Shark Bay Terrestrial Reserves

Draft Management Plan

1998

Department of Conservation and Land Management

National Parks and Nature Conservation Authority

World Heritage

SHARK BAY TERRESTRIAL RESERVES

DRAFT MANAGEMENT PLAN

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

WHAT DO YOU THINK?

We want to know what you think of the proposals in this draft management plan. Have you thought about writing a submission?

WHY WRITE A SUBMISSION ?

It is an opportunity to provide information, express your opinion, suggest alternatives and have a say on how we are proposing to manage the Shark Bay Terrestrial Reserves over the next 10 years.

If you prefer not to write your own submission you could make a joint submission with others.

WHAT MAKES AN EFFECTIVE SUBMISSION?

To ensure your submissions is as effective as possible:

- make it concise and clear;
- list your points according to the subject sections (and page numbers) in the plan;
- describe briefly each subject or issue you wish to discuss;
- say whether you agree of disagree with any or all of the objectives or recommendations within each subject or just those of specific interest to you; clearly state your reasons (particularly if you disagree) and give sources of information where possible; and
- suggest alternatives to deal with any issue with which you may disagree.

It is important to indicate those strategies and recommendations you agree with as well as those with which you disagree.

Each submission is important in its own right but those that give reasons for concerns, give support where appropriate and offer information and constructive suggestions are most useful.

WHAT HAPPENS TO YOUR SUBMISSION?

All submissions will be summarised according to the topics discussed. The draft management plan will then be reviewed in the light of submissions, according to established criteria. An analysis of the submissions will be published, including an indication of whether the plan was or was not amended in response to the comments and justification for the decisions. All submissions are confidential. If you do not want your name appearing in the analysis of submissions please note this on your submission.

WHAT CRITERIA WILL BE USED IN ASSESSING YOUR SUBMISSION?

1. The draft management plan will be amended if a submission:
   (a) provides additional resource information of direct relevance to management;
   (b) provides additional information on affected user groups of direct relevance to management;
   (c) indicates a change in (or clarifies) Government legislation, management commitment or management policy;
   (d) proposes strategies that would better achieve management goals and objectives; or
   (e) indicates omissions, inaccuracies or a lack of clarity.

2. The draft management will not be amended if:
   (a) there is clear support for the draft proposals;
   (b) a neutral statement is offered or no change is sought;
   (c) the submission addressed issues beyond the scope of the plan;
   (d) the submission makes points which are already in the plan or were considered during plan preparation;
   (e) existing strategies and recommendations appear to be the most practical, where submissions are in conflict with others or where resources are limited;
   (f) the submission contributes opinions which are not feasible (generally due to conflict with existing legislation, or Government or departmental policy).

DEADLINE

Submissions are welcome for two months following the date of release of the plan. Please ring (08) 99215 955 for enquiries.

WHERE DO YOU SEND YOUR SUBMISSION?

Written submissions should be sent to:

Executive Director
Department of Conservation and Land Management
Locked Bag 104
BENTLEY DELIVERY CENTRE WA 6983
Attn: Plan Coordinator
Shark Bay Terrestrial Reserves Management Plan

SUMMARY

This summary highlights the key management strategies for Shark Bay's Terrestrial Reserves.

Emphasis will be given to integrating management of the Terrestrial Reserves with management of the whole World Heritage Property. High priorities for integrated studies include a detailed flora survey, a systematic assessment of scenic landscape values, a strategic plan for interpreting World Heritage values, and a strategy to prioritise requirements for research, monitoring and evaluation.

The World Heritage values of the Class C Terrestrial Reserves (Shell Beach Conservation Park, Zuytdorp Nature Reserve and several island nature reserves) warrant all of these reserves being upgraded to Class A.

Bernier and Dorre Islands Nature Reserve

Protection of threatened fauna and heritage values are the priorities for management.

This plan recommends that day use be allowed on both islands and that restrictions on overnight recreational use be enforced. Effective community consultation, involvement and education are essential to ensure responsible use and practical management of the Reserve.

Other Island Nature Reserves

All of the 30 or so small islands in Shark Bay have significant fauna conservation values. This plan recommends that all these small islands not vested as nature reserves (excluding Faure and Dirk Hartog Islands), together with the existing island nature reserves (15 islands), are reserved as a single nature reserve.

Information, interpretation and community liaison will be essential to ensure that visitors to and around the islands have minimal impact on wildlife, particularly threatened fauna and breeding seabirds. The potential impacts of visitor use on each island will be assessed to determine if access restrictions are necessary to protect fauna and habitats which are sensitive to disturbance.

Francois Peron National Park

Gypsum mining leases exist as enclaves in the Park over a type of gypsiferous dune formation which is not otherwise represented in the World Heritage Property. This plan recognises that the development of these mining leases would likely have a detrimental affect on the Park's recreation, scenic and conservation values. Management strategies are to encourage protection of the unique gypsiferous dunes, refer mining proposals to the EPA for assessment and amalgamate the lease areas into the Park when mining tenements expire.

Visitor numbers are predicted to increase significantly during the term of this plan, particularly at the Peron homestead precinct which will be serviced by a new 2WD road. The precinct will be developed with a range of new recreation and tourism opportunities, which will be carefully planned to present and interpret its pastoral history and promote understanding of World Heritage and semi-arid ecosystems.

Coastal destinations will be upgraded to rehabilitate and sustain use of popular camping and day use areas. Cape Peron is a priority area for redevelopment to enhance environmental protection, visitor safety and interpretation.

At Red Cliff, adjacent to Monkey Mia, site development and rehabilitation works are required to address the visual impacts of an old quarry and erosion problems on the adjacent coast. Basic raw materials from the quarry may be required for the development of public facilities at Monkey Mia. Subject to environmental assessment and approval, the sale of basic raw materials could assist in funding the rehabilitation of this area and the development of day use recreation facilities. Quarrying of this site could only occur with the approval of the NPNCA and Parliament following which the quarry would be excised from the Park and be placed in a Section 5(g) Reserve under the CALM Act vested with the NPNCA. At the conclusion of quarrying the reserve would be cancelled and the area returned to the Park.

Several new recreation areas have been identified in the Park, and opportunities exist for partnerships between CALM and the private sector to develop new recreation facilities and services. Greater demand for nature-based tours and commercial visitor services is anticipated, and management of such use will ensure that quality services are provided

with little impact on conservation and recreation values. Information, interpretation and education will be essential to protect the natural and cultural assets, and encourage appreciation of the Park's values.

The conservation program, Project Eden, commenced in the Park in 1993. The large-scale control of introduced predators and other feral animals on Peron Peninsula enabled the first threatened fauna reintroductions in September 1997. Project Eden has great potential for integrating conservation and tourism, whereby opportunities for nature based tourism will be developed to help fund ongoing conservation works and to give visitors an insight into this important conservation initiative.

As the Park's vegetation regenerates from decades of overgrazing, there is an increasing threat of wildfire. A system of burn buffers is being established to minimise this threat.

Shell Beach Conservation Park

Shell Beach is one of the most visited and unique tourist destinations in Shark Bay. This plan recognises the importance of minimising the visual impacts of adjacent land use to protect the Park's scenic landscape values.

Recreation facilities have been developed at the main visitor site to cope with future visitation and to restrict vehicle access on the beach. Uncontrolled vehicle access is however degrading other coastal areas of the Park. New day use recreation areas are proposed to control vehicle access and enhance recreation opportunities. Land management programs such as feral animal control will be implemented as part of Project Eden.

Zuytdorp Nature Reserve

Zuytdorp Nature Reserve and the area proposed as an extension to the Reserve are noted for unique vegetation, rare flora, and spectacular coastal landscapes. The area is remote and difficult to access and visitation is low. The Reserve will not be promoted for recreation, however day use and camping will be permitted along the coastal zone.

Main Roads WA are assessing the feasibility of a proposal for a coast road between Kalbarri and Shark Bay. The results of this study could have major, long-term implications for future use and management.

A concerted effort with neighbouring pastoralists is needed to control the environmental damage caused by goats. Continued research is required to identify and document the area's ecology and cultural heritage.

PREFACE

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

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

This area management plan is for the Terrestrial Reserves of the Shark Bay World Heritage Property.

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

- a statement of the policies or guidelines proposed to be followed; and
- a summary of operations proposed to be undertaken for a specified period not exceeding 10 years.

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

ACKNOWLEDGMENTS

This plan was prepared by the Shark Bay planning team comprising Sue Hancock (Plan Coordinator), Greg Leaman (Midwest Regional Manager), Ron Shepherd (Regional Program Leader Nature Conservation) and Paul Brown (Gascoyne District Manager). Technical assistance was provided by Aminya Ennis, Alanna Chant and Burke Stephens.

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

- members of the Terrestrial Reserves Advisory Committee comprising Mr Rodney Bellotti, Dr Jackie Courtenay, Mr Greg Leaman (Chairman), Mr Rick Purcell, Mr Graeme Rundle, Mr Ted Sears, Mr John Sellenger, Mr Roger Syme, Mrs Robyn Westlake and Mr Phil Wood; and
- staff of the Department's Gascoyne District, CALM**Science**, Nature Conservation Division, Recreation Planning and Design Section and Information Management Branch.

NOMENCLATURE

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

CONTENTS

INTRODUCTION

1.0 OVERVIEW

1.1 Brief Description

Shark Bay is located on the westernmost point of Australia, about 750 km north of Perth. The parks and reserves of Shark Bay are part of CALM's Gascoyne District. The total area of Shark Bay's CALM-managed terrestrial reserves is about 122,000 hectares.

The Shark Bay region has a diverse range of landforms and exceptional scenic qualities. The area is of major botanical and zoological importance, and contains many threatened species. Several of the Reserves have important associations with the area's cultural heritage.

Shark Bay supports a range of industries and the region's economy is largely based on tourism, fishing, aquaculture, salt production and pastoral activities. Many of the region's existing and potential industries are dependent on maintaining the area's unique biological and geological features. The industry with the greatest potential for economic development in Shark Bay is tourism, and the local economy is becoming increasingly dependant on tourism.

Tourists are attracted to the area's natural attributes and the largely undeveloped environment. In the past, visitors went to Shark Bay primarily for fishing and the human-dolphin interaction at Monkey Mia, but there is increasing demand and expectation for experiencing other natural features of the area. As visitor numbers are expected to increase significantly, it is essential that recreation and tourism are managed so that the attractions upon which tourism is based are not impaired. It is also important to ensure that other industries and activities do not have an adverse impact on the area's tourism attractions.

Planning in Shark Bay

A number of plans have been prepared, or are being prepared, which relate to the management of the terrestrial reserves. These include the:

- Shark Bay Regional Strategy (1997)
- Shark Bay World Heritage Area Strategic Plan
- Shark Bay Marine Reserves Management Plan (1996)
- Shark Bay World Heritage Property Management Paper for Fish Resources (1996)
- Gascoyne Region Road Development Strategy (1997)
- Gascoyne Regional Ecotourism Strategy (1996)
- Gascoyne Aquaculture Development Plan (1996)
- Monkey Mia Reserve Draft Management Plan (1993)

Proposed Additions to the Terrestrial Reserve System

Additions to the system of conservation reserves in Shark Bay were proposed in the Environmental Protection Authorities "Red Book" Recommendations in 1976, the Shark Bay Region Plan in 1998 and the Shark Bay Regional Strategy in 1997.

Additions proposed as extensions to existing reserves are considered in this plan. These comprise extensions to the Zuytdorp Nature Reserve and the small island Nature Reserves.

