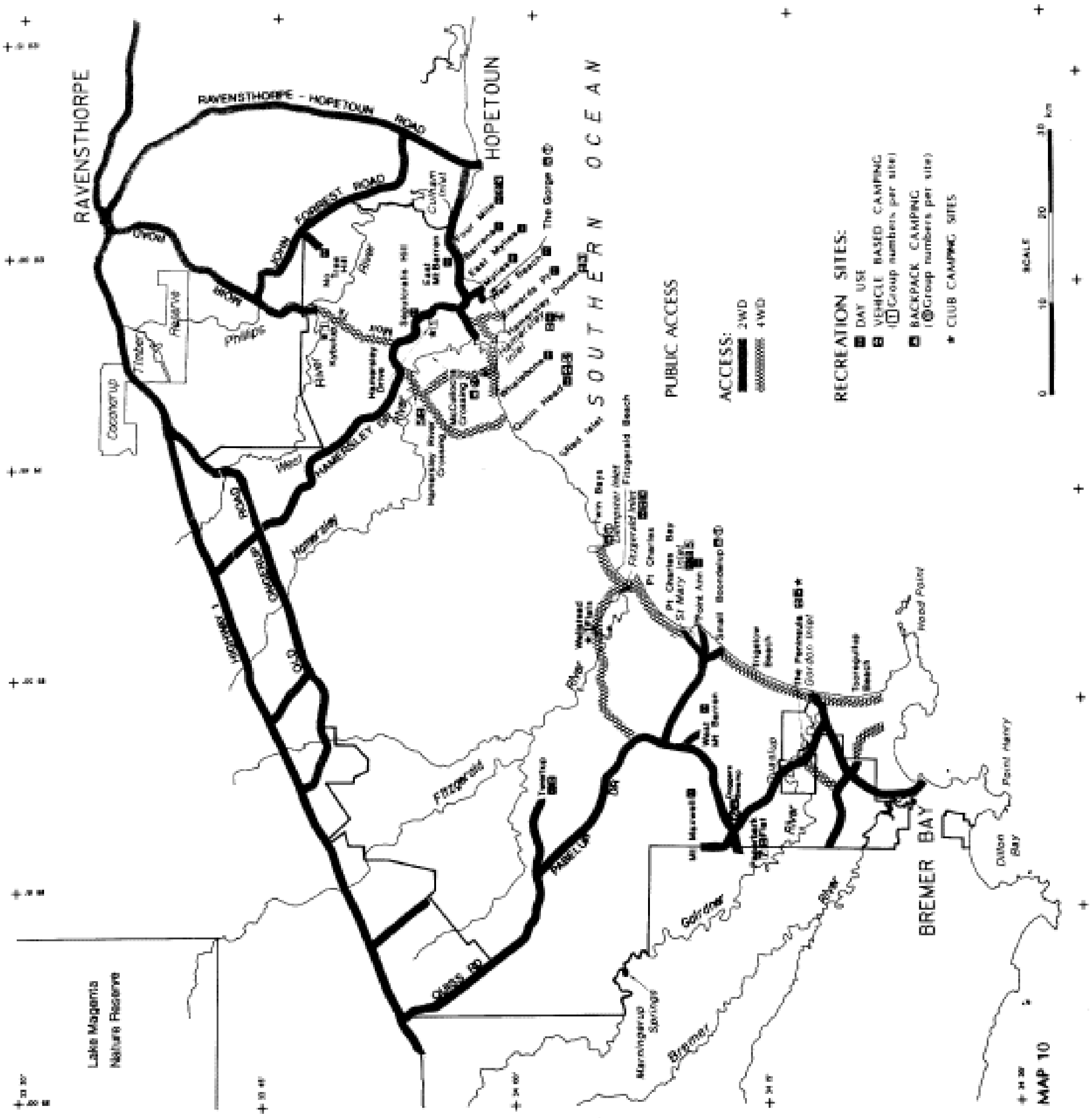
Once a corridor has been selected, the alignment of the road or track within the corridor must be designed in detail.

4. **For Class 1, 2, 3 and 4 roads (see strategy above for definition) design to provide for travelling speed of up to 60 km/hr. Provide signs at Park entrances and along roads to indicate this speed limit. Ensure safe visibility on curves and intersections.**

5. **For Class 5 and 6 tracks the most important consideration is minimising the risk of dieback introduction and disturbance. Design speed is not important.**

6. **On Class 5 tracks:**
   a. **test a range of water shedding and stabilising surfaces, such as gravel, limestone and geotextile treatments.**
   b. **continue track closures in some parts of the Park until satisfactory techniques for stabilisation. have been determined for broadscale implementation.**
   c. **once techniques are implemented, continue to closely monitor track status. d. consider dieback, landscape and erosion impacts before any technique is tested or implemented.**

7. **Exclude vehicles from the centre of the Park to reduce the risk of dieback introduction and/or spread to the lowest possible levels. Vehicle access for dieback sampling and fire management will be allowed under strict permit, subject to NPNCA approval. If a life-threatening emergency arises requiring the use of vehicles within these areas, entry will be authorised by the South Coast Regional Manager or a representative. Access for fire management purposes in the centre of the Park will be reviewed in 1995 (refer to 9.2 Fire).**



RAVENSTHORPE
RAVENSTHORPE - HOPETOUN ROAD
JOHN FORREST ROAD
HOPETOUN
SOUTHERN OCEAN
PUBLIC ACCESS
ACCESS:
2WD
4WD
RECREATION SITES:
DAY USE
VEHICLE BASED CAMPING
BACKPACK CAMPING
CLUB CAMPING SITES
SCALE
Fitzgerald
BREMER BAY
Point Henry
Dillon Bay
Lake Magenta Nature Reserve
MAP 10

TABLE 14. ROAD AND TRACK PRESCRIPTIONS

ROAD/TRACK	CLASS	MANAGEMENT ACTION	RECOMMENDED PRIORITY
EASTERN SECTION			
Hamersley Drive	1	Assess need for realignment. Provide "pull-overs" with inter pretive material. Seal around East Mt Barren, for dieback reasons, as highest priority. Seal to Mylies or further, if needed.	1
Moir Track	5	Assess need for realignment. Sheet where necessary.	1
Barrens Road	4	Maintain.	Ongoing
Four Mile Beach Road	4	Maintain.	Ongoing
Mylies Road	4	Maintain.	Ongoing
East Mylies Road	4	Maintain.	Ongoing
West Beach Road	4	Maintain.	Ongoing
West Beach Point Road	---	Close to vehicles, provide extended footpath to West Bch Point.	2
The Gorge Track	---	Close to vehicles, use as footpath, provide carpark at head of track.	1
Hamersley Inlet Road	2	Maintain.	Ongoing
Hamersley Dunes Track	5	Monitor. Traffic will be along a defined corridor.	Ongoing
Edwards Pt Track	5	Monitor.	Ongoing
West Hamersley Inlet Track	5	Assess need for realignment. Sheet where necessary.	1
Whalebone (Dave Niels) Tk	5	Assess need for realignment. Sheet where necessary.	1
Quoin Head Track	5	Assess need for realignment. Sheet where necessary.	1
Quoin - Whalebone Track	5	Close. Alternative access available.	1
No Tree Hill Track	4	Assess need for realignment. Provide carpark on lower slopes. Gravel.	3
WESTERN SECTION			
Pabelup Drive	1	Assess need for realignment. Seal sections for dieback reasons, if needed. Provide "pullovers" with interpretive material.	1
Colletts Road	4	Assess need for realignment.	1
Gairdner Road North	5	Assess need for realignment. Stabilise crossing. Sheet where necessary.	3
Gairdner Road- South*	4	Assess need for realignment. Liaise with Shire re joint road maintenance program.	3
Gordon Inlet Road*	4	Assess need for realignment. Upgrade to 2WD all weather. Liaise with Shire re joint road maintenance program.	3
Gordon Inlet - Quaalup Tk*	4	Assess need for realignment. Upgrade to 2WD all weather.	1
West Mt Barren Road	2	Maintain.	Ongoing
Pt Ann Road	2	Assess need for realignment.	2
Mt Maxwell Road	4	Assess need for realignment.	3
Fitzgerald Inlet Track	5	Realign to avoid 'Lake Nameless' catchment. Assess need for realignment in the remaining section. Sheet where necessary.	1
Twertup Track	4	Assess need for realignment. Sheet where necessary.	1
St Marys Track	2	Realign, upgrade to 2WD all weather. Provide stable access to Pt Charles Bay Beach.	1
Trigelow East Track	4	Realign, provide stable all weather vehicle access to northern end of Trigelow Beach.	1
Trigelow Beach Track		Close track which runs parallel to beach.	2
Trigelow Beach	---	Continue beach access, monitor.	Ongoing
"Small Boondalup" Track	---	Close to vehicles, use as footpath.	1
St Marys - Pt Charles Tk	5	Realign, keep beach open.	1
Point Charles Bay Beach	---	Continue beach access, monitor.	Ongoing
Smokehouse Landing Track	---	Close on basis of continuing access to S bank of Bremer River through Jerramungup Shire reserve.	1

ROAD/TRACK	CLASS	MANAGEMENT ACTION	RECOMMENDED PRIORITY
Fitzgerald Beach	---	Continue beach access, monitor.	Ongoing
Accesses around Quaalup	6	Review.	2
CENTRAL SECTION			
Telegraph Track (Fitzgerald Inlet - Quoin Head)	6	Close to all access except for dieback sampling and survey under strict permit. Review for fire access in 1995.	1
Drummond Track	6	Close to all access except for dieback sampling and survey under strict permit. Review for fire access in 1995.	1
Twin Bays Track	6	Close to all access except for dieback sampling and survey under strict permit. Review for fire access in 1995.	1
Bell Track South	6	Close to all access except for dieback sampling and survey under strict permit. Review for fire access in 1995.	1
Fitzgerald South Track	6	Close to all access except for dieback sampling and survey, under strict permit. Review for fire access in 1995.	1
Red Islet - Marshes Beach Track	6	Close to all access except for dieback sampling and survey under strict permit. Review for fire access in 1995.	1
Bell Track North	---	Keep closed.	1
Southern spurs off Old Ongerup Road	6	Maintain for fire (emergency) access.	2
GENERAL			
Firebreaks	6	Assess need for realignment. Minimise numbers, dieback risk and erosion. Ensure closure to public vehicles.	1

* Assess best provision of access to the Peninsula and Gordon Inlet and links with Bremer Bay and FRNP.

8. Temporarily close East Mt Barren path because of confirmed dieback at the beginning of the path. Re-locate the beginning of the path and realign the path to both avoid the infected area and to minimise the area infected if further spread associated with the footpath occurs. Clearly delineate the infected areas. Establish a sealed carpark on old gravel pit site and provide a stable walkway to the first stage of the path.

9. Because of dieback risks, prohibit access (including foot access) to the peaks of Mid Mt Barren, Woolbernup Hill and Thumb Peak, except by special permit. These peaks are proposed for closure or quarantine as they are part of the quartzite ranges which support high numbers of rare plants, many of which are susceptible to dieback. By walking on these peaks, walkers risk introducing dieback.

10. Provide parking and turning space for buses of up to 45 seats at East Mt Barren lookout, approaching from the east. Provide for buses of up to 20 seats at Point Ann, West Mt Barren and Mylies Beach and other destinations which may be approved from time to time. Elsewhere, roads should be designed and built to meet the requirements of cars, rather than those of buses or caravans.

11. Close all or parts of the Park following rain as necessary (ie. access ways where vehicles [or footwear] can pick up mud or soil). This is to minimise the risk of dieback infection and spread (see Section 9.1 Disease for explanation), damage to the track surface and to reduce safety risks to users. Use signs at all Park entrances and other media to indicate whether roads, tracks and footpaths are open or closed.

12. Realign the track on the hinterland of Point Charles Bay to ensure dieback cannot be introduced or spread to the "Lake Nameless" catchment, to reduce track visibility from Point Ann and St Marys, and to provide access to all of Point Charles Beach. Realign the Fitzgerald Inlet Track to avoid the 'Lake Nameless' catchment. The "Lake Nameless" catchment is one of the catchments from which all vehicles are being excluded to minimise the risk of dieback introduction and spread.

13. Keep Trigelow, Point Charles Bay, Fitzgerald/Dempster and Hamersley Beaches open to 4WD vehicles, with access available via the tracks indicated on Map 10. 4WD use of these four beaches has been retained on the basis that:

- **4WD access to the beach can be provided via a stable and visually acceptable alignment.**
- **these beaches are remote and, therefore, conflict with other users is minimal.**
- **a range of opportunities is available elsewhere in FRNP, firstly, for people to access the immediate hinterland of beaches in 2WD vehicles; and secondly, several remote beaches have been retained as foot access only, with no vehicle access to the immediate hinterland.**
- **users are notified of safety risks (eg. quicksand, changing beach profile).**
- **no breeding birds appear to be affected.**

If the effects on breeding birds, safety risks or damage to foredunes, particularly at access points, become unacceptable, 4WD use of the specific beach should be re-assessed. The beach of particular concern, in terms of breeding birds and safety (ie. quicksands), is Fitzgerald Beach. Any reassessment should be in consultation with users and the Fitzgerald River National Park Advisory Committee.

14. Restrict vehicles on beaches to the unvegetated beach face, generally between low and high water mark. Do not allow vehicles in foredunes.

15. Rehabilitate closed tracks to minimise erosion and encourage revegetation. Provide explanatory signs to inform users.

16. **Liaise with Shires to ensure that road standards within the Park and of adjoining roads are complementary.**

17. **Other than beach access as described, only permit the use of vehicles and machines off-road for fire control (and only in specified parts of the Park - refer to 9.2 Fire), search and rescue and other emergency circumstances. The decision will rest with the District Manager. Strict dieback hygiene must be observed and special care must be taken to avoid areas susceptible to soil erosion and degradation. Areas containing rare species or archaeological sites must also be avoided.**

18. **Subject all road and track maintenance to strict dieback hygiene measures.**

19. **A strictly limited number of management-only tracks will be maintained for the control of fire, pests, weeds and disease, and for survey, research and monitoring. These tracks will not be all-weather and may only be accessible in summer or following long dry periods. Their use will be subject to strict dieback hygiene and the approval of the District Manager. Maintenance works on these tracks should be limited to prevention of erosion and waterlogging, and should disturb the soil profile and natural drainage patterns as little as possible.**

20. **Management-only tracks will generally be open for walking but not to vehicle access by the public. They will be closed by secured gates.**

21. **New management tracks will only be established where no feasible alternatives for management exist, and only following evaluation using the Necessary Operations Checklist and obtaining the associated levels of approval. Location should be according to the principles given earlier (Prescription 3).**

22. **Liaise with local users prior to road closures, where possible.**

Research and Monitoring

23. **Monitor annually the status of roads, tracks and footpaths. If erosion gullies become greater than 10 cm deep, or if water ponds on a road or track for longer than three to four days after rain, then management action is necessary. These values are based on dieback risk, and soil degradation and erosion. They can be re-assessed and new values written if new information indicates the need.**

24. **Monitor access points to 4WD beaches. If 4WD tracks other than the designated main access point are created, management action is necessary.**

13.1 TELEGRAPH TRACK

The objective is to recognise the special wilderness values of the central part of the Fitzgerald in any access considerations associated with Telegraph Track.

Background

This 4WD track, which runs east-west through the centre of the National Park, has been closed since 1986 because of dieback risks (see 9.1 Dieback for an explanation). There are several reasons supporting continuation of this decision. These are.:

Dieback Risk

Telegraph Track traverses three catchments (Hamersley River, Quoin Head and Dempster) and provides access to a number of smaller coastal catchments. With realignment it could avoid the Quoin Head catchment. However, it would still place two major catchments at risk from dieback introduction and spread.

The Dempster is the only major catchment wholly within the National Park. This means that CALM can minimise changes in water quality and further dieback spread across the whole catchment.

Dieback risks can be overcome to some degree by upgrading access to sealed roads with comprehensive drainage. This means that dry conditions inhospitable to the survival of the dieback fungus are created. However, there is still some risk. The risk associated with gravel roads is greater, and is higher again for 4WD tracks. Construction of sealed roads is expensive and in many cases beyond the budget of land managers. In FRNP, the priorities are sealing major tourist roads such as Hamersley and Pabelup Drives. These are at greater risk given their higher levels of use.

Maximising Recreation Opportunities (Wilderness Values)

If the aim is to provide a diversity of recreational opportunities in the Park, then continued vehicle access through the central part of the Park and to the central coast means that few coastal areas are the domain of walkers only. This reduces the range of recreation and in particular wilderness opportunities.

Strategy

It is the intention at this stage that Telegraph Track (between Fitzgerald Inlet and Quoin Head Track) will remain closed to all vehicular use unless the fire management strategy for the central wilderness area, which will be reviewed by July 1995, requires it to be open for this purpose (see 9.2 Fire). The only exception is strictly controlled vehicle access approved by the NPNCA for management purposes. Recreational vehicle access will continue to be provided along Telegraph Track to Quoin Head. These decisions are necessary to protect the area from further dieback spread.

With this level of access 24% of the coastline can be considered reasonably protected, and providing for walkers only. It also provides for use of Quoin Head and Fitzgerald Inlet by 4WD-based visitors.

PRESCRIPTION

1. **Close Telegraph Track between Fitzgerald Inlet and Quoin Head Track to all vehicle access. Access for dieback and fire management purposes will only be permitted with NPNCA approval. In July 1995, future management access will be determined by the National Parks and Nature Conservation Authority on the advice of the fire advisory group.**

14.0 RECREATION SITES

NOTE: There are circumstances where certain users, for example anglers, have a genuine requirement to be on-site overnight. This plan will allow recreational fishermen to rest in their vehicles at designated 4WD sites overnight. 'Overnight resting in vehicles' is defined as sleeping in, or next to, a vehicle for one night, provided neither tents nor any other external structure is erected. This system will be periodically reviewed, time restrictions may be applied and specific sites may become unavailable.

14.1 GENERAL

The objectives are:

1. Provide a choice of recreation sites, within a range of natural settings, which can be used and maintained with minimal damage to the environment.
2. Ensure that recreation sites are located in stable landscapes where they are visually unobtrusive and where such use is sustainable in the longer term.
3. Minimise conflict between visitors by careful site location and design.
4. Consider visitors' safety at recreation sites as well *as* ensuring that the sites remain attractive.

Background

There are about 28 recreation sites currently used in the Park. Of these, 11 are used for both day use (parking and/or picnicking) and overnight camping, 13 for day use only and 4 for camping only.

The Park visitor survey (Cavana and Moore, 1988) indicated that 49% of visitors are day visitors and that the majority of campers stay 2 to 3 nights. The most frequently used campsites are Fitzgerald Inlet, Point Ann, Four Mile Beach and Mylies. With average levels of use the capacities of day use and camping areas are not exceeded. However, during peak use periods (Christmas -New Year, January and March long weekends, school holidays and Easter) the capacities of Mylies, Point Ann and Hamersley Inlet are often exceeded. The ability to camp away from other people is considered important by 81% of visitors. Many recreation sites have generally been established at the end of fishing tracks or are associated with coastal features such as beaches and headlands. The majority of sites lie on the coast. This has led to two major problems.

Firstly, many sites are located on fragile, highly erodible soils, such as recently consolidated sands. Recreational use, particularly camping, has focused on small stands of melaleucas. Many of these stands have been progressively stripped for firewood or damaged by vehicles pushing under them for shade. Once the sandy soils in these areas are exposed, they are readily damaged by water and wind erosion.

Therefore, these fragile areas cannot continue to support intensive uses such as camping. Reductions in the intensity of use can be achieved by changing the site from camping to day use (thereby reducing the length of time and the demands users place on a site), closing the area to vehicles and providing for foot access only, or by closing the area to all access. The measure chosen depends on the fragility of the area, level of degradation and availability of alternative sites.

Secondly, the majority of sites cater for both day use and camping. Using one area to cater for both demands may lead to conflict between day users and campers. To make the most efficient use of space and minimise safety risks, day use and camping sites should be physically separated where possible. The three sites which are deteriorating most rapidly are Point Ann, Mylies and Quoin Head.

Point Ann is popular because it provides a sheltered beach and small sandy terrace protected by cliffs. It has become highly degraded. The stands of melaleucas which once provided shelter and shade have been progressively removed for firewood or otherwise damaged. Erosion gullies several metres deep run from the access track to the beach. There is conflict between day visitors and their parking requirements, campers and the occasional boat trailer. An old shack also adds to the congestion.

Mylies Beach is a long beach popular for fishing and swimming. The site itself lies between a stream and mobile dunes. It is limited in size, with the melaleucas being damaged by camping. The site becomes crowded at times, with the potential for conflict between campers and day users. The site was damaged by floods in 1988, when the walkway to the beach was washed away, and by fire in 1989 when vegetation was completely removed.

Quoin Head also provides a sheltered beach. The site is on sloping sands at the foot of a steep rocky slope. The melaleucas have been extensively damaged by stripping for firewood and by vehicles pushing into stands for shelter. Exposed areas are becoming damaged by wind and water erosion with gullies 1 m deep.

Stands of mallees on stable soils provide attractive alternatives for camping in the Park. A number of potential sites relatively close to the coast (100 m - 1 km) exist in the Park.

Strategy

Reference to the Recreation Goal for the FRNP indicates that the Park should cater for recreational use in a natural setting, with minimal facilities. Within this framework there should be a choice of settings, including coastal, heathland and mallee; and development, ranging from "developed" to "less developed". This should include areas accessible to 2WDs with facilities, 4WD-accessible areas with no facilities apart from toilets, and backpack campsites with no facilities. There are currently enough

sites, albeit poorly planned, to meet demand, except over peak-use periods. It is an inefficient use of resources to plan on the basis of peak demand, which only occurs on 18-20 days per year.

Although the sites meet demand, their inherent fragility and obvious degradation mean that in a number of areas current levels of use cannot be sustained in the longer term. In terms of camping, the Park currently provides for about 21 groups in the western end and 19 groups in the east, giving a total of 40 groups spread over 18 locations.

The strategy proposed in this plan for camping is to provide attractive, additional/alternative areas which are stable and sustainable in the longer term. The number of proposed areas will cater for current demand plus a potential increase of about 100% over the next 10 years. This is based on potential sites for 43 groups in the west and 36 in the east, giving a total of 79 across 18 areas (Map 10 and Table 15). Of these 18 locations, six will be accessible to 2WD, four to 4WD, five to backpackers only and four (2 to 2WD, 2 to 4WD) for clubs or organised groups.

Only limited changes to existing camping sites, to prevent further degradation, will be made until alternatives are provided. For example, a camping area will not be changed to day use until an attractive, alternative camping area has been established.