Proposed conservation estate requiring the creation of new reserves which are distinct from existing reserves is not considered in this plan. As such, this plan does not address the management of proposed national parks on Dirk Hartog Island and western Edel Land, the proposed timber reserve on South Peron and the proposed nature reserve on Petit Point. Management plans will be prepared for new reserves subsequent to their gazettal.

World Heritage Property

Shark Bay was inscribed on the World Heritage List in December 1991 on the basis of its "natural heritage" values. The four natural criteria at the time of listing were that the site contain:

1. outstanding examples representing the major stages of the earth's evolutionary history; or

2. outstanding examples representing significant ongoing geological processes, biological evolution and human interaction with the natural environment; or

3. superlative natural phenomena, formations or features (for example outstanding examples of the most important ecosystems, areas of exceptional natural beauty or exceptional combinations of natural and cultural elements); or

4. the most important and significant habitats where threatened species of animals and plants of outstanding universal value from the point of view of science and conservation still survive.

The Shark Bay World Heritage Property (see Map 1) covers approximately 2.2 million hectares of land and water. The existing terrestrial reserves comprise about

6% of the World Heritage Property, or 20% of the land within the World Heritage Property.

Each of the terrestrial reserves contains features which meet at least one of the World Heritage criteria. Some of the reserves' key World Heritage values are:

- the peninsulas and islands which provide refuge for migratory and threatened fauna, including 5 threatened mammal species on Bernier and Dorre Islands Nature Reserve, and breeding sites for seabirds;
- exceptional scenery including the Zuytdorp Cliffs, Shell Beach and the birridas, lagoons and coastal cliffs of Peron Peninsula; and
- the botanical transition zone between the eucalypt dominated Southwest Province and the acacia dominated Eremaean Province.

The Agreement between the State of Western Australia and the Commonwealth of Australia on Administrative Arrangements for the Shark Bay World Heritage Property signed on 12 September 1997 established a Shark Bay World Heritage Property Ministerial Council as well as a Community Consultative Committee and Scientific Advisory Committee to advise the Ministerial Council. The agreement also commits to the development of a strategic plan for the entire World Heritage Property, in order to provide an overall framework to ensure the protection, conservation and preservation of the Property's outstanding universal values.

Register of the National Estate

Most of Shark Bay, including all of the terrestrial reserves, is listed on the Australian Heritage Commission's Register of the National Estate, in recognition of the area's significance for nature and heritage conservation.

1.2 Public Participation

Public participation in the preparation of this management plan has been extensive. Much of the main direction for the future of the Reserves is based on the views expressed by the many people who have become involved during the preparation of this management plan.

Advisory Committee

An Advisory Committee was formed to provide advice on the preparation of this management plan. Three committee meetings were held in 1996 to assist in preparing the draft plan. Members of the Advisory Committee provided insight on a range of topics including tourism, recreation, natural history, cultural heritage, conservation, industry and community attitudes.

Meetings and Workshops

A number of meetings were held with interested groups and individuals, including the Shires of Shark Bay and Carnarvon and representatives of recreation, industry and conservation groups. A public workshop was held in Denham in May 1994 to discuss future management of Francois Peron National Park.

Pre-draft Submissions

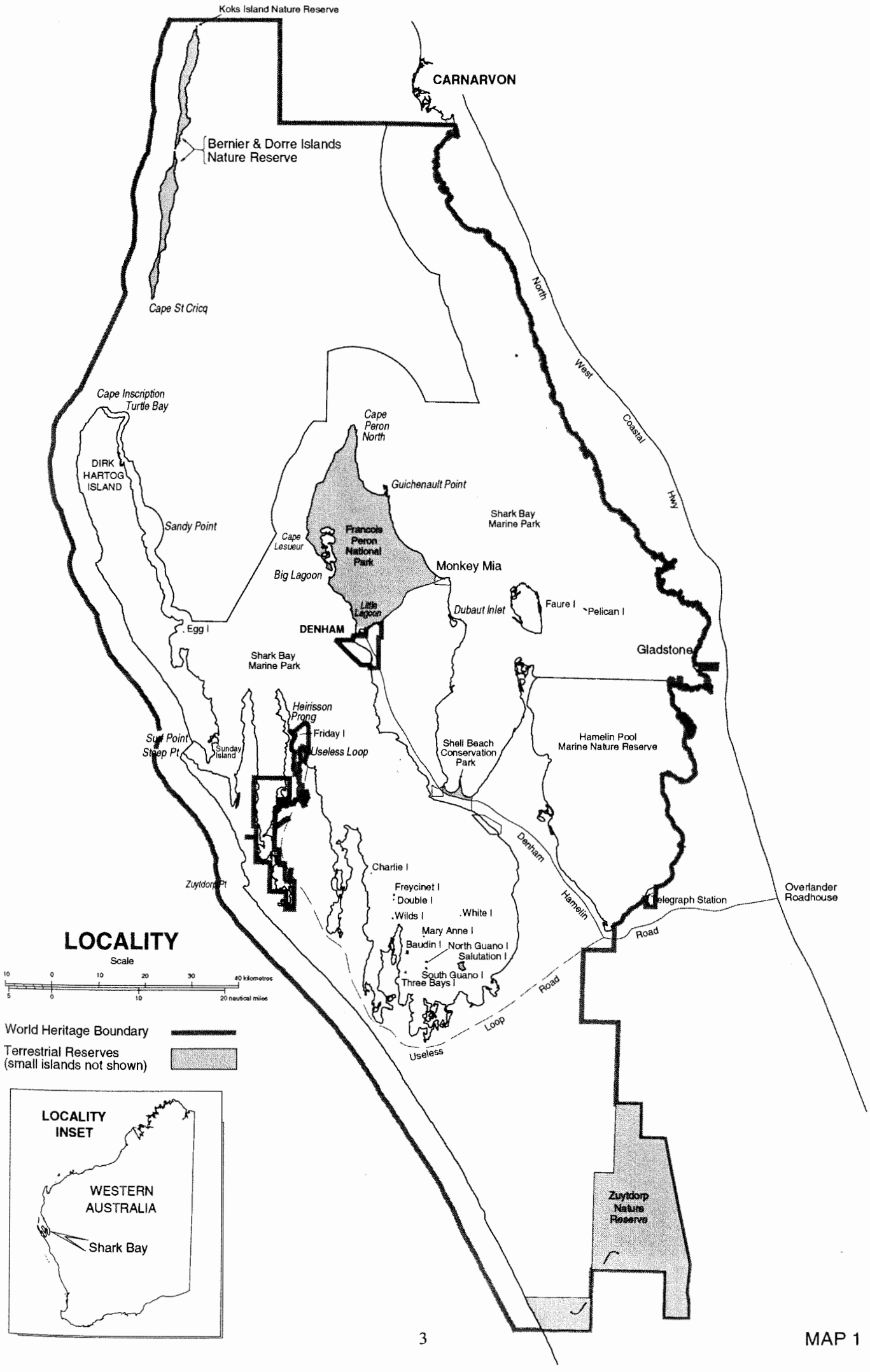
Interest groups were contacted and advertisements were placed in local and Statewide newspapers announcing the commencement of the management plan and inviting submissions and comments. Four submissions were received.

Surveys

The 1993 Shark Bay World Heritage Area User Survey provided much information about visitation patterns and the views of residents and visitors.

CALM conducted a survey of Carnarvon residents who visit Bernier and Dorre Islands Nature Reserve. The purpose of this survey was to gather information about how people use these islands and their awareness of the islands' conservation values.

"Comment Cards" were made available for visitors to Francois Peron National Park and Shell Beach Conservation Park, and traffic counters are used to determine visitor numbers in these Parks. Visitor observations and informal discussions are conducted opportunistically.


Koks Island Nature Reserve
CARNARVON
Bernier & Dorre Islands Nature Reserve
Cape St Cricq
North West Coastal Hwy
Cape Inscription
Turtle Bay
DIRK HARTOG ISLAND
Sandy Point
Egg I
Cape Peron North
Guichenault Point
Shark Bay Marine Park
Cape Lesueur
Francois Peron National Park
Big Lagoon
Monkey Mia
Little Lagoon
DENHAM
Dubaut Inlet
Faure I
Pelican I
Gladstone
Shark Bay Marine Park
Heirisson Prong
Friday I
Useless Loop
Surf Point
Steep Pt
Sunday Island
Shell Beach Conservation Park
Hamelin Pool Marine Nature Reserve
Denham Hamelin Road
Telegraph Station
Overlander Roadhouse
Zuytdorp Pt
Charlie I
Freycinet I
Double I
Wilds I
White I
Mary Anne I
Baudin I
North Guano I
Salutation I
South Guano I
Three Bays I
Useless Loop Road
Zuytdorp Nature Reserve
LOCALITY
Scale
10 0 10 20 30 40 kilometres
5 0 10 20 nautical miles
World Heritage Boundary
Terrestrial Reserves
(small islands not shown)
LOCALITY INSET
WESTERN AUSTRALIA
Shark Bay

MAP 1

2.0 MANAGEMENT GOALS AND OBJECTIVES

2.1 Primary Objectives

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

To conserve Western Australia's wildlife and manage lands and waters entrusted to the department for the benefit of present and future generations.

CALM's primary objective in managing national parks and conservation parks, as defined in Section 56 of the CALM Act (1984), is to:
fulfil so much of the demand for recreation by members of the public as is consistent with the proper maintenance and restoration of the natural environment, the protection of indigenous flora and fauna, and the preservation of any feature of archaeological, historic or scientific interest.

In the case of nature reserves, the primary objective is to:
maintain and restore the natural environment, and to protect, care for, and promote the study of indigenous flora and fauna, and to preserve any feature of archaeological, historic or scientific interest.

2.2 NPNCA and CALM Management Policies

This draft management plan is based on current NPNCA and CALM policies. These policies supplement legislation, principally the CALM Act (1984), and associated regulations. Policies are published and distributed throughout CALM as policy statements and are available to the public on request.

2.3 Management Goals

CALM's management goals and objectives for the Shark Bay Terrestrial Reserves are:

Conservation

Conserve biological, physical, cultural and landscape resources.

Recreation and Tourism

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

Community Relations

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

Commercial and Other Uses

Manage commercial and other uses in a manner that minimises impacts on the reserves' values.

Knowledge

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

LAND USE MANAGEMENT

3.0 LAND TENURE

The objectives are to:

- *ensure that the area's values are adequately protected by tenure; and*
- *seek to incorporate appropriate lands within the reserves.*

Tenure plans for each of the terrestrial reserves are shown in Maps 2 to 6. Proposed tenure changes are summarised in Table 1.

Shark Bay's Class A terrestrial reserves comprise Bernier, Dorre, Koks, Friday and Charlie Islands Nature Reserves and Francois Peron National Park. The remaining terrestrial reserves are Class C and comprise Shell Beach Conservation Park, Zuytdorp Nature Reserve and a nature reserve comprising 13 small islands. Shark Bay's Class C reserves contain values of World Heritage significance and should be upgraded to Class A.

3.1 Bernier, Dorre and Koks Islands Nature Reserves

Bernier, Dorre and Koks Islands are Class A nature reserves which lie approximately 50 km west of Carnarvon. Bernier and Dorre Islands have extremely high conservation significance due to the presence of five threatened mammal species.

Bernier and Dorre Islands were first leased for pastoral use in 1864 and subsequent grazing leases were granted in 1905, 1919, 1924 and 1939. In spite of these leases, grazing only occurred for 10 years on Bernier Island and reportedly not at all on Dorre Island.