The strategy proposed for day use areas is to separate them from camping sites. Also, most parking areas require re-assessment to maximise the space available, while at the same time minimising the area disturbed. Details on specific sites are given in Table 15, Map 10 and the following prescriptions. The development of detailed plans for all sites within the National Park is beyond the scope of this plan but will be undertaken during the life of this plan.

PRESCRIPTIONS

It is essential to read the strategy above before reading the following prescriptions.

General

1. **Carry out site modifications and management according to the prescriptions in Table 15. Carry out site developments in accordance with a site development plan. Prepare plans in consultation with CALM landscape architects.**

2. **Consult with Fitzgerald River National Park Advisory Committee regarding site development plans. All new developments should be based on an up-to-date dieback hygiene plan and an approved Seven Way Test (see 9.1 Disease for explanations).**

Camping

3. **Design campsites to cater for a range of group sizes, from one vehicle to three to four vehicle groups. Also, design to provide, where possible, good separation of camping groups, either by screening vegetation, landform and/or distance.**

4. **Provide for vehicle-based, 2WD-accessible camping at St Mary Inlet, Hamersley Inlet, Four Mile Beach, Twertup, "The Peninsula" and Paperpark Flat (at the southern end of Pabelup Drive) (Table 15, Map 10). The last two are new sites. Support the use of Hamersley Inlet Shire Reserve for camping.**

5. **Provide for vehicle-based 4WD-accessible camping at Fitzgerald Inlet, Quoin Head, Hamersley River Crossing and Hamersley Dunes (Table 15, Map 10). Investigate a possible new campsite in Whalebone Beach area.**

6. **With the exception of the wilderness zone, CALM will seek additional campsites and the upgrading and expansion of suitable existing campsites, with emphasis on those near the coast and accessible to 2WDs. Implementation will be subject to NPNCA approval.**

7. **Implement a system for booking of campsites, particularly for 4WD sites during peak demand periods, according to need.**

8. **Provide for backpack camping (foot access only) at The Gorge, McCulloch's Crossing, "Small Boondalup" River, Dogger's Swamp and the eastern end of Fitzgerald Beach (Table 15, Map 10). The Gorge, "Small Boondalup" and the Fitzgerald Beach sites are currently accessible by 4WD, but are degrading rapidly.**

9. **Provide for group camping, on a bookings basis, with a maximum group size of preferably four or rive vehicles, or 20 people or fewer, at The Peninsula, Wellstead Flats, Kybulup Pool and Hamersley Drive (Map 10). The last is a new site.**

10. **Close camping sites behind Trigelow Beach, at Point Charles, West Hamersley and Edwards Point because of degradation and erosion.**

11. **Consider the needs of commercial fishermen in the development of camping areas near Gordon and Hamersley Inlets.**

12. **Develop, as required, a campsite host system at selected campsites.**

13. **Inspect disused gravel pits with the view to rehabilitation into campsites if the need arises and if appropriate.**

14. **Change the use of Mylies and Point Ann from camping and day use to day use only. Details are given in Table 15.**

15. **Provide for day use (well separated from camping) at Quoin Head and Hamersley Inlet (National Park site).**

Day Use

16. **Re-assess and, if necessary, modify the design of carparks at Mt Maxwell, West Mt Barren, Twertup Field Study Centre, Four Mile (day use), Barrens, East Mt Barren lookout and the carpark at the foot of East Mt Barren path, East Mylies, Mylies and West Beach (Table 15, Map 10).**

17. **Close West Beach Point carpark and access road (Table 15, Map 10). Provide footpath from a new carpark on West Beach Road. This will reduce the visual scar of the existing road and carpark.**

18. **Ensure that parking areas at West Mt Barren, Point Ann and Mylies cater for 20-seater buses and that East Mt. Barren lookout carpark caters for 45-seater buses.**

19. **The highest priorities for management actions are to: a. change Pt Ann to day use and at the same time establish camping areas at St Marys and Paperbark Flat. b. change Mylies to day use and at the same time increase the capacity of Hamersley Inlet (National Park site) and Four Mile.**

Research and Monitoring

20. **Regularly photograph recreation sites from a fixed point and in a fixed direction. Use photographs to identify subtle changes over time (and between managers) at a particular site.**

21. **Record, on a regular basis, percentage canopy cover (from aerial photos), number of broken branches and depth of erosion gullies. If the canopy cover has decreased by more than 10%, number of broken branches has doubled or erosion gullies are deeper than 10 cm since the last survey, then management intervention is necessary. Change these criteria and standards if new information indicates the need. Keep a written record of any changes made.**

TABLE 15. MANAGEMENT PRESCRIPTIONS FOR RECREATION SITES*

SITE	MANAGEMENT GUIDELINES	RECOMMENDED PRIORITY
WESTERN SECTION		
Mt Maxwell lookout Current: day use Proposed: day use	Assess carpark design. Define carpark boundaries.	3
West Mt Barren Current: day use Proposed: day use	Assess carpark design. Provide seating on walktrail. Provide for access by small buses (up to 20 seats).	3
Trigelow Beach Current: day use and vehicle based camping Proposed: closure	Close and rehabilitate campsites. Close track.	2
"Small Boondalup" River Current: day use and vehicle-based camping Proposed: backpack camping	Close to vehicles, promote as a readily accessible backpack site. Provide carpark and start of the path on Trigelow East Tk. Assess need for provision of formal walkway to beach.	2
Point Ann Current: day use and vehicle-based camping Proposed: day use	Re-design for day use only. Convert shack to day use facility. Provide camping at St Marys, The Peninsula and Paperbark Flat. Use information boards to explain why changes have been made. Provide for launching of small boats, and parking for boat-trailers.	1
St Mary Inlet Current: day use and vehicle-based camping Proposed: day use and vehicle based camping	Design to provide camping for 5 groups (maximum design load 10). Ensure 4WD access to Pt Charles Bay Beach.	1
Point Charles Current: vehicle-based camping Proposed: closure	Close campsite and rehabilitate.	2
Fitzgerald Beach (E end) Current: vehicle-based camping Proposed: backpack camping	Close campsite to vehicles, tidy up and encourage use as a backpack campsite.	2
Fitzgerald Inlet Current: day use and vehicle-based camping Proposed: day use and vehicle based camping	Design to provide camping for 10 groups (maximum design load 15). Ensure 4WD access to beach.	1

SITE	MANAGEMENT GUIDELINES	RECOMMENDED PRIORITY
Twertup Current: day use and built accommodation Proposed: day use and built accommodation	Assessment of future requirements by consultation between CALM and Fitzgerald River National Park Association.	2
Paperbark Flat Current: none Proposed: vehicle-based camping	Develop for vehicle-based camping for 7 groups (maximum design load 15).	1
The Peninsula† (Pt 32666) Current: informal camping (no facilities) Proposed: vehicle-based camping	Develop for vehicle-based camping for 15 groups (maximum design load 20). Provide toilets.	2
Dogger's Swamp Current: none Proposed: backpack camping	Backpack camping, no facilities.	2
Smokehouse Landing (currently part of Jerramungup Shire Reserve) Current: day use Proposed: day use; access by boat and foot only.	Liaise with Shire to provide access to the southern part of the Shire reserve. Close to vehicles and rehabilitate access track to Smokehouse Landing.	1
EASTERN SECTION		
Four Mile - day use Current: day use Proposed: day use	Assess need to increase carpark capacity once capacity of the camping area has been increased (see below).	3
Four Mile - camping Current: vehicle-based camping Proposed: vehicle-based camping	Increase capacity for 7 groups (maximum design load 7) to give a total of 13 sites by extending existing camping area.	1
Barrens Beach Current: day use Proposed: day use	Re-design carpark to form a loop.	3
East Mt Barren lookout Current: day use Proposed: day use	Re-design parking area to reduce visual impact and erosion problems. Provide disabled access path to lookout. Provide parking for buses up to 45 seats in capacity.	2

SITE	MANAGEMENT GUIDELINES	RECOMMENDED PRIORITY
East Mt Barren path Current: day use Proposed: day use	Move and seal beginning of the path and parking area, realign path because of dieback risks to rare plants. Use carpark as a display area for information on dieback.	1
Mylies Beach Current: day use and vehicle-based camping Proposed: day use	Re-design for day use only, based on site about 200 m west of existing site. Retain existing carpark (with some re-design) for use during peak periods. Provide additional camping at Four Mile and Hamersley Inlet. Use information boards to explain why changes have been made.	2
East Mylies Current: day use Proposed: day use	Reduce road crest, use cut to fill carpark. Check that fill level doesn't make cars visually obtrusive. Monitor existing footpath for erosion.	2
The Gorge Current: vehicle-based camping Proposed: backpack camping	Close to vehicles, rehabilitate access track. Provide paths, with beginning of the path off West Beach Road. Provide for backpack camping.	2
West Beach Point Current: day use Proposed: day use	Close carpark and West Beach Point Road. Provide walktrail to West Beach Point from a new carpark on West Beach Rd.	3
West Beach Current: day use Proposed: day use	Redesign to create one-way loop within carpark.	3
Edwards Point Current: day use and vehicle-based camping Proposed: day use	Monitor track and turn around on Point. Close and rehabilitate campsite.	2
Hamersley Dunes (campsite inland of mobile dunes) Current: vehicle-based camping Proposed: vehicle-based camping	Develop nearby mallees for vehicle-based camping for 3 groups (maximum design load 6).	2
Hamersley Inlet (National Park site) Current: day use and vehicle-based camping Proposed: day use and vehicle based camping	Develop campsite for 4 groups (maximum design load 6) and day use area with access to inlet for boat launching. Provide pull-over on entrance road for views over the Inlet.	1

SITE	MANAGEMENT GUIDELINES	RECOMMENDED PRIORITY
Hamersley Inlet West Current: day use and vehicle-based camping Proposed: closure.	Close and rehabilitate. Close off the 'slide' down to Hamersley Inlet.	2
Whalebone Beach Current: day use Proposed: day use	Maintain existing access. Provide parking and turn around area at western end of beach. Close tracks along cliffs. Investigate a possible new campsite in the Whalebone Beach area.	2
Quoin Head Current: day use and vehicle-based camping Proposed: day use and vehicle-based camping	Provide for limited vehicle-based camping for 4 groups (maximum design load 4). Site of limited suitability for camping in the longer term; however, no other sites available nearby. Give high priority to monitoring. Rehabilitate degraded and eroding areas. Modify last steep section of access track to reduce erosion.	1
Hamersley River Crossing Current: informal camping (no facilities) Proposed: vehicle-based camping	Develop for vehicle-based camping for 5 groups (maximum design load 10). Realign Telegraph Track around the northern end of the yate woodland to enlarge camping area and physically separate the Track and camping area.	1
McCulloch's Crossing Current: none Proposed: backpack camping	Backpack camping, no facilities. Commence the path on Hamersley Drive.	2
Sepulcralis Hill Current: day use Proposed: day use	Maintain.	Ongoing
No Tree Hill Current: none Proposed: day use	Provide carpark on lower slopes and footpath to peak.	2
CENTRAL SECTION		
Marshes Beach to Twin Bays Current: backpack camping Proposed: backpack camping	Monitor for impacts by backpack campers.	Ongoing

† outside the existing National Park boundary * details on club/group sites not included.

14.2 RECREATION SITE MANAGEMENT (Level of development, campfires, caravans and rubbish)

The objectives are:

1. *Manage sites to protect the natural environment and maintain each site's attractiveness to visitors.*
2. *Manage sites in the most cost-effective way.*

Background

To retain the natural setting of recreation sites requires a clear definition of the acceptable levels of facility development. This is given below in the Strategy. Other points of broad relevance to site management across the Park are campfires and rubbish bins.

A major problem in the Park, and many other areas on the south coast, is the destruction of trees for firewood. Trees are a particularly limited resource in FRNP. In coastal areas their removal often leads to erosion and a reduction in shelter for campers and other visitors. Stands of melaleucas are particularly susceptible.

Most recreation sites have rubbish bins provided. These are emptied regularly by Park staff. There is a need to rationalise the provision of bins as emptying them is very time-consuming, reducing ranger time for other tasks. Most visitors only stay in the Park 2-3 days and could readily take their rubbish with them.

Strategy

A range of facilities should be provided at sites across the Park. Sites nearest the eastern and western ends of the Park and closest to the rangers (and, therefore, more rapidly accessed and maintained) should be the most developed, while those further into the Park should be more primitive.

Flushing toilets, showers and caravan parks will not be provided. Toilets will be "long drop" only, with sealed vaults accessible to sanitary trucks at the busiest sites.

Caravans should be actively discouraged because camping areas are small and not designed for caravans, and because the roads are not designed to safely accommodate them.

The facilities provided should be based on minimal maintenance to provide Park staff with more time for interpretive, educational, monitoring and research functions.

PRESCRIPTIONS

1. **Provide gas barbecues at the more intensively used areas.**

2. **Do not permit campfires on the ground within the Park, because of fire risks and impacts of firewood collection on fragile coastal vegetation. Allow fires in containers that meet with the ranger's approval on beaches and in approved campsites, provided a live fire is not left unattended and visitors supply their own fuel which is free of dirt and seeds. Brochures and general information on the Park will advise visitors to bring their own wood and fire container.**

3. **Provide toilets at all camp sites and day-use sites as required, with the exception of backpack sites. The siting of toilets must be unobtrusive.**

4. **As far as possible remove bins. Provide bulk rubbish collection sites close to exits. Provide brochures and pre-visit information which encourage visitors to "pack it in, pack it out".**

5. **Provide tables at some major day use sites.**

6. **Accept the use of generators at some remote sites (such as Fitzgerald Inlet and Quoin Head, and the club sites). If conflict arises with other users, generator-only camping areas may need to be designated.**

7. **Use of post and rails should be minimal. Their use is acceptable in the more developed sites at the eastern and western ends, but less so at the more remote sites. Use natural features where possible.**

8. **Ensure that all signs conform with the CALM Sign Manual.**

Research and Monitoring

9. **Include a sign monitoring and maintenance program in the Park's annual works program.**

15.0 RECREATION ACTIVITIES

15.1 NATURE STUDY

The objective is to encourage all visitors to appreciate, and increase their understanding of, the Park's natural and cultural environments and in particular the need to control dieback.

Background

The Park is a popular area for wildflower enthusiasts throughout the year, with interest peaking over the spring months. The attractions of FRNP's flowers are the diversity of species, the restricted distribution of many and their unusual shapes and forms. Wildflower interest presently focuses on East and West Mt Barren, Mt Maxwell and Hamersley Drive.

The Twertup Field Study Centre (refer to Section 16.0) attracts the interests of naturalists throughout the year. It provides a focal point for vertebrate, invertebrate, floral and palaeontological studies. Courses are periodically offered by members of the Fitzgerald River National Park Association.

Over the winter and spring months, increasing numbers of people are visiting Point Ann and Four Mile Beach to watch whales.

PRESCRIPTIONS

Prescriptions for Nature Study are given under Section 16.0 Information, Interpretation and Education.

15.2 SIGHTSEEING

The objective is to foster an appreciation of the natural environment by vehicle-based sightseers.

Background

FRNP is visited by many people who enjoy the scenery, wildflowers and "naturalness" without leaving their car, or only leaving it briefly. Sightseeing is the most popular activity undertaken in the Park (68% of visitors; Cavana and Moore, 1988). The eastern and western loop roads provide attractive tourist routes, with Hamersley Drive, in particular, offering constantly changing views and spectacular wildflowers for much of the year. A number of people are satisfied driving the short distance from Hopetoun to East Mt Barren or West Beach and then returning to Hopetoun. They may only stop briefly, but the scenery and flowers viewed from the car are worth the trip.

PRESCRIPTIONS

1. **Provide several "pull-overs" and associated information on Hamersley and Pabelup Drives.**

2. **Provide safe, comfortable access for 2WD vehicles along Hamersley and Pabelup Drives (13.0 Access provides further details).**

3. **Assess potential "pull-overs", associated information requirements and possible interpretive footpaths along Old Ongerup Road, in consultation with the Shire of Ravensthorpe and interest groups. Implement findings of assessment, with guidance from CALM landscape architects.**

Further prescriptions are given under 16.0 Information, Interpretation and Education.

15.3 BUSHWALKING

The objectives are:

1. *Provide a variety of bushwalking opportunities in the Park, ranging from short scenic and interpretive paths into each major natural community in the Park to extended walks of several days duration, sometimes into remote areas.*
2. *Ensure that footpaths are developed in locations which are capable of sustaining them, where maintenance is feasible and where Park values will not be adversely affected.*

Background

The second most popular activity in the Park is walking (46% of visitors; Cavana and Moore, 1988). It is an activity which 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 developed in conjunction with other facilities, such as campgrounds or picnic sites, long distance walking tracks, or cross-country tracks.

The Park offers a wealth of bushwalking opportunities. Currently, walks range from a 15 minute walk at Twertup, through 1-2 hour walks up East and West Mt Barren, to a weeklong coastal walk from Bremer Bay to Hopetoun. The "coastal walk" is currently unmarked and in a number of places there is a bewildering number of paths converging and diverging. In some sections the path is nonexistent. 'It could be tremendous walk, ... however at the moment only experienced walkers can use it' (L. Sandiford, pers. comm., 1988).

Other opportunities are available for development. Short footpaths of less than one day duration could be provided on the sandplains and river valleys as well as the peaks. Short walks associated with recreation sites such as Point Ann and Quoin Head also provide additional walking opportunities. Overnight walks could be developed along the Hamersley and Fitzgerald Valley, the rabbit proof fence and inland tracks. Places such as the Eyre Range should be left for experienced walkers.

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 imp-acts such as the spread of dieback disease, the introduction of weeds, or the escape of fires from overnight campfires may also occur. Usually these problems can be minimised effectively through the sensitive location and design of paths, the careful selection of campsites and suitable education. Access for bushwalkers may need to be altered from time to time depending on the dieback situation.

Of similar concern is the potential safety problem associated with long distance walks through remote areas. In the event of a walker becoming lost or injured, search and rescue operations could lead to substantial environmental impacts. Such problems can be largely offset through visitor information programs designed to ensure walkers are adequately informed about, and equipped to handle, the conditions they will encounter.

Guidelines for footpath development

- paths should be placed low in the landscape, wherever possible, to minimise the risk of disease introduction or spread.
- paths should be circuits or loops rather than commencing and ending at widely divergent points.
- beginning of the paths should be relatively accessible to vehicles to facilitate visitor use and management and provide information on the associated path.
- paths should provide views; that is, paths should be placed in a position in the landscape where this can be achieved without jeopardising Park values, particularly by creating dieback risks.
- path alignments or routes should be located along or near the boundaries of different landforms, soil types or plant communities to provide maximum visual diversity.
- longer walks (routes) should enable the walker to experience the remoteness and solitude of the Park.

Strategy

Walks in the Park were selected to provide a range of opportunities. Such opportunities cover both ends and the centre of the Park, a combination of the valleys, coast, mountains and northern upland and include a range of walk lengths.

Three footpath "standards" are used in this plan: walk, track and route. A **walk** is the easiest and is relatively short and well formed. It is constructed to "shoe" standard and is suitable for people of all ages and fitness levels. A **track** is more difficult, requiring some skill or experience. However, it is generally well designed, marked and suitable for people of average fitness. It is designed to "boot" standard. A **route** is most difficult, being lightly marked to unmarked and requiring a high degree of experience. It is only suitable for well-equipped walkers.

The Strategy section in 13.0 Access outlines contingency measures in the case of possible or confirmed dieback infections associated with footpaths.

PRESCRIPTIONS

1. **Develop the paths detailed in Table 16. Development may range from the construction of a gravelled surface with gentle grades (a walk) to the provision of only a sign at the beginning of the path, pamphlets and/or route markers as required (a route).**

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

3. **Produce information for walkers on the dieback risks associated with the Park, how to protect Park values, and ensure their own safety.**

4. **Place signs at the beginning of paths regarding dieback, requesting walkers to scrape any earth off their boots into the waterproof rubbish bin provided before they start walking.**

5. **Close Mid Mt Barren, Woolbernup Hill and Thumb Peak to walkers because of the potential dieback risk and their botanical importance. Prescription 9 in 13.0 Access gives a more detailed explanation. Place signs at appropriate points to explain why.**

6. **Require walkers to carry their own cooking fuel and not to light wood fires. The fire risks are too great and wood is a scarce commodity in the Park. Require walkers to carry their rubbish out. Promote minimum impact bushwalking.**

7. **Produce individual brochures for most walks. Leave a number of routes unmarked for those who enjoy a high degree of challenge.**

8. **Develop some walks for interpretation.**

9. As unobtrusively as possible, and based on the best possible alignment, mark sections of the coastal route which are currently confusing.

10. On the longer walks, provide designated camping sites with no facilities at attractive places capable of supporting such use in the longer term. Several proposed backpack campsites are given in Section 14.0 Recreation Sites (Table 15, Map 10).

11. Retain the water tank at Twin Bays.

Research and Monitoring

12. Monitor the effects of bushwalking in remote areas.

TABLE 16. WALKS

PATH	DURATION	STANDARD
Less Than 1 Day		
1. Twertup Short Loop	1/2 hr	walk
2. Pt Ann - St Marys	1/2 hr	walk/track
3. West Beach Point	1-2 hrs	walk
4. Twertup Long Loop	1 1/2 hrs	walk
5. The Gorge	1 hr	track
6. Horrie & Dorrie (Twertup)	1 1/2 hrs,	track
7. Dogger's Swamp	1-2 hrs	track
8. West Mt Barren	2 hrs	track
9. East Mt Barren	2-3 hrs	track
10. Pt Ann Heritage Trail	1-2 hrs	track
11. W edge of Culham Inlet	1 1/2 hrs	track
12. No Tree Hill	1-2 hrs	track
13. Boondalup River	3-4 hrs	route
1 Day or Longer		
14. Roe's Rock Pool	1 day	track
15. McCulloch's Crossing	1-2 days	track/route
16. Parwoonup	1-2 days	track/route
17. Mt Drummond	1 day	track
18. Dempster Inlet	1-2 days	route
19. Quoin Hd - Marshes	1-2 days	route
20. Fitzgerald Inlet - Twin Bays	1-2 days	route
21. Eyre Range	2-3 days	route
22. Quoin Hd - Twin Bays	1-3 days	route
23. Fitzgerald Valley	2-3 days	route
24. Hopetoun - Bremer Bay	7-10 days	route

15.4 CAMPING

Objectives, background information and detailed prescriptions for camping are given under 14.0 Recreation Sites, and in Table 15 and Map 10.

15.5 RECREATIONAL FISHING

The objective is to allow vehicle access for recreational fishing to those sections of the coast, including beaches and cliffs, which are able to support use with minimal damage to the natural environment.