In 1907 Dorre Island was declared a reserve for native game under the Game Act 1892 and Bernier Island was declared for the same purpose in 1919. The Game Act protected fauna from wanton destruction but not from habitat interference.

In 1957, Bernier and Dorre Islands were vested in the Fauna Protection Advisory Committee as Class A Nature Reserve No. 24869 for the "Conservation of Fauna". The purpose of this reserve was amended in 1980 to "Conservation of Flora and Fauna" and with the proclamation of the CALM Act in 1984, vesting was transferred to the NPNCA. This reserve is declared to low water mark.

In 1970 Bernier Island was declared a "limited access area" which allows for day use but not overnight use, and Dorre Island was gazetted a "prohibited area" which allows for access only when permission is given.

Section 17.0 Recreation recommends that day use be permitted on both islands.

Two lighthouse reserves are enclaves in the Nature Reserve. These reserves were originally declared in 1981, and in 1994 were enlarged subsequent to a survey of existing improvements on the site.

A proposal to extend the Shark Bay Marine Park to include waters adjacent to the islands is currently being considered.

Koks Island was reserved in 1976 as Class A Nature Reserve Number 33901 for the purpose of "Conservation of Flora and Fauna".

3.2 Other Island Nature Reserves

The 30 or so small islands of Shark Bay all have conservation values. Only 15 of these islands are nature reserves, whilst the remaining islands (with the exception of Faure Island which is leased for pastoral purposes) are Vacant Crown Land (VCL). Most of the unreserved islands are little more than rock outcrops that provide important seabird habitats and possess significant scenic qualities. Some of these islands may have heritage values and a few are used for recreation. The Shark Bay Regional Strategy recommends that all of Shark Bay's unvested islands be vested with the NPNCA as nature reserves.

The tenure of the island Nature Reserves is disjointed and the island names are often confused. For simplicity, all of the island Nature Reserves (other than Bernier and Dorre Islands Nature Reserve) should have common tenure and be declared as a single reserve known as the Shark Bay Islands Nature Reserve. Un-named islands should be officially named after consultation with the local community.

Two Class A nature reserves, Friday Island (No. 33829) and Charlie Island Reserve (No. 33828). were gazetted in 1976 and their purpose is "Conservation of Flora and Fauna".

Class C Nature Reserve No. 26004 was gazetted in

1961 and comprises 13 islands for the purpose of "Conservation of Fauna and Collection of Guano". This reserve's purpose is a legacy of the islands' past use and guano mining is not likely to occur again both for conservation and economic reasons. The purpose of Reserve 26004 should be amended to "Conservation of Flora and Fauna".

Under Section 62 of the CALM Act, lands and waters may be classified as "prohibited areas", "limited access areas" or any other classification to prescribe conditions of use for the protection of values. Several of the islands may warrant access restrictions to protect nesting habitats or other conservation values. An assessment of all islands should be conducted to determine appropriate classifications.

3.3 Francois Peron National Park

Francois Peron National Park is Class A Reserve No. 42471. It was gazetted on 8 January 1993 for the purpose of "National Park" and extends to high water mark. The Park was acquired through the State Government's purchase of Peron Station (PL No. 3114/761) in 1990.

The waters adjacent to the National Park form part of the Shark Bay Marine Park.

An area of VCL exists at Guichenault Point. The Point functions as part of the National Park and wildlife and recreation programs are proposed in this area. The VCL should therefore be reserved.

Two gypsum mining leases over VCL are enclaves in the Park. These leases were granted to Agnew Clough Ltd and Australian Mutual Provident Society in 1984 and are due to expire in 2005. As at December 1997, the leases have not been activated. Consistent with the Shark Bay Regional Strategy, a recommendation of this plan is to incorporate these mining lease enclaves into the Park when tenements expire.

A disused aircraft landing ground is the only tenure intrusion on the Park's southern boundary along the Monkey Mia Road. The airstrip was constructed in a birrida and the site has little development potential, other than for rehabilitation and possibly interpretation. This area should be incorporated into the Park.

A small reserve for a navigation beacon exists near Cape Peron (Reserve No. 37742).

3.4 Shell Beach Conservation Park

Shell Beach Conservation Park is Class C Reserve No. 42443. It was gazetted on 8 January 1993 and was acquired through the State Government's purchase of Peron Station.

The adjacent waters form part of the Shark Bay Marine Park.

The reserve's fauna and landscape values warrant upgrading the reserve from Class C to Class A.

3.5 Zuytdorp Nature Reserve

Zuytdorp Nature Reserve is Class C Reserve No 34771. The Nature Reserve was gazetted on 13 December 1991, from the amalgamation of two reserves previously known as the Cooloomia Nature Reserve (gazetted in 1979) and the unvested Zuytdorp National Park (gazetted in 1977).

The Reserve's values for flora, landscape and cultural heritage warrant upgrading from Class C to Class A.

Portions of Nanga and Tamala pastoral leases are proposed as nature reserve (Shark Bay Regional Strategy). This tenure proposal will contribute to greater representation in conservation reserves for two of Shark Bay's World Heritage values - the botanical transition zone and the spectacular Zuytdorp Cliffs. It is likely that the Zuytdorp Nature Reserve will be extended to include these areas.

Consideration has been given to extending the Zuytdorp Nature Reserve south to include the area of Murchison House Station north of the Emu proof fence. This would provide a practical management boundary for both conservation and pastoral purposes.

A proposal to extend the Shark Bay Marine Park to include the waters west of Edel Land (including the waters adjacent to the reserve) is currently being considered.

RECOMMENDATIONS

Bernier and Dorre and Koks Islands Nature Reserves

1. **Classify Dorre Island as a "limited access area" under Section 62 of the CALM Act, to allow for day use but no overnight recreational use. (H)**

Other Island Nature Reserves

2. **Reserve all island Nature Reserves and unreserved islands of Shark Bay as a**

single Class A Nature Reserve vested with the NPNCA for the purpose of "Conservation of Flora and Fauna". (This does not include Bernier and Dorre Islands and the Faure and Dirk Hartog Island pastoral leases). (H)

3. Consider introducing access restrictions on some islands, subject to assessing the islands' values and their sensitivity to visitor use and human impacts. (M)