Background

The FRNP coastline has long been a destination for fishermen. For at least 100 years farmers and other local residents have been using the beaches and cliffs. Fishing is controlled by the Fisheries Act and Regulations. Limitations are placed on species caught, number taken, areas that fish can be taken from and type of fishing involved as well as seasons in which catches may be taken. CALM and the Fisheries Department work cooperatively.

Beach fishing is popular, with species caught including herring, shark, skipjack and tailor. During late summer and early autumn, salmon can be caught from Hamersley Beach. Rock fishing generally concentrates on groper, while inlet fishing generally produces black bream.

Vehicle access to fishing spots may have adverse impacts on the environment. If vehicles leave existing roads and tracks it encourages other vehicles to follow, leading to a profusion of tracks. This is becoming an increasing problem as more people buy 4WDs and explore the more remote parks of the south-west. Continuing 4WD use of sandy soils and steep rocky slopes leads to rapid gully erosion.

Camping in areas with no facilities, as is the case in more remote fishing spots, can create problems if firewood is not carried in and rubbish carried out. Past use has led to minimal impact in remote sites; however, all sites are becoming increasingly accessible as numbers of 4WDs, and people's interest in exploring remoter areas increases. Adverse impacts are already high at readily accessible sites (refer to 14.0 Recreation Sites).

PRESCRIPTIONS

1. **Continue to allow vehicle access for recreational fishing, to those points accessible by 2WD roads and public 4WD tracks (Map 10). Following addition of the inlets to the Park (refer**

to prescriptions in Section 3.3) continue to permit fishing in all waters of the Park, subject to the Fisheries Regulations. The only exception is the Dempster Inlet which should be closed to fishing and retained as a biological reference area.

2. **"Overnight resting" in vehicles will be permitted on beaches designated as 4WD accessible and at some 4WD sites in the Park (refer to 14.0 Recreation Sites). "Overnight resting" is defined as sleeping in, or next to, a vehicle provided neither tents nor any other external structure is erected.**

3. **Encourage fishermen using the Park to join fishing dubs. This helps people become aware of their responsibilities and increases the social and educational aspects of fishing. CALM will liaise closely with fishing clubs and provide information.**

4. **Allow for foot access along paths to remote fishing spots in the natural environment and wilderness zones (refer to 5.0 Management Zones).**

5. **Encourage the Fisheries Department to monitor and research fish stocks in inland waterways.**

15.6 BOATING

The objective is to provide for boat launching where the natural environment is stable enough to support such use in the longer term, and where such activities do not unduly impinge upon other recreational activities or the landscape.

Background

Use of boats in the Park is closely associated with fishing. Small boats less than 3 m long are generally used. They are occasionally launched at Point Ann and used for fishing in Point Charles Bay. Small boats are also occasionally launched at Hamersley Inlet.

Opportunities for boat use are limited in FRNP. Much of the coastline is exposed and there are few calm bays for launching or fishing from a boat. Although the inlets are protected, most are too shallow for boating. The Hamersley is an exception with several suitable launching sites.

PRESCRIPTIONS

1. **Allow car-top boats on all inlets and rivers of the Park, except the Dempster, which is part of the wilderness zone and has non-motorised access only.**

2. **Provide vehicle access to the water for launching small boats and off-beach parking for boats and trailers at The Peninsula (Gordon Inlet), Point Ann and Hamersley Inlet (old National Park site).**

3. **Support the Ravensthorpe Shire in providing for boat launching and associated parking requirements at the Hamersley Inlet Shire Reserve.**

Research and Monitoring

4. **Monitor boat launching sites. If tracks to the water, other than at the launching area, become obvious additional management actions are necessary.**

15.7 HORSE RIDING

The objective is to exclude horse riding from the Park except for search and rescue.

Background

There is no horse riding in the existing Park. Horse riding can adversely affect the natural environment. The major concerns in FRNP are the spread of weeds, erosion and damage to vegetation. Horses may also spread dieback. Because of the very high values of FRNP, risks should be minimised. Park roads are not open to horses and many alternative areas for horse riding exist in the region.

PRESCRIPTIONS

1. **Continue to exclude recreational horse riding from the FRNP.**

2. **Allow use of horses in search and rescue if:**
   a. **approval has been granted by the CALM District Manager;**
   b. **soil conditions are dry, minimising the risk of dieback introduction and spread;**
   c. **the horses' hooves have been thoroughly cleaned before entering the Park; and**
   d. **there is no other viable alternative by 4WD, air or boat access, on foot or some combination of these.**

15.8 GROUP AND CLUB-BASED ACTIVITIES

The objective is to accommodate use by groups and clubs to the extent that it is compatible with the Park's natural values and the aspirations of other users.

Background

The Park is used by naturalist, 4WD, bushwalking and fishing clubs, plus community groups. Use concentrates over the summer months, peaking over Christmas-New Year, January and March long week-ends and Easter.

A number of these groups are Perth-based. Some stay in caravan parks nearby, while others camp in the National Park. 4WD clubs drive to destinations in the Park, set up camp and remain in the one place for three to seven days (S. Wilke, W.A. Association of 4WD Clubs, pers. comm., 1988).

School groups generally come from Albany, and to a lesser extent from Perth, to walk the coastal route.

Party sizes of most groups are generally four to 10 vehicles. Groups of greater than four to five vehicles can lead to damage of camping and day use sites as excess vehicles are forced to drive over or into surrounding areas to remain with the group. Conflict with other users due to crowding and pressure on facilities, such as* toilets, is also a problem.

Proposed club and group campsites are marked on Map 10. The Marningerup area (on western edge of the Park) is a possible future site for group camping.

PRESCRIPTIONS

1. **Liaise with clubs and organisations to keep group sizes to approximately 20 people or fewer, in four or rive vehicles.**

2. **Make suitable campsites available for club and group use on a bookings basis (Map 10).**

3. **Review and consider limitations on bushwalking groups only if backpack campsites become degraded or the enjoyment of other walkers is being affected.**

4. **Provide publications for groups and organisations regarding the values of the Park, how group members can help protect these values, camp-sites available to groups and the benefits of booking ahead.**

15.9 COMMERCIAL OPERATORS

The objective is to allow use of parts of the FRNP by a limited number of commercial operators, while ensuring that the Park environment and other users are not adversely affected.

Background

A number of commercial operators visit the Park, principally over the spring months, with wildflower tours. The Park roads are generally not suitable for large vehicles.

The road and recreation site proposals in this plan will provide suitable facilities for small buses. However, the roads and facilities, such as toilets, will not meet the requirements of larger buses and associated larger numbers of people. Also, the numbers of people in larger buses may adversely affect the enjoyment of the Park by other users.

The Park is only rarely used by "wilderness-walking" tour operators. This is probably a result of its distance from Perth and lack of readily available water. The Park does, however, provide good opportunities for extended walks.

PRESCRIPTIONS

1. **Liaise with the Shires to ensure provision of facilities in nearby towns for tour members. This encourages visitors to spend money locally, and also means that large ablution blocks do not need to be provided in the Park.**

2. **Provide parking and turning space for buses of up to 45 seats at East Mt Barren lookout, approaching from the east. Provide for buses of up to 20 seats at Point Ann, Mylies Beach and West Mt Barren and at other destinations which may be approved from time to time.**

3. **Continue to ensure that tour operators contact rangers before entering the Park and have correct entry permits. Encourage tour operators to obtain interpretive information.**

4. **Should road standards be upgraded to a level accepted as safe for 45 seater buses during the period of this plan, the NPNCA may allow this commercial use to occur subject to appropriate conditions.**

PART E. MANAGEMENT FOR EDUCATION

GOAL: Foster a sense of stewardship for the Park by the community at all levels - local, State, national and international - emphasising its special conservation, landscape, recreation, cultural and historic values.

16.0 INFORMATION, INTERPRETATION AND EDUCATION

The objectives are:

1. *Develop and maintain a Park information program which interprets the Park's values, natural systems, and management concerns, particularly dieback, fire, flora, fauna and geology; and which addresses visitor needs and public safety.*
2. *Emphasise, in any information program, the Park's international biosphere reserve designation and, in particular, the values of the Park to the broader community and the community's role in the Park's future.*
3. *Encourage use of the Park for educational purposes.*
4. *Enrich the visitor's understanding and appreciation of the Park's natural and cultural values through on-site interpretation.*

Background

Nature study is one of the most popular activities in the Park (32% of visitors). The majority of visitors also noted that it was important to learn more about nature, particularly from information displays and publications (Cavana and Moore, 1988).

The Park is particularly rich in terms of interpretive features. Its geologic history ranges from the ancient Archaean Shield to the more recent Eocene spongolite and siltstone and even younger limestone shoreline. The Proterozoic Barrens and associated ranges add to this diversity. The wealth of plant species, a number found nowhere else, and the Park's rare birds and mammals are also features of interest. To this can be added a number of Aboriginal sites and features of European history dating back more than 100 years.

There is a significant level of involvement by community groups in public education and interpretation. The Fitzgerald River National Park Association and CALM have jointly established a number of walks and produced associated publications. The Association run courses from the Twertup Field Study Centre.

The Fitzgerald Biosphere Project Committee (FBP) is also interested in education and research in the broader context of the Park and adjacent lands. They are actively seeking funds to promote the biosphere concept and better land management practices, particularly on agricultural lands.

Field Study Centre

Twertup Field Study Centre is run on a volunteer basis by the Fitzgerald River National Park Association. It is located in the north-western part of the Park, in an old house on the edge of a disused spongolite quarry. The building was originally occupied by the quarry operator (Horace Worth) and was restored and established as a Study Centre in 1981. It is used on a bookings basis

through the Association. There is currently no tenancy agreement. The Association uses Twertup on a "permissive occupancy" basis.

The Study Centre has education, information and interpretation functions. Courses run by the Fitzgerald River National Park Association include botany, geology, ornithology, palaeontology, entomology, arachneology and photography. Information and interpretation resources include a library, herbarium, maps and other publications. Other features include its use as a venue for meetings (Fitzgerald River National Park Association, Agriculture Protection Board), art camps, University extension courses and school camps. It is also a base for survey and research in the western end of the Park, a starting and wayside point for bushwalkers, and a place for day visits and quiet family camping.

Strategy

Adopt an integrated approach to the provision of information, interpretation and education regarding FRNP. This will involve close liaison with community groups, Government departments (such as the Tourism Commission), and the tourism industry.

Interpretation and education programs should explore the ecosystem functions of the Park, the Park's role in the broader region, and individual values (scenery, rare plants and animals).

PRESCRIPTIONS

Prior to implementation of the following programs, Park facilities and services should be of a sufficient standard to support the anticipated and resultant increase in demand.