4. Determine appropriate names for each island in consultation with the local community. (H)

Francois Peron National Park

5. Reserve the Vacant Crown Land on Guichenault Point by incorporating this area into the Park. (H)

6. Subject to the expiry of gypsum mining tenements M09/7 and M09/8, amalgamate these areas into the Park. (O)

7. Incorporate the disused Shire airstrip (Reserve 29432) into the Park. (H)

Shell Beach Conservation Park

8. Amend the Reserve's classification from Class C to Class A. (H)

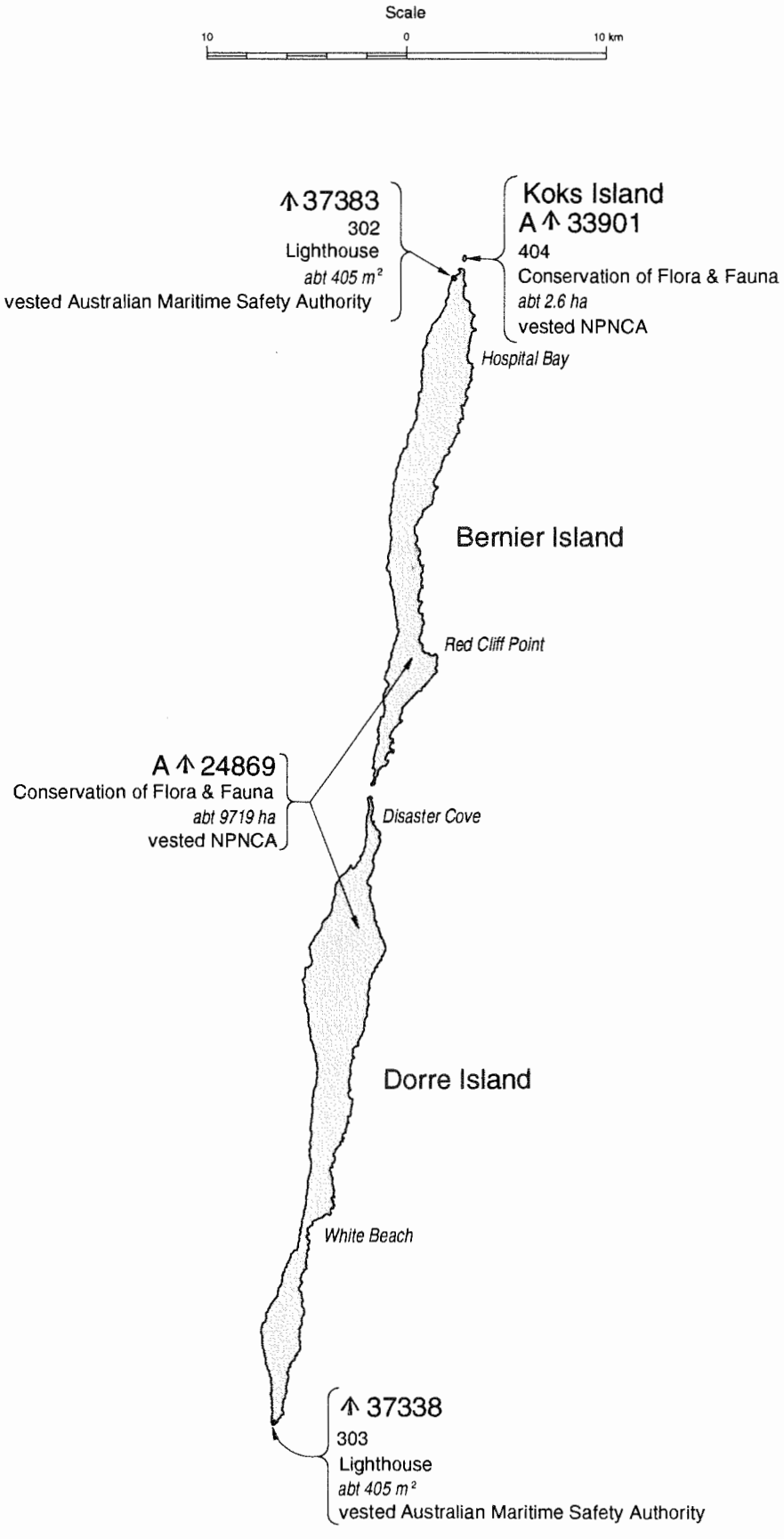
Zuytdorp Nature Reserve

9. Amend the Reserve's classification from Class C to Class A. (H)

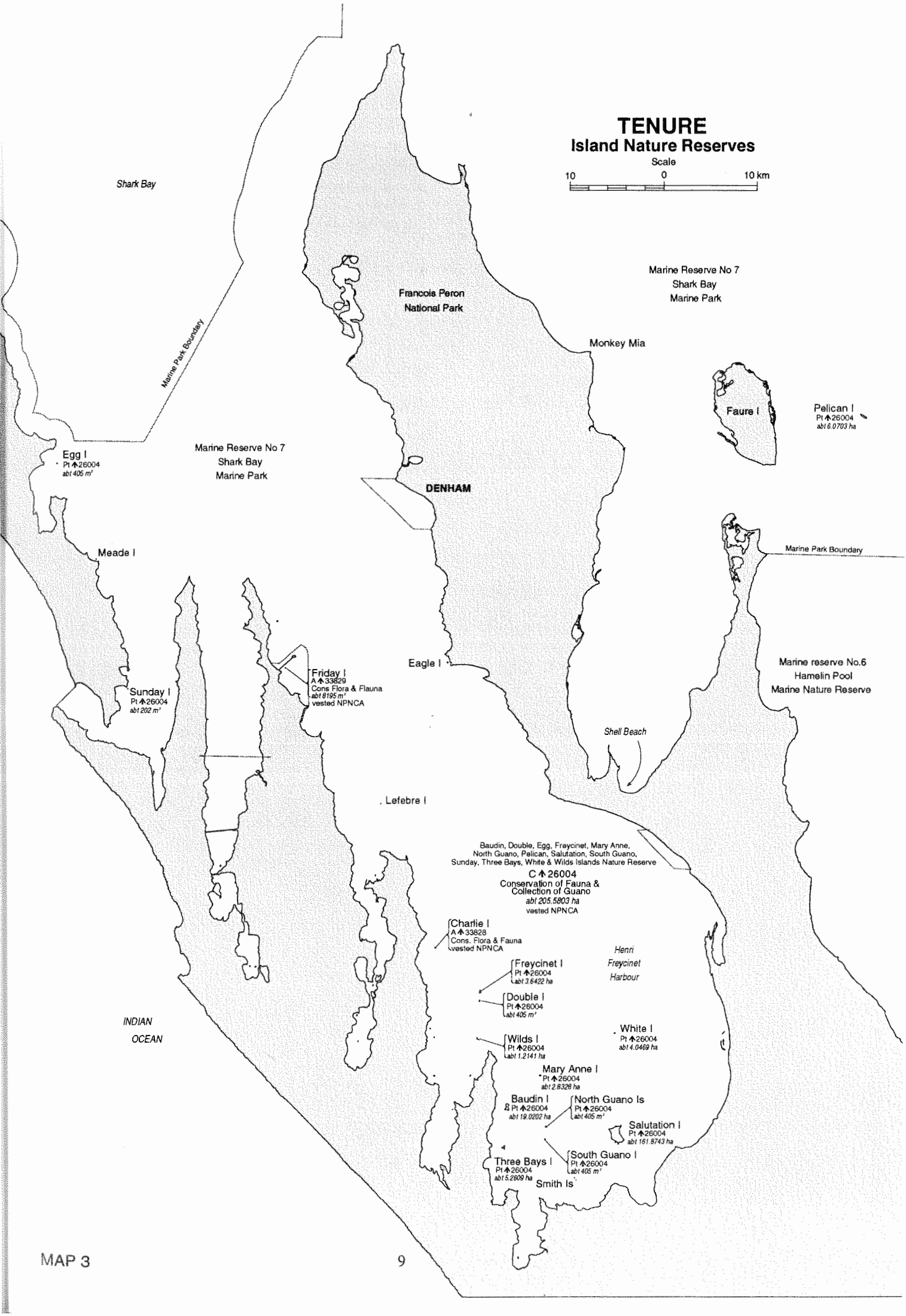
10. Continue negotiations to acquire land from Nanga and Tamala Stations for reservation as nature reserve. Reserve this area as part of Zuytdorp Nature Reserve. (H)

11. Liaise with the lessees of Murchison House Station regarding the possible southward extension of Zuytdorp Nature Reserve. (M)

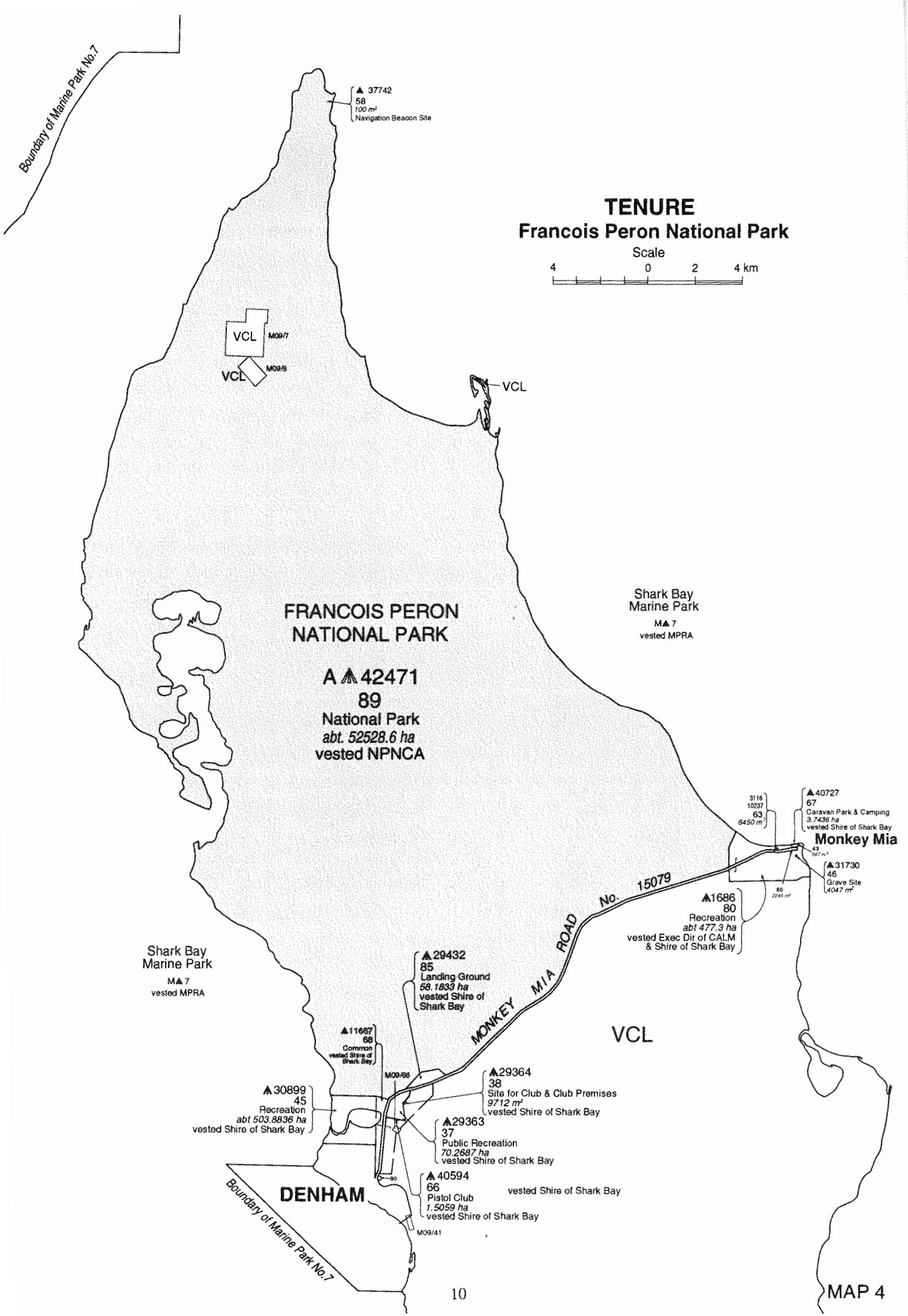
TENURE
Bernier, Dorre and Koks Islands Nature Reserves