General

1. **Provide Park information, interpretation and education as part of a regional and local community approach. This will involve liaison with community groups, other Government departments and local government. The Fitzgerald River National Park Advisory Committee will provide a useful forum (see 20.0 Liaison).**

2. **Ensure that FRNP information, intepretation and education programs complement other CALM programs, particularly those in the CALM South Coast and Goldfields Regions.**

Information

3. **Update and maintain supplies of a basic Park brochure, including a detailed map. The brochure should contain a general description of the Park and Biosphere Reserve, and details of recreation sites.**

4. **Provide information bays at Park entrances with details of recreation sites, dieback and other management concerns and specific points of interest. They should be regularly monitored, maintained and updated by regional staff in accordance with CALM standards for interpretive facilities. The information symbol "i" should be erected I km either side of the Quiss Road turn-off indicating the CALM information bay.**

5. **Provide interpretive signs at key sites, based on particular themes relevant to the management objectives for that area. For example, East Mt Barren: dieback; Pt Ann: whales; Quoin Head: campsite degradation; Quiss Road: fire. Information should be regularly updated.**

6. **Warning signs (eg. coast risk) should be placed in potentially hazardous areas which receive moderate to high levels of use (eg. 2WD accessible beaches with known rips or some cliffs).**

7. a. **Once works have been completed on Pabelup and Hamersley Drives (see Section 13.0 Access) and at associated fa**cilities, place Main Roads Dept **approved signs to the Park on appropriate turn-offs from Highway 1.**
   b. **Sign-post all 2WD accessible points and give distances at turn-offs.**
   c. **Turn-offs to 4WD tracks (eg. Fitzgerald Inlet and Quoin Head) should not be sign-posted at turn-offs, rather small, distance signs should be placed several hundred metres down the track. This will help to keep use levels low, thereby minimising track and recreation site degradation.**

8. **Provide simply designed pamphlets emphasising a "code of the coast" to shops and service stations in Bremer Bay, Jerramungup, Ravensthorpe and Hopetoun. The pamphlets should include safety details, plus information on dieback and fire, the standard of various roads and tracks, and current Park management.**

Interpretation

9. **Produce publications which promote FRNP as an ecosystem and part of larger ecosystems, and on specific themes relevant to particular parts of the Park. Themes could include biosphere status, early exploration. and settlement, Aboriginal use, plants known only from FRNP, geology, whales, banksias, orchids, honeyeaters and waterbirds. These pamphlets could also include management information.**

10. **Provide interpretive information (publications, signs, displays) for a number of walks (Table 16). Use these walks to interpret distinctive features within the Park.**

11. **Establish seasonal interpretive activities and programs, including children's programs. Evening talks and activities could also be established. The emphasis could initially be in the Hopetoun area as it currently receives the majority of Park visitors. Hopetoun Caravan Park (only 4-5 km away from the Park) could be included as part of the regional approach in Park communication programs. Local expertise should be employed where possible.**

12. **Promote and maintain the vehicle-based Heritage Trail which follows Hamersley Drive. Provide pull-overs to encourage people to get out of their vehicles and enjoy the Park. Develop a similar publication and approach for Pabelup Drive.**

13. **Develop the interpretive potential of Old Ongerup Road, in association with the Shire of Ravensthorpe and interest groups. Development could include information bays, picnic areas, publications and short walks. Planning and implementation should be in consultation with CALM landscape architects.**

Education

14. **Continue to support and encourage educational activities by groups and individuals associated with FRNP.**

Field Study Centre

15. **Establish a lease agreement with Fitzgerald River National Park Association regarding Twertup Field Study Centre. Provide year-round 2WD access. Support the Association in their ongoing use of Twertup.**

16. **Co-operate with, and provide assistance to, the FRNPA in the provision of Park information, education and interpretation.**

PART F. RESEARCH AND MONITORING

GOALS:

1. Promote and undertake the scientific study and monitoring of those physical, biological and social values and natural processes special to the Park.

2. Measure and control impacts of management activities and human use on the Park environment.

17. 0 RESEARCH AND MONITORING

The objectives are:

1. Promote and undertake research on the flora, fauna, ecosystem processes, physical environment and archaeology of the Park, with special emphasis on endangered and endemic species, and on processes/activities that threaten *or enhance conservation values.*
2. Develop and implement a monitoring program to determine: a. the impacts of management and human use on the Park; and b. changes in the natural environment and other natural processes.

Background

The Park has particularly high potential for research, in terms of both research for Park management and as part of a world-wide network of biosphere reserves.

In physical terms, the Park has a diversity of landforms subject to a range of physical processes, particularly ongoing erosion by water and wind. Biologically, the area is large (328 026 ha), relatively undisturbed and contains a wealth of plant and animal species, a number of these rare. In social terms, the Park provides a good opportunity to evaluate the impacts of various levels and types of recreation use and management activities. Research in all areas is enhanced by the availability of good baseline data on the area's biological values (Chapman and Newbey, in prep.) and visitor use (Cavana and Moore, 1988).

Research is an integral part of the international biosphere reserve (IBR) concept (Section 4.0). In FRNP, which is regarded as the core of the Fitzgerald Biosphere Reserve, emphasis should be on non-manipulative research.

Topics researched to date include honey possums and pygmy possums, geology, honeyeater pollination, eucalypts, fire and floral/faunal succession, inlets, Aboriginal occupation, water levels and water quality in the Fitzgerald River, Ground Parrots, Western Bristlebirds, a comprehensive two-year biological survey and a visitor survey. A number of these projects are ongoing.

Other work currently underway includes surveys to establish the status of the chuditch in the Park, surveys and radio-tracking of Ground Parrots, and monitoring of regrowth following the 1989 fires. Proposed research includes determination of the effects and management of fox predation.

Monitoring is necessary to determine changes over time, particularly changes in response to disturbance. Causes of disturbance may be as varied as dieback introduction and spread, weed or pest invasion, fire, public use, and/or management activities.

Monitoring is also a fundamental component of IBRs, both in terms of "benchmark" areas which can be used to monitor broadscale changes in the environment, and buffer areas where more localised changes can be followed. About 60 fixed monitoring points have been established across the Park as part of the FRNP Association two-year biological survey. These, plus other baseline data already collected, provide a starting point for regular monitoring.

Monitoring water quality and flow is essential to the Fitzgerald Biosphere Project to determine the effectiveness of various catchment management programs. A Water Authority gauging station exists within the National Park on the Fitzgerald River, and samples have been taken regularly from the Fitzgerald and other major rivers.

Social monitoring, or determination of visitor satisfaction and impacts of visitors, is receiving increasing attention from park management agencies throughout Australia. There is also a need to monitor the impact of recreation on the natural environment so management action can be taken in time to prevent degradation.

The impact of management activities, such as buffer burning, pest control and re-planting needs to be monitored. This is the only way that the success, or otherwise, of management actions can be evaluated.

The level of research and monitoring undertaken will be influenced by the level of funding. The prescriptions in Table 17 represent a list of desirable activities recognised to date. It may be a number of years before all high priority research programs can be funded.

PRESCRIPTIONS

1. **Implement an integrated program of survey, research and monitoring based on the summary given in Table 17. Staff from the CALM Research Division, South Coast Region and FRNP, and the Fitzgerald Biosphere Project Committee should be involved in integrating the program, and should facilitate its implementation.**

2. **Assess potential locations, and acquire funds, for the establishment of a CALM research station to service the Park. Factors to be considered are: closeness to species/communities being studied, closeness to rangers for security and servicing, and establishment and maintenance expenses. Jacup is a potential site.**

3. **Continue to require all research workers to follow dieback hygiene procedures whether travelling by vehicle or on foot. Provide research workers with a publication explaining these procedures.**

4. **Continue to require all research workers to make their findings readily available, with copies of their findings being kept at the CALM South Coast Regional Office and made known to the Ranger-In-Charge.**

Research and Monitoring

5. **Encourage non-manipulative research in the Park. However, some manipulative research is required, such as determining the most effective ways of eradicating dieback and of establishing fire buffers, feral animal control and 4WD track stabilisation techniques.**

6. **Encourage and support other groups, agencies, institutions and individuals to carry out research and monitoring projects relevant to the conservation and management of the Park.**

TABLE 17. SUMMARY OF SURVEY, RESEARCH AND MONITORING PRESCRIPTIONS FOR THE FITZGERALD RIVER NATIONAL PARK (Implementation dependent on availability of funding)

SECTION No.	PRESC. No.	PRESCRIPTION
HIGH PRIORITY		
C7.2	6	Survey areas proposed for management activities for rare flora prior to the activity commencing.
C7.2	7	Carry out detailed surveys within the Park and adjacent areas to locate other populations of the priority rare flora. Give priority to the Barren Ranges and areas likely to be disturbed.
C7.2	8	Research the response to disturbance (such as dieback, fire, soil disturbance, weeds and grazing), reproductive biology and taxonomy of the priority rare flora.
C7.3	8	Investigate habitat requirements and ecology of rare fauna species by: a) conducting comprehensive surveys to determine broader distribution b) studying individuals of each species to determine which habitats, including vegetation structures, compositions and fire ages, are used c) studying life history characteristics of each species d) determining appropriate fire regimes for each species.
C7.3	9	Investigate the impacts of predation by introduced carnivores by baiting foxes in part of the Park for 3-4 years. Monitor small mammal and fox populations in both baited and unbaited parts of the Park to determine the effects of baiting. Identify prey species from fox stomach and gut analyses. Determine effective control mechanisms. Use the research findings to guide future management.
C7.3	10	Update existing data on the Park's invertebrates. Subject to resource availability, carry out invertebrate surveys, investigate the effects of fire and dieback on invertebrate communities.
C9.1	16	Continue developing techniques which will enable the rapid confirmation of the presence or otherwise of Phytophthora species in plant communities on the south coast.
C9.1	17	Accurately determine boundaries of, and regularly monitor, known dieback infections. Continue using aerial photography, landsat and thermal enhanced imagery for monitoring disease distribution.
C9.1	19	Continue to survey and sample roads, tracks (including management-only) and footpaths within the Park for signs of dieback disease.
C9.1	20	Quantify the impact of each Phytophthora sp. This information is necessary in order to assign and predict hazard ratings for all vegetation associations in the Park.

SECTION No.	PRESC. No.	PRESCRIPTION
C9.1	21	Investigate control and eradication procedures while ensuring that they do not place other areas or values at risk. Eradication or isolation of all the infections should be of the highest priority.
C9.1	22	Focus research effort on determining practical methods for preventing dieback introduction and spread and accurately identifying high hazard locations. Effort should also be directed towards developing effective ways of controlling soil and water movement, particularly in relation to roadworks and facilities development and maintenance. This work, although focusing on FRNP, should complement similar research across the CALM South Coast Region.
C9.2	20	Continue to investigate the practicality of using aerially ignited wind-driven buffers.
C9.2	21	Record and analyse details of all fires, including available fire behaviour information.
C9.2	22	Instigate a research and monitoring program to determine the level of environmental impact resulting from the prescribed fire regimes, fuel modification and wildfire suppression activities, and wildfires; and to examine the effectiveness of prescribed burning and wildfire suppression procedures.
C9.2	23	Continue to strongly support the need for a geographic information system for the recording and analysis of information on fire in the Park.
C9.6	7	Conduct a survey, prior to material extraction, to ensure that no conservation values, particularly rare plants or Aboriginal sites, will be disturbed.
D12.2	1	Monitor visitor numbers and patterns of use, using traffic counters, site surveys and questionnaires.
D13.0	23	Monitor annually the status of roads, tracks and footpaths. If erosion gullies become greater than 10cm deep or water ponds on a road or track for longer than 3-4 days after rain then management action is necessary. These values are based on dieback risk and soil degradation and erosion. They can be re-assessed and new values written if new information indicates the need.
D14.1	20	Record on a regular basis percentage canopy cover (from aerial photos), number of broken branches and depth of erosion gullies. If the canopy cover has decreased by more than 10%, number of broken branches has doubled or erosion gullies are deeper than 10 cm since the last survey, then management intervention is necessary. Change these criteria and standards if new information indicates the need. Keep a written record of any changes made.
F17.0	6	Encourage and support other groups, agencies, institutions and individuals to carry out research and monitoring projects relevant to the conservation and management of the Park.

SECTION No.	PRESC. No.	PRESCRIPTION
MEDIUM PRIORITY		
C6.2	5	Monitor beach access points, both footpaths and vehicle access points, and take remedial actions as required.
C6.3	8	Support continued monitoring of river flow and quality, with particular emphasis on the Fitzgerald River. Continue to provide access, for monitoring, to the gauging station on the Fitzgerald River in the northern part of the Park.
C7.1	6	Carry out research into management regimes (especially fire) required to maintain vegetation communities and fauna habitat.
C7.2	9	Encourage surveys of the distribution, and research into the taxonomy, of the 250 important species identified by Chapman and Newbey (in prep.).
C7.3	3	Identify and research keystone species to develop knowledge of community response to disturbances such as dieback, fire, recreation use and management actions, and knowledge of general community changes over time.
C8.1	5	Encourage the W.A. Museum and other professional archeologists to further study Aboriginal occupation and use of the Park.
C9.1	18	Develop a comprehensive description, including information on species affected, vegetation association, infection area, rate of spread, soil profile, topography and threat to ground and surface waters.
C9.3	7	Record the general extent and location of pest animals, control measures implemented and an evaluation of their success. Request the Agriculture Protection Board to do likewise.
C9.4	8	Monitor known priority flora populations for weed invasion. Take control measures as necessary.
C9.5	5	Monitor, evaluate and record the success of rehabilitation techniques used. Experiment with a range of rehabilitation techniques.
D12.2	2	Using surveys, monitor visitor perceptions regarding Park management.
D13.0	24	Monitor access points to 4WD beaches. If 4WD tracks other than the designated main access points are created, management action is necessary.
D14.1	19	Regularly photograph recreation sites from a fixed point and in a fixed direction. Use photographs to identify subtle changes over time (and between managers) at a particular site.
D14.2	9	Include a sign monitoring and maintenance program in the Parks annual works program.
D15.3	12	Monitor the effects of bushwalking in remote areas.
D15.6	4	Monitor boat launching sites. If tracks to the water other than at the boat launching area become obvious additional management actions are necessary.

SECTION No.	PRESC. No.	PRESCRIPTION
F17.0	5	Encourage non-manipulative research in the Park. However, some manipulative research is required, such as determining the most effective ways of eradicating dieback and of establishing fire buffers, feral animal control and 4WD track stabilisation techniques.
LOW PRIORITY		
C6.2	4	Use fixed points and aerial photography to monitor the movement of sand inland from unstable dunes, eg. Hamersley Inlet, Gordon Inlet.
C6.3	9	Encourage, in consultation with the Environmental Protection Authority, longer term research and monitoring of inlet dynamics, such as opening and closing of bars, water levels and rate of sediment accumulation. Use the Dempster Inlet as an undisturbed reference.
C8.1	4	Continue to investigate the traditional Aboriginal knowledge of the area.
C9.2	24	Continue to investigate the use of computer modelling to aid fire management.
C10.2	7	Monitor the effect of commercial fishing on access routes and points, and other Park users.
C10.2	8	Develop with the Fisheries Department and the Fitzgerald Biosphere Project, a monitoring program on the impacts of commercial fishing on fish stocks, the inlets and river systems.

PART G. IMPLEMENTATION OF THE PLAN

18.0 MANAGEMENT PRIORITIES

Strategy

The following list provides a general overview of priorities. Only the six highest priorities are listed. These are:

1. Determining practical procedures for dieback control to protect the Park's flora, particularly the priority rare and endemic species (7.2 Flora).

2. Realigning and/or treating where necessary roads, tracks (including managementonly) and footpaths designated in this plan, primarily to reduce dieback risks (13.0 Access).

3. Relocating where necessary and establishing boundary fire buffers (9.2 Fire).

4. Changing Pt Ann and Mylies from camping and day use to day use only and providing attractive alternatives; re-designing Quoin Head to separate day use and camping and to stabilise erosion. (14.0 Recreation Sites).

5. Providing up-to-date Park publications, displays and signs (16.0 Information, Interpretation and Education).

6. Conducting research into habitat requirements of rare species such as the Ground Parrot, Western Bristlebird and heath rat (7.3 Fauna).

19.0 STAFF

Background

The Park currently has a staff of three: a ranger-in-charge at Jacup, and two rangers, one at East Mt Barren and the other at Quaalup. Over the summer months, mobile rangers assist by servicing popular areas, particularly at the eastern end of the Park. There is a need for seasonal staff for the western end of the Park, in areas such as Pt Ann and The Peninsula.

Specialist staff from the CALM Albany regional and district offices and Perth also provide assistance, however the travel time involved reduces their effective operating time. If research, and particularly monitoring, and the proposed site works are to be undertaken, staff numbers and funding will need to be increased.

Housing

Facilities at Jacup include a house, workshop and storage shed and wash-down pad. Mains electricity and the dam water supply are adequate. Additional land for further housing or facilities is available.

Facilities at East Mt Barren include a house, workshop, storage shed and washdown pad. Mains electricity and rainwater supply are used. The existing water supply is inadequate and additional sources are required, primarily for firefighting and the washdown facility. These facilities could not be readily expanded without an adverse effect on the views from East Mt Barren.

The Quaalup residence is privately owned and a government-owned facility will be required when the current ranger retires. Its location should be based on the point of greatest access to the Park, on cost-effectiveness in terms of closeness of services (eg. mains electricity) and recreation sites requiring frequent servicing.

PRESCRIPTIONS

1. **Actively seek an increase in the number of staff in order to successfully implement this plan. Resources are required to:**
   - **develop proposed recreation sites and paths.**
   - **assist in implementing research and monitoring programs.**
   - **assist in general implemention of the management plan prescriptions.**
   - **assist in Park maintenance.**
2. **Locate the residence for the ranger servicing the south-western part of FRNP in or adjacent to the south-western part of the Park.**
3. **Assess the feasibility of re-locating the East Mt Barren ranger's residence to the east side of Culham Inlet.**

20.0 LIAISON

20.1 COMMUNITY LIAISON

Background

Several methods of communication between the local community and CALM exist. The first of these is the presence of three Park rangers as members of the local community. Each is involved to different degrees in local community groups such as the FRNP Association and the South Coast Recreation Association. The rangers, plus other CALM staff, also become involved in firefighting on lands adjacent to the Park. CALM regional and district staff based in Albany maintain regular contact with the Ravensthorpe and Jerramungup Shire Councils. The Fitzgerald River National Park Advisory Committee and community - CALM link also provide excellent fora for information exchange.

Ongoing liaison with local community groups and associations is essential, as is liaison with interests further afield.

Community Involvement in Implementation

There is tremendous potential for public involvement in the implementation of this plan. This involvement may range from monitoring, research and interpretation to laying brush and re-planting. The best mix would be a combination of paid and voluntary contributions.

PRESCRIPTIONS

1. **Revise the structure and membership of the existing Fitzgerald River National Park Advisory Committee, to create a Committee to provide advice to the CALM South Coast Regional Manager regarding implementation of this management plan and other management issues which arise. Any revisions to the structure and membership should be made in consultation with the existing Committee.**

2. **Hold regular meetings in the Fitzgerald area to discuss aspects of management of the Park with the local community and, relevant Government departments.**

3. **Ensure ongoing CALM involvement in the Fitzgerald Biosphere Project Committee.**

4. **Liaise with the Ravensthorpe and Jerramungup Shire Councils, State Emergency Services and local Counter Disaster Advisory Committees regarding emergency situations which could occur in the Park.**

20.2 GOVERNMENT AGENCY LIAISON

Liaison with the two Shires is essential for a number of reasons:

a. integrated fire management
b. integrated management of the two Shire reserves and the National Park
c. provision of a valuable recreation resource to the local community
d. potential benefits to the local community of educational and research uses of the Park.

The Tourism Commission and Great Southern Tourism Directorate should also be aware of the values and management issues associated with FRNP in their planning for tourism development in the south-east region. Ongoing liaison with the Bush Fires Board, local Bush Fire Control Officers and volunteer brigades regarding fire protection of areas adjacent to the Park is also essential. The Main Roads Department and Department of Agriculture are also key players in achieving good land management in the Fitzgerald area.

PRESCRIPTION

1. **Continue, and seek ways to improve, liaison established between CALM and other Government agencies and departments.**

21.0 FUNDING

Background

Management of FRNP is funded by CALM. External funding has also been provided to the FRNP Association for research and the Fitzgerald Biosphere Project Committee for educational and interpretive projects. This has included international funding from World Wide Fund for Wildlife, and Commonwealth funding from the Australian Heritage Commission. The biosphere reserve status of the Park represents a significant opportunity to attract funding.

PRESCRIPTIONS

1. **Actively seek sufficient funds during the first 2 to 3 years of this plan to ensure essential works are carried out, ie. to upgrade, realign or close the nominated roads and tracks, establish perimeter low fuel buffers and carry out the works necessary to manage, establish and rehabilitate recreation sites.**

2. **Seek funding from the Main Roads Department for proposed works on roads and tracks.**

3. **Actively seek funding both within and outside Government to implement this plan.**

4. **Support community groups in their efforts to seek funds for projects associated with the Park.**

22.0 EVALUATION AND REVIEW

The results from the research and monitoring programs detailed in this plan will be an integral part of the yearly and 10-year evaluation and review process outlined below. There is provision under Section 61 of the CALM Act for the plan to be amended, as required. If there are major changes to the plan, the revised plan will be released for public comment.

PRESCRIPTIONS

1. **CALM and Fitzgerald River National Park Advisory Committee should review plan implementation each year, prior to CALM preparing the works program for the Park for the following year. The highest priorities for this program are given in 18.0 Management Priorities. The review should identify which prescriptions have been implemented and to what degree, and any new information which may affect management.**

2. **The fire advisory group, representing the two local bush fire organisations, Shires, Bush Fires Board, Fitzgerald River National Park Association and CALM, should meet annually to review implementation of the fire master plan, and priorities and programs for the next year. The group should report to the Shires, National Park and Nature Conservation Authority, Bush Fires Board and CALM.**

3. **A major review by the fire advisory group of fire access requirements, particularly in the central Park, should be completed by July 1995. The review should include consideration of aerially ignited mosaic burning.**

4. **The National Parks and Nature Conservation Authority will monitor the implementation of the FRNP management plan as required under Section 22 (1)(e) of the Conservation and Land Management Act.**

5. **Review the plan in the final year of its 10-year term. This review should identify the extent to which the objectives have been achieved and prescriptions implemented, the reasons for lack of achievement or implementation, and a summary of information which may affect future management.**

BIBLIOGRAPHY

Anon. (1983). Looking at Biosphere Reserves - a 1983 perspective. *Nature and Resources 19(2):* 22-25

Batisse, M. (1982). The Biosphere Reserve: A Tool for Environmental Conservation and Management. *Environ. Conserv. 9*(2) : 101 -111

Beard, J.S. (1973). Vegetation of the Ravensthorpe Area. Veg. Map. Publ., Perth.

Beard, J.S. (1976). Vegetation of the Bremer Bay and Newdegate Areas. Veg. Map. Publ., Perth.

Beard, J.S. (1980). A New Phytogeographic Map of Western Australia. *WA.Herbarium Research Notes* 3 : 37-58.

Bell, D. (1985). Honeybees and native flora in Australia. IN: Department of Conservation and Land Management (1987) *Beekeeping and Land Management*. Proceedings of a Workshop. November 1985, Perth, Western Australia.

Bird, C. (1985). Prehistoric Lithic Resource Utilisation: A case study from south-west Western Australia. Unpublished Phd Thesis, University of Western Australia, Centre for Prehistory.