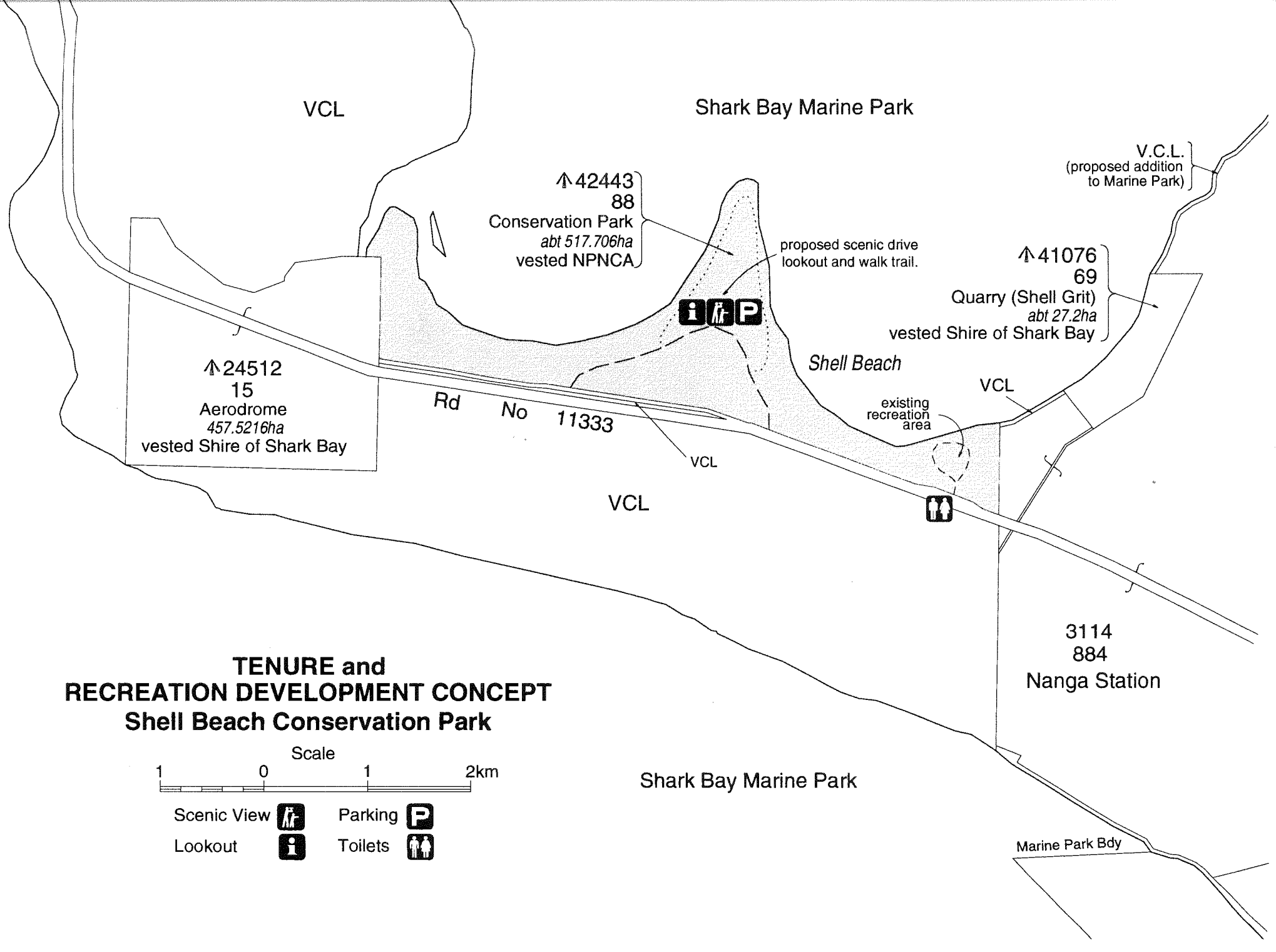


MAP 2

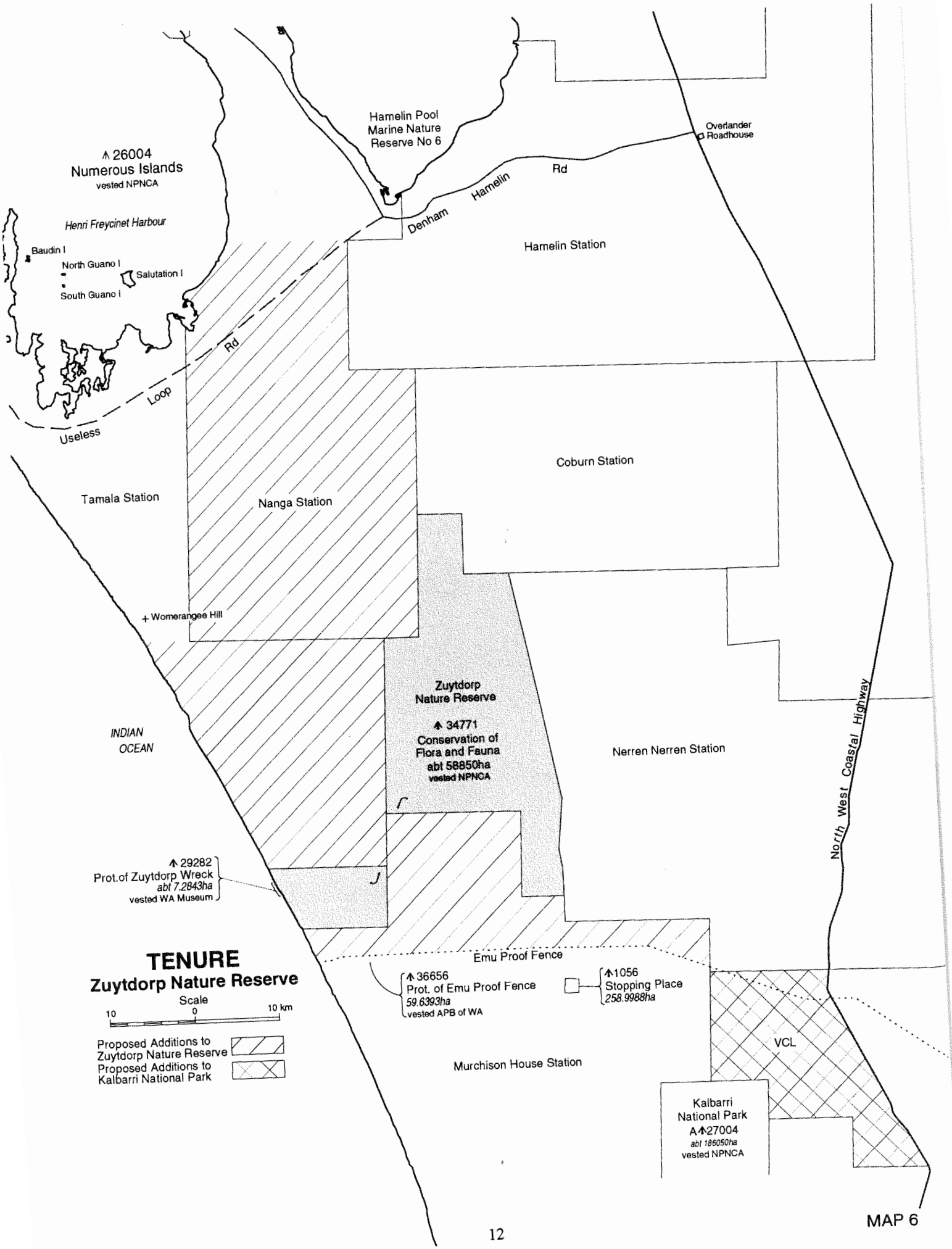

TENURE
Island Nature Reserves
Scale
10 0 10 km
Shark Bay
Marine Park Boundary
Francois Peron
National Park
Marine Reserve No 7
Shark Bay
Marine Park
Monkey Mia
Faure I
Pelican I
Pt A26004
abt 6.0703 ha
Egg I
Pt A26004
abt 405 m²
Marine Reserve No 7
Shark Bay
Marine Park
DENHAM
Meade I
Marine Park Boundary
Friday I
A A33829
Cons. Flora & Flauna
abt 8195 m²
vested NPNCA
Eagle I
Sunday I
Pt A26004
abt 202 m²
Marine reserve No.6
Hamelin Pool
Marine Nature Reserve
Shell Beach
Lefebre I
Baudin, Double, Egg, Freycinet, Mary Anne,
North Guano, Pelican, Salutation, South Guano,
Sunday, Three Bays, White & Wilds Islands Nature Reserve
C A 26004
Conservation of Fauna &
Collection of Guano
abt 205.5803 ha
vested NPNCA
Charlie I
A A33828
Cons. Flora & Fauna
vested NPNCA
Henri
Freycinet
Harbour
Freycinet I
Pt A26004
abt 3.6422 ha
Double I
Pt A26004
abt 405 m²
INDIAN
OCEAN
White I
Pt A26004
abt 4.0469 ha
Wilds I
Pt A26004
abt 1.2141 ha
Mary Anne I
Pt A26004
abt 2.8328 ha
Baudin I
Pt A26004
abt 19.0202 ha
North Guano Is
Pt A26004
abt 405 m²
Salutation I
Pt A26004
abt 161.8743 ha
South Guano I
Pt A26004
abt 405 m²
Three Bays I
Pt A26004
abt 5.2609 ha
Smith Is

MAP 3


TENURE
Francois Peron National Park
Scale
4 0 2 4 km
Boundary of Marine Park No.7
▲ 37742
58
100 m²
Navigation Beacon Site
VCL M09/7
VCL M09/8
VCL
FRANCOIS PERON NATIONAL PARK
A▲42471
89
National Park
abt. 52528.6 ha
vested NPNCA
Shark Bay Marine Park
M▲7
vested MPRA
▲40727
67
Caravan Park & Camping
3.7436 ha
vested Shire of Shark Bay
Monkey Mia
▲31730
46
Grave Site
4047 m²
▲1686
80
Recreation
abt 477.3 ha
vested Exec Dir of CALM & Shire of Shark Bay
MONKEY MIA ROAD No. 15079
Shark Bay Marine Park
M▲7
vested MPRA
▲29432
85
Landing Ground
58.1833 ha
vested Shire of Shark Bay
▲11667
68
Common
vested Shire of Shark Bay
M09/68
VCL
▲30899
45
Recreation
abt 503.8836 ha
vested Shire of Shark Bay
▲29364
38
Site for Club & Club Premises
9712 m²
vested Shire of Shark Bay
▲29363
37
Public Recreation
70.2687 ha
vested Shire of Shark Bay
▲40594
66
Pistol Club
1.5059 ha
vested Shire of Shark Bay
vested Shire of Shark Bay
DENHAM
M09/41
Boundary of Marine Park No.7
MAP 4


VCL
Shark Bay Marine Park
V.C.L.
(proposed addition
to Marine Park)
42443
88
Conservation Park
abt 517.706ha
vested NPNCA
proposed scenic drive
lookout and walk trail.
41076
69
Quarry (Shell Grit)
abt 27.2ha
vested Shire of Shark Bay
Shell Beach
24512
15
Aerodrome
457.5216ha
vested Shire of Shark Bay
Rd No 11333
VCL
existing
recreation
area
VCL
VCL
3114
884
Nanga Station
TENURE and
RECREATION DEVELOPMENT CONCEPT
Shell Beach Conservation Park
Scale
1 0 1 2km
Scenic View
Parking
Lookout
Toilets
Shark Bay Marine Park
Marine Park Bdy

MAP 5


Hamelin Pool
Marine Nature
Reserve No 6
Overlander
Roadhouse
26004
Numerous Islands
vested NPNCA
Hamelin Rd
Denham
Henri Freycinet Harbour
Baudin I
North Guano I
Salutation I
South Guano I
Hamelin Station
Rd
Loop
Useless
Coburn Station
Tamala Station
Nanga Station
Womerangee Hill
Zuytdorp
Nature Reserve
34771
Conservation of
Flora and Fauna
abt 58850ha
vested NPNCA
INDIAN
OCEAN
Nerren Nerren Station
North West Coastal Highway
29282
Prot.of Zuytdorp Wreck
abt 7.2843ha
vested WA Museum
TENURE
Zuytdorp Nature Reserve
Scale
10 0 10 km
Proposed Additions to
Zuytdorp Nature Reserve
Proposed Additions to
Kalbarri National Park
Emu Proof Fence
36656
Prot. of Emu Proof Fence
59.6393ha
vested APB of WA
1056
Stopping Place
258.9988ha
VCL
Murchison House Station
Kalbarri
National Park
A27004
abt 186050ha
vested NPNCA

MAP 6

Table 1.
LAND TENURE

Gazetted Name	Reserve Number	Area (Ha)	Purpose	Vesting	Class	Land Classification	Proposed Changes
Bernier and Dorre Islands Nature Reserve	24869	9719.8	Conservation of Flora and Fauna	NPNCA	A	Bernier Island: Limited Access Area Dorre Island: Prohibited Area	Gazette the Nature Reserve as a "limited access area" under Section 62 of the CALM Act.
Koks Island Nature Reserve	33901	2.6	Conservation of Flora and Fauna	NPNCA	A		Amalgamate all existing and proposed island Nature Reserves (excluding Bernier and Dorre Islands Nature Reserve) to create a single Class "A" Nature Reserve known as the Shark Bay Islands Nature Reserve for the purpose of "Conservation of Flora and Fauna" vested in the NPNCA. Land classifications to be determined.
Friday Island Nature Reserve	33829	0.8	Conservation of Flora and Fauna	NPNCA	A		As Above
Charlie Island Nature Reserve	33828	Indeterminate	Conservation of Flora and Fauna	NPNCA	A		As Above
Freycinet, Double, Sunday, Pelican, White, Salutation, Baudin, Egg, Three Bays, Wild, Mary Anne, North and South Guano Islands Nature Reserve	26004	205.6	Conservation of Fauna and Collection of Guano	NPNCA	C		As above
Francois Peron National Park	42471	52 528.6	National Park	NPNCA	A		Incorporate VCL at Guichenault Point and the disused Shire air strip (Reserve 29432). Area of gypsum mining tenements to be incorporated upon expiry or withdrawal.
Shell Beach Conservation Park	42443	517.8	Conservation Park	NPNCA	C		Upgrade from Class "C" to "A".
Zuytdorp Nature Reserve	34771	58 850.0	Conservation of Flora and Fauna	NPNCA	C		Upgrade from Class "C" to "A". Incorporate areas of Nanga and Tamala pastoral leases. Continue negotiations to incorporate a portion of Murchison House pastoral lease.

4.0 ADJACENT LAND USE

The objective is to encourage complementary management between the reserves and adjacent lands and waters.

Bernier and Dorre Islands Nature Reserve

The Shark Bay Regional Strategy and the Shark Bay Marine Reserves Management Plan recommend that waters adjacent to these islands become part of the Shark Bay Marine Park. This will enhance management of the area's marine and terrestrial values.

Other Island Nature Reserves

Increasing use for coastal recreation on the pastoral stations around Freycinet Harbour is attracting increasing visitation to and around the island Nature Reserves. Liaison with station managers is essential to encourage responsible visitor use on and around the islands.

Francois Peron National Park

The future tenure and development of VCL south of the Monkey Mia Road may affect Park values and management, particularly the scenic qualities of the Park's south boundary. One such value is the relatively undeveloped scenic drive from Denham to Monkey Mia. Development along this road should be sited in nodes which focus around Denham or Monkey Mia, leaving the tourist drive in as natural a condition as possible.

Shell Beach Conservation Park

A Shire quarry for shell grit operates less than 1km east of the Shell Beach viewing area. Visitor comments indicate that many people believe it is inappropriate for large scale shell extraction to occur adjacent to one of the World Heritage Property's main attractions.

Numerous vehicle tracks enter the Park from the Denham-Hamelin Road Reserve. These tracks should eventually be closed when new recreation facilities are developed in this area. Liaison with managers of adjacent land is essential to manage vehicle access and protect the Park's coastal landforms.