Bradby, K. (1989). A Park in Perspective - A Report on the Past, Present and Future of the Fitzgerald River National Park. A Report for the Fitzgerald River National Park Association.

Burbidge, A. A. and McKenzie, N. L. (1989). Patterns in the modem decline of Western Australia's vertebrate fauna: Causes and conservation implications. *Biol Cons. 50, 143-198.*

Cavana, M. and Moore, S. (1988). Fitzgerald River National Park. Visitor Survey. November 1987 -April 1988. Department of Conservation and Land Management.

Cavana, M. (1991). Fitzgerald River National Park. Analysis of Public Submissions. Department of Conservation and Land Management, Perth.

Chapman, A. (1985). *A Fire-fauna Study in Fitzgerald River National Park*. National Parks Authority of Western Australia. Unpublished Report.

Chapman, A. (1988). *A Preliminary List of Vertebrate Fauna from the Proposed Kybulup Reserve*. Unpublished Report.,

Chapman, A. and Newbey, K. (in prep). A Biological Survey of the Fitzgerald Area, Western Australia. Final Report - Part 1. A Project Funded by the Heritage Committee of Western Australia.

Conservation and Land Management Act (1984). No. 126 of 1984. Western Australian Government, Perth.

Council of Nature Conservation Ministers (1986). Identification and Management of Wilderness Areas in Australia. A Report by the CONCOM Working Group on Management of National Parks.

Craig, G., Burkin, B. and Van Steveninck, A. (1984). Ravensthorpe District Draft Coastal Management Plan. DCE Bulletin No. 152.

Davis, B. W. and Drake, G.A. (1983). *Australia's Biosphere Reserves: Conserving Ecological Diversity.* Aust. National Commission for UNESCO. Aust. Govt. Publ. Serv. 1983.

Department of Conservation and the Environment (1984a). Jerramungup Coastal District Draft Management Plan. Bulletin No. 167.

Department of Conservation and the Environment (1984b). Jerramungup Coastal District Recreation Survey. Bulletin No. 162.

Department of Conservation and Land Management (1989). *South Coast Region Dieback Protection Plan 1989-1993*. CALM.

Department of Conservation and Land Management (1989). *The South Coast Region Draft Managment Plan*. CALM.

Derrick-Sewell, W.R. and Dumbrell, J.W. (1987). *Wilderness Decision Making: A Comparative Study of Experiences in British Columbia, Australia and New Zealand.* Cornett Occasional Papers No. 5. Department of Geography, University of British Columbia. Victoria.

Dortch, C. (1984). *Devils Lair, A Study in Prehistory.* W.A. Museum, Western Australia.

Hallam, S.J. (1975). *Fire and Hearth - A Study of Aboriginal Usage and European Usurpation in South-western Australia.* Australian Aboriginal Studies No. 58, Australian Institute of Aboriginal Studies, Canberra.

Hallam, S.J. (1985). The History of Aboriginal Firing. IN: Ford, J. (ed). (1985) *Fire Ecology and Management in Western Australian Ecosystems.* Symposium Proceedings. WAIT Environmental Studies Group Report No. 14.

Hawes, M. and Heatley, D. (1985). Wilderness Assessment and Management. A Discussion Paper. The Wilderness Society, Hobart, Tasmania.

Henschke, C.J. (1982). Preliminary Groundwater Investigation in Relation to Soil Salinity at Fitzgerald, Western Australia. Technical Report 9. Division of Resource Management. Department of Agriculture, South Perth.

Hocking, R. (1988). The Bremer Basin. IN: Geological Survey of Western Australia. Memoir 3. Geol. Surv. West. Aust. Unpublished Report.

Hodgkin, E.P. and Clark, R. (1987). *Estuaries and Coastal Lagoons of South Western Australia -An Inventory. Number One. Wellstead Estuary - The Estuary of the Bremer River.* Environmental Protection Authority Estuarine Study Series No. 1.

Hodgkin, E.P. and Clark, R. (1990). *Estuaries and Coastal Lagoons of South Western Australia -An Inventory. Estuaries of Shire of Ravensthorpe and the Fitzgerald River National Park.* Environmental Protection Authority Estuarine Study Series No. 7.

Hopper, S.D. (1985). Impact of honeybees on Western Australia's nectarivorous fauna. IN: Department of Conservation and Land Management (1987). *Beekeeping and Land Management*. Proceedings of a Workshop, November, 1985, Perth, Western Australia.

Jenkins, C.F.H. (1980). *The National Parks of Western Australia*. National Parks Authority, Perth.

Kitchener, D.J., Chapman, A., Dell, J. & Muir, B. G. (1977). Biological Survey of the Western Australian Wheatbelt. Part 3. Vertebrate Fauna of Bendering and West Bendering Nature Reserves. *Rec. West. Aust. Mus.Suppl.* No. 5

Kitchener, D.J., Chapman, A., Dell, J. and Muir, B.G. ((1979). Biological Survey of the Western Australian Wheatbelt. Part 10. Buntine, Nugadong, and East Nugadong Nature Reserves and Nugadong Forest Reserve. *Rec. West. Aust. Mus. Suppl.* No. 9.

Kitchener, D.J., Chapman, A., Muir, B.G. and Palmer, M. (1980).The Conservation Value for Mammals of Reserves in the W.A. Wheatbelt. *Biol. Conserv.* 18(3): 179-207.

Kitchener, D.J., Dell, J., Muir, B.G. and Palmer, M. (1982). Birds in W.A. Wheatbelt Reserves - Implications for Conservation. *Biol. Conserv.* 22(2): 127-163.

Kitchener, D.J. (1982). Predictors of Vertebrate Species Richness in Nature Reserves in the W.A. Wheatbelt. *Aust. Wildl. Res.* 9: 1-7.

Madin, R.W. & Smith, T.F. (1987). *Declared Plant Control Handbook 1987.* Recommendations for the Control of Declared Plants in Western Australia, 1987 Edition. Agriculture Protection Board. Department of Agriculture, Western Australia.

McCaw, L., Maher, T. and Gillen, K. (1991). Wildfire in the Fitzgerald River National Park, Western Australia, December 1989. CALM Technical Report.

McFarland, D. (1988). The composition, microhabitat use and response to fire of the avifauna of subtropical heathlands in Cooloola National Park, Queensland. *Emu 88*: 249-257.

McNee, S. (1986). Surveys of the Western Whipbird and Western Bristlebird in Western Australia, 1985. RAOU Report No. 18.

Meagher, S.J. and Ride, W.D.L. (1979). Use of Natural Resources by the Aborigines of South western Australia. IN: Berndt, R.M. & Berndt, C.H. (eds) (1979*). Aborigines of the West - Their Past and Their Present.* UWA Press. p66-80.

Mees, G.F. (1977). The status of *Gambusia affinis* (Baird & Girard) in south-western Australia. Rec. West. Aust. Mus. 6(1): 27-32.

Meredith, C.W., Gilmore, A.M. and Isles, A.C. (1984). The ground parrot (*Pezoporus wallicus Kerr*) in south-eastern Australia: a fire-adapted species? Aust. J. Ecol. 9(4) : 367-380.

Moore, S.A. (1988a). Fitzgerald River National Park. Summary of Public Workshop Held on Thursday 10 March, 1988. CALM.

Moore, S.A. (1988b). Fitzgerald River National Park. Summary of Submissions to Leaflet. CALM.

Muir, B.G. (1980). Fitzgerald River National Park - A Summary of Existing Knowledge and Suggestions for Future Research. National Parks Authority, Perth, Western Australia.

Muir, B.G. (1985). The Dibbler (*Parantechinus apicalis*) found in Fitzgerald River National Park. *West. Aust. Nat.* 16(2/3): 48-5 1.

Mulcahy, M.J. and Bettenay, E. (1971). The Nature of Old Landscapes. *Search 2* (11-12): 433-434.

National Parks and Nature Conservation Authority (1990). Draft policy statement on Management of Designated Wilderness Areas.

Newbey, K.R. (1979). The Vegetation of Central South Coastal Western Australia. M.Phil. Thesis Murdoch University. Volumes 1 and 2.

Newbey, K.R. (1982). Land Use Planning of the North Fitzgerald Area. Initial Ecological Survey. Interim Report.

Newbey, K.R. (1985). Fire Ecology Study of the Marningerup Section, Fitzgerald River National Park, Western Australia. Park 1: Pre-bum Vegetation and Flora Survey. Report prepared for the Department of Conservation and Land Management Perth, 1985.

Newbey, K.R. (in press). Introduced plants of the Fitzgerald Area, Western Australia. Kingia.

Pianka, E.R. (1969). Sympatry of desert lizards (*Ctenotus*) in Western Australia. *Ecology 50*: 1012-30.

Preece, K. and Lesslie, R., (1987). A Survey of Wilderness Quality in Victoria. A Report to the Ministry for Planning and Environment Victoria and the Australian Heritage Commission.

Sandiford, L. (1988). *Rugged Mountains, Jewelled Sea. The South Coast Heritage Trail Network.* A Joint Project by the Western Australian Heritage Committee and the Department of Conservation and Land Management, 1988.

Scott, J. (1975). Fish. IN: A spring, 1975, biological survey of the proposed Mussel Pool complex and recommendations for its future development. Westem Australia Museum. Unpublished Report.

Sharley, H. (1985). Tourism Development Plan. Goldfields Region, December 1985. Western Australian Tourism Commission, 1985.

Sheppard, D. (1988). Parks are for People .... or Are They? *Australian Parks and Recreation. 24* (2):11-14.

Sokolov, V.E. and Vinogradov, B.V. (1986). Man and the Biosphere - a view from above. *Nature and Reserves. 22* (1-2).

Smith, F.G. (1977). *Fitzgerald River National Park. Outline Working Plan*. National Parks Authority, Perth, Western Australia.

Smith, G.T. (1977). The effect of environmental change on six rare birds. *Emu 77*: 173-179.

Smith, G.T. (1985). Fire Effects on Populations of the Noisy Scrub-bird (*Atrichornis clamosus*), Western Bristlebird (*Dasyornis longirostris*) and Western Whipbird (*Psophodes nigrogularis*). IN: Ford, J. (ed) (1985). *Fire Ecology and Management in Western Australia Ecosystems*. Symposium Proceedings. WAIT Environmental Studies Group Report No. 14.

Strahan, R. (ed). (1983). *The Australian Museum Complete Book of Australian Mammals*. Angus & Robertson. Sydney.

Thom, R. (1977). Explanatory Notes to Ravensthorpe Sheet, Western Australia. 1:250,000 Geological Series. Geol. Surv. West. Aust.

Thom, R. (1979). Clastic Dykes near the South Coast of Western Australia. Geol. Surv. West. Aust.

UNESCO/MAB (1986). Programme UNESCO on Man and the Biosphere Implementation of the Action Plan for Biosphere Reserves. Proceedings of European MAB Conference on Biosphere Reserves and Ecological Monitoring. 24-28 March, 1986.

Van Steveninck, A. and Burkin, B. (1984). Starvation Boat Harbour Coastal Management Plan. DCE Bulletin No. 15 1.

Watkins, D. (1985). Report of the RAOU Ground Parrot Survey in Western Australia. RAOU Report No. 15, August 1985.

Watson, J. R., (1991). The identification of river foreshore corridors for nature conservation in the South Coast Region of Western Australia. IN: D.A. Saunders and R.J. Hobbs (eds). *Nature Conservation 2: The Role of Corridors*. Surrey Beatty and Sons, pp 63-68.

Western Australian Forests Department (1980). Management Plan: Cocanarup Timber Reserve. Forests Department, Perth.