Zuytdorp Nature Reserve

The waters surrounding the Zuytdorp wreck have a 500m radius protection zone, gazetted under the Commonwealth Historic Shipwrecks Act 1976. On the coast adjacent to the wreck site is a 7 hectare "A" Class reserve (No. 29282) vested with the WA Maritime Museum (WAMM) for the Protection of the Zuytdorp Wreck. Consideration has been given to incorporating Reserve 29282 into Zuytdorp Nature Reserve, but at this stage the WAMM wish to maintain control of this reserve.

Liaison with pastoral station managers in the vicinity of the Reserve is essential to manage visitor access consistently and control goats effectively.

RECOMMENDATIONS

1. Liaise with the Shires, managers and users of adjacent lands and waters, to establish cooperation for the protection of the terrestrial reserves and adjacent land use values. (O)

Francois Peron National Park

2. Liaise with the Shire and other agencies involved in the future tenure and management of VCL along the Monkey Mia Road, to encourage land use which does not detract from the values of the Park. (O)

Shell Beach Conservation Park

3. Liaise with the Shire and other relevant agencies to minimise the impacts of shell quarrying operations on the scenic values of Shell Beach. (O)

4. Liaise with managers of adjacent land to manage vehicle access into the Park. (H)

Zuytdorp Nature Reserve

5. Liaise with the WA Maritime Museum regarding management of the area and the possible inclusion of Reserve 29282 into the Zuytdorp Nature Reserve. (O)

MANAGEMENT FOR CONSERVATION

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

5.0 CLIMATE

The objective is to consider the effects of climate in management of the terrestrial reserves.

Shark Bay has a semi-arid to arid climate, characterised by hot dry summers and mild winters. Average summer temperatures range from 20 to 35 degrees, and average winter temperatures range from 10 to 20 degrees. The average annual rainfall is low, ranging from 200 mm in the east to 400 mm in the west of Shark Bay. Most rain falls between May and July. The annual evaporation rate ranges from 3,000 mm in the east to 2,000 mm in the west. The Shark Bay environment is extremely saline.

The area is influenced by the south-east trade winds which generate southerly winds for most of the year. During summer, southerlies commonly blow consistently for several days at over 25 km/hr. There are periodic summer/autumn cyclones which generate winds with gusts up to 180 km/hr.

RECOMMENDATION

1. **Ensure that facilities and management activities are planned to accommodate the area's climate, including the threat of cyclones and associated tidal surges, the effects of high salinity and requirements for shade. (O)**

6.0 GEOLOGY, GEOMORPHOLOGY AND HYDROLOGY

The objectives are to:
- *Protect and conserve geological features, landforms and soils; and*
- *Protect and conserve surface and ground water resources.*

The unusual landforms of the reserves which are listed as being of World Heritage value include the Zuytdorp Cliffs, Shell Beach and the birridas, lagoons and coastal cliffs of Peron Peninsula. Many of the coastal landforms are fragile and can be degraded by vehicle access, pedestrian use and grazing by feral animals.

Geology

Shark Bay lies within the Carnarvon Basin, a geological depression in which over 6,000 metres of marine sedimentary rocks have been deposited since the early Silurian [434 ±16 million years before present (BP)], (Hocking, 1990). There is evidence to suggest that the inlets and peninsulas result from a series of gentle synclines.

The superficial geology of Shark Bay is dominated by Quaternary (2 million years BP) dunal and marine sedimentary units. Two major phases of dune building which occurred during the Pleistocene (2 - 0.01 million years BP) have been identified in Shark Bay. The first phase was dominated by terrestrial dune development which led to the formation of the Peron Sandstone - a red quartz sandstone exposed on the Peron Peninsula. The second, a major phase of coastal dune formation, resulted in the development of the Tamala Limestone - a pale, off white calcarenite (cemented calcareous dune sand). The steep Zuytdorp Cliffs are formed from this limestone.

Geomorphology

Four distinct geomorphological provinces have been recognised within the Shark Bay World Heritage Property - the Edel, Peron, Yaringa and Gascoyne/Wooramel Provinces (Logan et al 1970).

The Edel Province which comprises Bernier and Dorre Islands, Dirk Hartog Island and Edel Land is a landscape of modern calcareous dunes deposited over the Tamala Limestone. These dunes were formed over the last 10 000 years as a result of marine transgression. Numerous gypsiferous pans or evaporite deposits (birridas) are present within this landscape as elliptical or circular depressions.

The Peron Province comprises the Peron and Nanga Peninsulas and Faure Island. This landscape is characterised by the presence of relict terrestrial dunes and Peron Sandstone preserved as calcrete cores (pinnacles). These are generally overlain by a series of recent, broad, undulating, red sand dunes produced through the reworking of material derived from the Peron Sandstone (Nilemah Dunes). Interdunal depressions are commonly occupied by birridas or, when adjacent to the coast, marine lagoons. The western margin of the Peron Province is characterised by the presence of the Tamala Limestone which overlies the Peron Sandstone. Coquina (cemented or lithified shell beds) deposits occur as beach ridges and benches on the shores of Lharidon Bight and Hamelin

Pool.

The Yaringa Province comprises the eastern shores and hinterland of Hamelin Pool, and the Gascoyne-Wooramel Province forms the coastal strip along the eastern margin of the Shark Bay World Heritage Property. These two provinces do not occur in the terrestrial reserves.

Hydrology

The Carnarvon Basin is generally lacking in permanent surface water due to low annual rainfall, high evaporation and permeable soils. Apart from intermittent flow of the Wooramel River, there are few surface water features in Shark Bay.

The salinity of shallow groundwater generally exceeds (6000mg/l), though thin localised layers of less saline water occur in the Peron Sandstone and Tamala Limestone. Bores are used throughout the area to draw hot artesian water from the Birdrong Sandstone at depths of 100-500metres. The salinity range of bores in the area ranges from 300mg/l to 600mg/l.

6.1 Bernier and Dorre Islands Nature Reserve

Bernier and Dorre Islands separated from the mainland about 8000 years ago when the sea level rose to about 20 metres below its present height. The water depth in the gap between Bernier and Dorre Islands is about 4 metres, so it is assumed that the islands separated from each other between 3 000 and 6 000 years ago.

The islands are plateaus of sand plains and dunes surrounded by cliffs. Along the west coast, large eroded slabs of rock have broken away from the cliff and settled on an almost continuous intertidal reef platform. On the east coast are narrow, isolated beaches of sand or rubble. The maximum elevation on the islands is 50 metres at Quoin Bluff on Dorre Island.

Bernier and Dorre Islands can be broadly divided into 4 major landforms - travertine rock, sand plain, consolidated dunes and unconsolidated dunes.

Sandplain is the dominant landform on both islands and is characterised by low relief and reddish sand soils. Consolidated dunes have formed parallel to the strong prevailing southerly winds and extend along much of the west plateau where dune swales bear the tallest vegetation on the islands.

Travertine rock is a crust of limestone which caps the dunes and has been exposed by wind along the western cliffs and on isolated headlands on the east coast. The travertine landform has little surface soil but sand filled solution pipes are a refuge for plants and animals.

Unconsolidated dunes comprise about 3% of Dorre Island, with active wind erosion gullies near Disaster Cove. Blowouts comprise about 15% of Bernier Island and appear to have resulted from the lack of travertine crust, together with past concentrated grazing by goats. South of Red Cliff Point, the island is repeatedly dissected by bare sand. The only extensive blowout in the north of the island is near Hospital Valley.

6.2 Other Island Nature Reserves

Islands west of Peron Peninsula are geological extensions of the mainland and were formed as a result of the Holocene marine transgression which drowned much of the paleo-coast of Shark Bay. They are composed of Tamala Limestone with very little loose surface soil. Guano, produced by large colonies of birds, was mined from many islands in the late 1800's. Since the cessation of mining these deposits are again accumulating.

Pelican Island, east of Peron Peninsula, is composed of Peron Sandstone overlain by Holocene beach ridges and coastal dunes of coquina and lightly cemented skeletal carbonate sand.

6.3 Francois Peron National Park

The dominant landforms are sandplains and dune deposits which overlay the Peron Sandstone. Sandplains in the west of the Park are undulating with slopes of less that 4 %. The surface geology is generally loose and highly porous, though clay-sand occurs below the surface in localised areas. Sandplains to the east are broader and flatter.

Birridas commonly occur in the interdunal depressions. Most birridas are round or elliptical and have a central raised platform of gypsum-rich material, surrounded by a moat-like edge which is usually dry but thick and boggy. The birrida surface is often covered by loose, powdery gypsum, which when removed by wind can accumulate as gypsiferous dunes.

The gypsiferous dunes of the dry Lake Montbazin are not represented elsewhere in the Shark Bay World Heritage Property. These dunes are coincidental with two gypsum mining leases which have not as yet been activated but are current until 2005.

Much of the Park's coastline comprises cliffs of Peron Sandstone, a relatively soft, poorly cemented, red quartz arenite. Modern soft beaches and coastal sand-dunes are present around headlands. Outcrops of Dampier Limestone are exposed at several locations as shelly beaches. Tidal flats occur in low lying coastal areas at Big Lagoon and Guichenault Point.

Three bores still operate in the Park. Two bores have flow control valves and provide in total about 60,000kl per annum for Park purposes. The Homestead bore is free flowing, drawing about 50,000 kilolitres per annum and feeding the only permanent surface water feature in the Park. Drilled in 1923, the Homestead bore is now in poor repair and will soon require major restoration.

See section 27.0 Utilities and Services for further information about bore water use.

6.4 Shell Beach Conservation Park

The most characteristic feature of the Park is the Hamelin Coquina, a beach ridge deposit composed of lithified shells of the bivalve mollusc *Fragum erugatum*. Huge numbers of these molluscs occupy the hypersaline environment of Lharidon Bight and are swept on-shore during storms. Beach ridges of almost pure, white shells may be up to 10 metres thick, a kilometre wide and many kilometres long. Research is being undertaken into the biology of *Fragum* and its accretion processes.

An elevated ridge of Peron Sandstone divides the Park into two bays. The algal-bound tidal flats of Lharidon Bight are evident on the northern bay and poorly cemented shelly limestone is exposed at the mouth of a Holocene tidal channel.

Colluvial sand and silt deposits are present behind the beach ridges.

6.5 Zuytdorp Nature Reserve

The coastal portion of the Reserve is within the Edel Province and appears as an undulating plain of Tamala Limestone and residual sand which meets the coast in the Zuytdorp Cliffs. These cliffs are up to 200 metres high and are generally dissected by drainage channels. Soaks occur in the limestone sink holes which are common amongst the coastal gullies. A few permanent soaks also occur in inland areas. The soaks provide water for indigenous and feral animals, and were important for Aborigines and stock management.

The inland portion of the Reserve is in the Peron Province and consists of undulating sandplains and longitudinal dunes. The relief is up to 50 metres with slopes generally less than 8%.

RECOMMENDATIONS

1. Consider the vulnerability of geological features, landforms and soils in all management operations, such as new access, site developments and fire management. (O)

2. Monitor the effects of recreation and other use on landforms. (O)

3. Consider the potential impacts on surface and ground water during all management activities. (O)

4 Consider the potential impacts of salinity on all management activities. (O)

Francois Peron National Park

5. Continue to liaise with the WA Water Corporation regarding the use and management of surface and ground water resources. (O)

6. Assess the condition of all bores on the Park and determine management options. (H)

7. Request that Department of Minerals and Energy (DOME) encourage the protection of the unique gypsiferous yet dune formations in preparing mining plans for the gypsum leases. (O)

8. Liaise with DOME to amalgamate the area of the gypsum mining leases into the Park when tenements expire. (O)

9. Develop an appropriate site to interpret the evolution and geology of birridas. (M)

Shell Beach Conservation Park

10. Continue research into the accretion of *Fragum erugatum* shell. (O)

7.0 VEGETATION AND FLORA

The objective is to protect and conserve native plant communities and species, especially threatened or other priority species.

The area from Zuytdorp Nature Reserve to Freycinet Harbour is particularly important for flora being the transition zone between the South West Botanical Province and the Eremaean (or arid) Botanical Province. A pronounced overlap between major botanical provinces is unusual in Australia and is of great scientific value in determining how species adapt to different environments, and the factors which limit distribution and abundance. This botanical transition zone contains many species and some genera at the limit of their geographic range. A large portion of this transition zone is proposed to be reserved in the extension to Zuytdorp Nature Reserve (Shark Bay Regional Strategy 1997).

Another important feature of this transition zone is the unique "tree heath" vegetation. Tree heath extends from the inland portion of Zuytdorp Nature Reserve to Freycinet Harbour, and is not known to occur elsewhere in Western Australia.

The World Heritage Property contains 823 known species of plants, including 15 species which are threatened (i.e. declared rare) under the *Wildlife Conservation Act 1980.* Only one of these rare species occurs on a conservation reserve - *Drakonorchis barbarella* on Zuytdorp Nature Reserve.

7.1 Bernier, Dorre and Koks Islands Nature Reserves

Dorre Island

Much of the east coast and south of the island supports dwarf scrub which is pruned by the wind and salt. The dwarf scrub on rock pavement is dominated by *Diplolaena grandiflora* which is mostly less than 1 metre high but in some sheltered areas can attain 2.5 metres in height. Other prominent species are *Scaevola crassifolia* and *Westringia rigida,* and to a lesser extent *Carpobrotus rossii* and *Capparis spinosa.*

The dwarf scrub on dunes consists of low, almost prostrate shrubs less than 0.5 metres high which form sparse or dense communities. The principal species are *Olearia axillaris*, *Acanthocarpus preisii*, *Spinifex longifolius*, *Frankenia pauciflora* and the spectacular *Beaufortia dampieri* and *Pileanthus limacis. Dampiera incana* is the most common plant in the dune swales and *Atriplex bunburyana* and *Rhagodia preissii* occur in some areas.

The heath and spinifex community occurs in the north and centre of the island on flat sandplains. *Triodia plurinervata* (spinifex or hummock grass) is dominant and forms dense hummocks about 0.5 metre high. Interspersed with the *Triodia plurinervata* are low domed shrubs, principally *Thryptomene baeckeacea* and other species. In the centre of the island are some *Eucalyptus oraria* and *E. obtusiflora* which are often only 0.5 metre high in spite of having thick trunks and horizontal branches spreading over several metres.

Wattle thicket occurs on the red sands of the older consolidated dunes on the west coast. The thicket is usually very dense and up to 2.5 metres high. There are no dominant species and the composition is fairly consistent, with a range of localised dominant species throughout this community.

Bernier Island

The vegetation patterns of Bernier Island are quite different from Dorre Island. The dwarf scrub on dunes and wattle thicket communities predominate. A feature of Bernier Island is the patchy open grass flats of *Eulalia fulva* amongst the wattle thicket which probably indicates the presence of loam or clay. Bernier Island has virtually no flat sandplain to support heath and spinifex, so *Triodia* is present only as occasional clumps.

Some of the extensive sand drifts of Bernier Island are un-vegetated, but *Spinifex* and *Myoporum* can occur on the coast and along the drifts. Further inland, *Frankenia pauciflora, Olearia axillaris, Pileanthus limacus, Rhagodia, Atriplex, Pimelea and Alectryon oleifolius* occur on drifts further inland. Annual species in the swales include *Lotus, Ptilotus* and *Euphorbia.*

Flora

A total of 166 plant species have been recorded on the islands, including 12 introduced species.

The vegetation and flora of Bernier and Dorre Islands is predominantly that of the temperate south west region of WA. Twenty two temperate species reach the northern extent of their geographical range on the islands and 10 desert species reach their western limit here. Twenty one of the 39 species which are at their southern limit in Shark Bay occur on the islands. Six of the 28 species endemic to Shark Bay occur on the islands.

7.2 Other Island Nature Reserves

Vegetation Communities

Pelican Island is the only island nature reserve east of Peron Peninsula. It is a sand/mud based island, with a largely bare beach backed by a low shrubland of *Nitraria billardierei*.

All of the islands west of Peron Peninsula are limestone based, ranging in size from 0.1 ha to 160 ha. The smallest islands are bare rocks, and the largest have beaches, cliffs, dunes and limestone outcrops.

Generally the islands consist of low cliffs with limestone rubble slopes and a central plateau of shallow soil which supports a shrubland dominated by *Nitraria billardierei*. Islands with sandy rises and dunes are covered in low heaths of varying composition, but dominated by combinations of the following species: *Olearia axillaris, Diplolaena grandiflora, Thryptomene baeckeacea, Sarcostemma australe, Atriplex cinerea, Rhagodia latifolia, Acacia rostellifera, Acacia ligulata* or *Scaevola crassifolia*. Beaches, where present, are backed by herbfields or grasslands of *Spinifex longifolius* or *Sporobolus virginicus*.

The *Nitraria* shrubland of 11 islands has been removed by guano mining and replaced by a dense herb field of *Calandrinia polyandra*, the grasses *Setaria dielsii* and *Bromus arenarius* and the weeds *Chenopodium murale* and *Sonchus oleraceus*.

Flora

An undescribed species of *Calandrinia* (J. Alford 1976) is currently only known from one island in this area. It may be endemic, but further survey is required.

7.3 Francois Peron National Park

The Park's vegetation has been severely affected by past grazing. As vegetation regenerates, the composition of the flora will change and the risk of fire is likely to increase.

Vegetation Communities

Bowgada scrub extends down the eastern half of the Park on red sandhills. This community is dominated by *Acacia ramulosa*, a spreading shrub that can attain a height of 3m. Associated species include:

- large shrubs - *Acacia sclerosperma* (limestone wattle), *A. tetragonophylla, Exocarpus sparteus, Eucalyptus obtusiflora* (red mallee), *Grevillea eriostachya* (orange grevillea), *Alectryon oleifolius* (bullock bush);
- small shrubs - *Dodonaea inaequifolia, Eremophila platycalyx, E. oldfieldii, Labichea cassioides, Melaleuca aff. nesophila, Scholtzia umbellifera, Triumfetta appendiculata*;
- climbers - *Commicarpus australis, Marsdenia australis, Stipa elegangtissima*;
- ephemerals - *Podolepis canescens.*

Acacia-Lamarchea thicket replaces bowgada scrub in the northwest of the Park. This is a low thicket, generally about 1.2m high. The lower height is thought due to wind exposure as there is no change in soil type. *Acacia ligulata* and *Lamarchea hakeifolia* are the two dominant species, associated with *Acacia tetragonophylla, Alyogyne cuneiformis, Exocarpos sparteus, Melaleuca cardiophylla, Olearia axillaris* and *Scaevola spinescens*.

Wattle thicket occurs in the southwest of the Park. *Acacia ligulata* is the dominant species and the thicket varies in height from about one to two metres depending on exposure to the wind. Associated shrubs include *Acacia sclerosperma, A. tetragonophylla, Exocarpus sparteus, Alectryon oleifolius, Alyogyne cuneiformis* and a dwarf variety of sandalwood (*Santalum spicatum*).

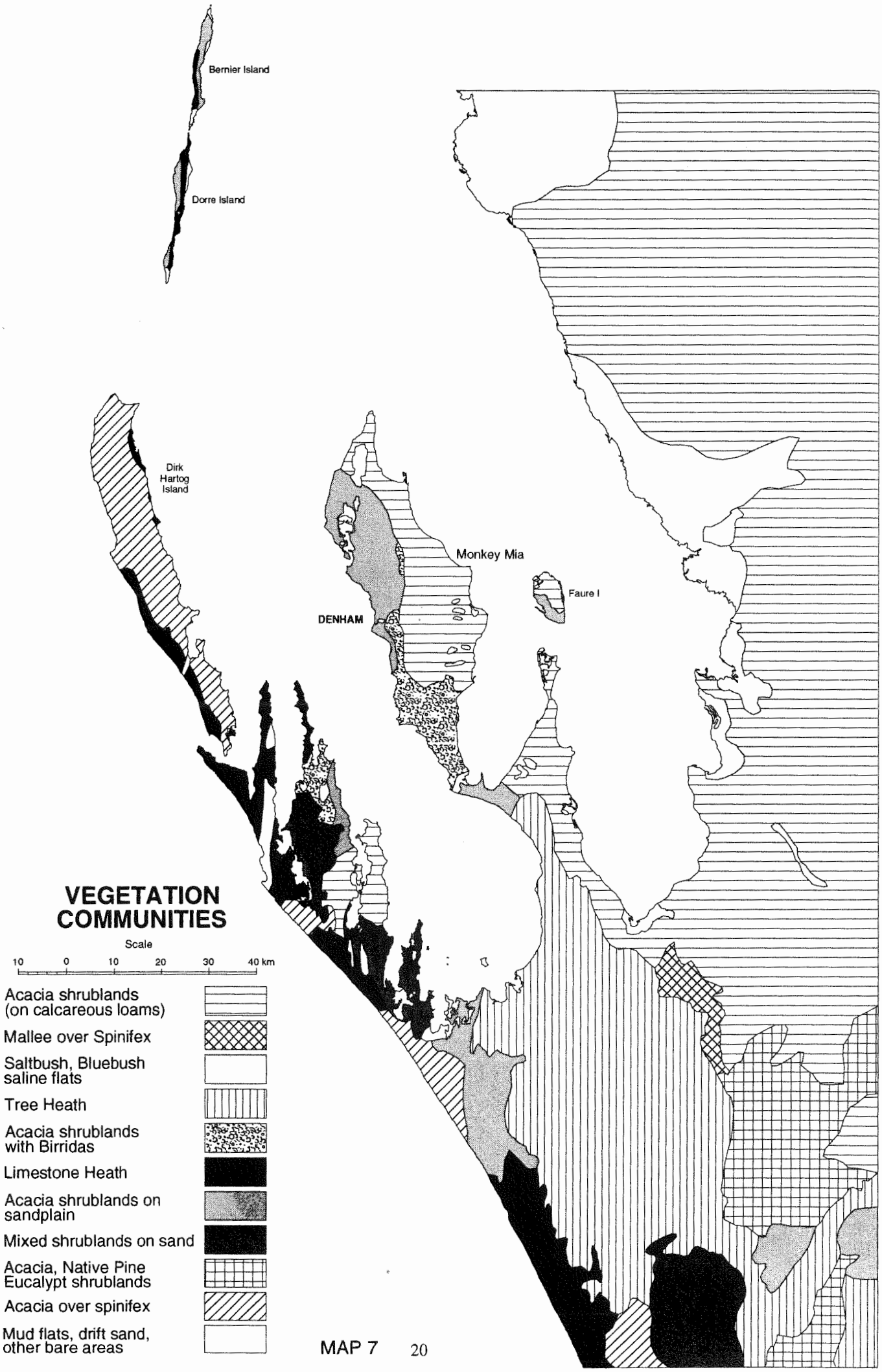
Scrub steppe occurs in two small areas of the Park. *Triodia plurinervata* is dominant with scattered domed shrubs of various species to 1.2m.

Birridas are located in many of the interdune depressions and range from a few metres to several kilometres in length. The saltpans carry very scattered plants of *Halosarcia* spp. and *Frankenia pauciflora* (Seaheath), or are sometimes bare, with *Atriplex cinerea* around the margin.

Flora

A total of 279 flowering plant species have been recorded in the Park, including 37 species at the northern limit of their geographical range at Shark Bay, and 13 species at their southern limit.

The mangrove community at Guichenault Point has an extensive stand of the white mangrove (*Avicennia marina*). Mangroves also occur at Big Lagoon.


Bernier Island
Dorre Island
Dirk Hartog Island
Monkey Mia
Faure I
DENHAM
VEGETATION COMMUNITIES
Scale
10 0 10 20 30 40 km
Acacia shrublands (on calcareous loams)
Mallee over Spinifex
Saltbush, Bluebush saline flats
Tree Heath
Acacia shrublands with Birridas
Limestone Heath
Acacia shrublands on sandplain
Mixed shrublands on sand
Acacia, Native Pine Eucalypt shrublands
Acacia over spinifex
Mud flats, drift sand, other bare areas

MAP 7

7.4 Shell Beach Conservation Park

Vegetation Communities

The primary vegetation of the Shell Beach Conservation Park is wattle thicket with similar structure and species composition as Francois Peron National Park above.

Flora

A total of 97 plant species have been recorded in the Park. More are expected to be recorded with further survey.

7.5 Zuytdorp Nature Reserve

Zuytdorp Nature Reserve lies on the northern extremity of the South West Botanical Province and near the edge of the Eremaean Botanical Province. As a result, the flora is enriched with the presence of both arid and south western species.

The reserve comprises two distinct areas - the inland area of sandplains and the coastal area of limestone plains and cliffs.

Vegetation Communities

Tree heath is the typical vegetation of the inland portion of the Reserve. This unique formation is not known to occur elsewhere in WA. Tree heath is heathland with small trees of *Eucalyptus* and other species up to 6m high. The vegetation is open at all levels and very irregular. This community shows features of both south west and arid type plant associations. It is very species rich.

Scrub heath occurs in the southern area of the inland portion of the Reserve. The scrub heath is dominated by *Banksia sceptrum, Actinostrobus arenarius* (sandplain cypress) and *Xylomelum angustifolium* (woody pear)

Where vegetation is present along the coastal cliffs, it is in the form of wattle scrub and heath. This community includes a few very small, scattered *Atriplex* spp., *Frankenia pauciflora* and *Pimelea gilgiaua* with a few larger bushes of *Diplolaena grandiflora.* The cliff face, where not absolutely sheer, carries a few *Atriplex* and *Frankenia.*

Coastal heath extends inland from the cliffs. The heath vegetation is dense with small shrubs well adapted to harsh conditions. *Melaleuca leiopyxis* is the most common species with others including *Grevillea hakeoides, Calothamnus blepharospermus* and *Hakea trifurcata.* The coastal heath continues east until there is a change to deeper soil.

Scrub heath with patches of wattle thicket occurs in deeper yellow sand east of the coastal heath. Banksia species, *Grevillea annulifera, G. leucopteris* and *Nuytsia floribunda* are conspicuous as large shrubs to 3m. *Acacia spathulifolia* dominates the heath layer. Patches of *Acacia rostellifera* thicket occur throughout the heath and form islands of dense bush.

Flora

A brief survey in the coastal portion of the Reserve in August 1995 resulted in 314 species of flowering plants being recorded, including 29 new flora records for the World Heritage Property. The Reserve is known to contain one species of threatened flora, *Drakonorchis barbarella* (Small Dragon Orchid), and one species, *Verticordia cooloomia,* on CALM's Priority List of flora that is poorly known and in need of survey. Many species are at the northern or southern extent of their geographical range.

A large number of plants are restricted, or nearly so, to the tree heath community. These include *Eucalyptus beardiana, E. roycei, Grevillea rogersoniana, Adenanthos acanthophyllus, Newcastelia chrysophylla, Hakea stenophylla,* two undescribed species of *Melaleuca, Acacia intricata, Macarthuria intricata, Verticordia cooloomia, Eremaea dendroidea* and *Calothamnus formosus.*

Several shrub species in the Reserve are present in 'giant' forms. The reasons for the 'gigantism' are not fully understood.

RECOMMENDATIONS

1. **Design facilities and management practices to minimise adverse impacts on flora and vegetation values, particularly threatened and priority flora. (O)**

2. **Monitor plant communities or species that are threatened, unique or in some way warranting special consideration. (O)**

3. **Provide opportunities for visitors to increase their knowledge and develop appreciation of the Reserves' vegetation and flora. (O)**

4. **Complete a detailed flora survey of the World Heritage Property, and determine and map plant community types. (H)**

5. **Promote research on changes to flora**

composition caused by the removal of feral herbivores on Peron Peninsula and the effects of fire and other factors affecting survival and regeneration. (H)

6. **Support the acquisition of lands adjacent to Zuytdorp Nature Reserve to improve the representation of vegetation communities on conservation reserves. (H)**

8.0 FAUNA

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

Shark Bay is an area of major zoological importance due to the isolation of habitats on peninsulas and islands from disturbance which has occurred elsewhere. The area harbours the only remaining populations of several native animals which were once widespread and common on mainland Australia.

Shark Bay satisfies the World Heritage criteria for having " the most significant habitats where threatened species of animals and plants of outstanding universal value from the point of view of science and conservation still survive ". The reserves contain major populations of most species in Shark Bay which are threatened or specially protected under the *WA Wildlife Conservation Act, 1950.*

Threatened terrestrial fauna of the World Heritage Property, and their occurrence on the terrestrial reserves, are as follows:

- banded hare-wallaby or muning (*Lagostrophus fasciatus*) - Bernier and Dorre Islands Nature Reserve
- western barred bandicoot (*Perameles bougainville*) - Bernier and Dorre Islands Nature Reserve
- Shark Bay mouse (*Pseudomys fieldi*) - Bernier Island Nature Reserve
- rufous hare-wallaby or mala (*Lagorchestes hirsutus*) - Bernier and Dorre Islands Nature Reserve
- boodie or burrowing bettong (*Bettongia lesueur*) - Bernier and Dorre Islands Nature Reserve
- greater stick-nest rat (*Leporillus conditor*) - Salutation Island Nature Reserve
- Baudin Island spiny-tailed skink (*Egernia stokesii aethiops*) - Baudin Island Nature Reserve
- thick-billed grass-wren (
- *textilis textilis*) - Francois Peron National Park
- malleefowl (*Leipoa ocellata*) - Francois Peron National Park and Zuytdorp Nature Reserve
- Dirk Hartog black and white fairy-wren (*Malurus leucopterus leucopterus*) - not known to occur in the terrestrial reserves.

Over 35 bird species recorded in Shark Bay migrate to Asia and are protected by international agreements between the Australian Government and the governments of China and Japan. Many of these species roost on the island Nature Reserves.

The management of threatened species involves the preparation and implementation of Recovery Plans which aim to prevent extinctions, increase numbers of individuals and populations and ultimately remove the species from the threatened list. Recovery Plans exist for the Shark Bay mouse, rufous hare wallaby, malleefowl and greater stick-nest rat. Priorities for recovery plans for other threatened species are directed to the most threatened taxa.

An increasingly important technique for the conservation of threatened species is the translocation of individuals of threatened fauna from one area to another. This technique is being used in Project Eden, a project which aims to control feral animals and reintroduce threatened fauna which occurred on Peron Peninsula prior to European settlement.

Shark Bay's fauna includes many relict and endemic species and subspecies, and numerous species at the limit of their geographic range. These biogeographical characteristics are important for the scientific study of continuing evolution, and satisfy the World Heritage criteria for there to "be outstanding examples representing significant ongoing geological processes, biological evolution and human interaction with the environment".

Shark Bay had comparatively rich mammal assemblages, but of the 37 species recorded, more than half are now locally extinct. The region is noted for its diversity of reptiles and supports nearly 100 species. The avifauna is also rich with over 230 species or 35% of Australia's bird species having been recorded. Some invertebrate species have been collected in Shark Bay, but there has been no systematic survey of the Reserves' invertebrate fauna.

8.1 Bernier, Dorre and Koks Islands Nature Reserves

Mammals

Australia currently has 58 mammal species listed by the World Conservation Union's Species Survival

Commission as threatened with extinction - five of these threatened mammal species occur on Bernier and Dorre Islands Nature Reserve. These five mammals are declared threatened fauna under the *WA Wildlife Conservation Act 1950*. They are also listed as "endangered" or "vulnerable" under the Commonwealth *Endangered Species Protection Act 1992*, meaning that the survival of these species is unlikely if causal factors continue to operate.

The mammal fauna of Bernier and Dorre Islands is unusually diverse and of extreme conservation importance. Of the nine indigenous mammal species recorded, five are threatened:

- boodie
- banded hare-wallaby
- rufous hare-wallaby
- western barred bandicoot
- Shark Bay mouse

Whilst each of these species were once widespread in arid or semi arid areas of mainland Australia, Bernier and Dorre Islands represent the only remaining natural occurrences for four of the five threatened species. The reasons for the extinction of these species from the mainland include habitat change due to agriculture and pastoral use, predation from foxes and cats, competition for habitat from rabbits and changes in fire regimes.

The major threats to the islands' threatened fauna and their habitats are:

- the inadvertent or deliberate introduction of non indigenous species, particularly predators such as cats, foxes and rats, and competitors such as rabbits;
- disease;
- the event of a major fire;
- inappropriate recreation activity or development; and
- inappropriate management practices.

An Action Plan for the Conservation of Australian Marsupials and Monotremes (1996) identified the broad objectives and actions required to conserve populations of endangered species on Bernier and Dorre Islands. It proposed that populations of each of these species be reintroduced to areas of their former habitat by the year 2000. Peron Peninsula and Dirk Hartog Island are proposed as major translocation sites once threatening processes such as feral predators and competitors are controlled. Experimental translocations began in 1992 with the transfer of burrowing bettongs from Dorre Island to Heirrison Prong. Shark Bay mice were translocated to Doole Island in the Exmouth Gulf in 1993 and to Heirrison Prong in 1995.

Birds

At least nine species of seabird breed on Bernier and Dorre Islands and seven other seabird species are regular visitors. Species such as the terns and ospreys which nest on leeward sandy beaches of the east coast may be subject to disturbance from visitors landing in the vicinity.

Resident breeding land birds include the wedge-tailed eagle, kestrel, white-browed scrub-wren, field-wren and variegated fairy-wren. Visiting land birds, many of which may breed on the islands, include the bronze cuckoo, barn owl, welcome swallow, Australian pipit, silvereye and singing honeyeater. The introduced turtle-dove has been recorded on Bernier Island.

A variegated fairy-wren subspecies, *Malurus lamberti bernieri*, is endemic to Bernier and Dorre Islands. It is common and plentiful in localised areas amongst the dense heath and spinifex.

There has been no survey of Koks Island's fauna though nesting seabirds have been observed.

Reptiles and Amphibians

Bernier and Dorre Islands have a rich reptile fauna with at least 30 recorded species. Skinks are particularly well represented and the gecko species and legless lizard frequent spinifex dune habitats. Bungarras, dragon lizards and snakes occur in a variety of habitats. The mulga or king brown snake is highly venomous and moderately common on the islands.

Six terrestrial reptile species are southern species at the northern limit of their geographic range. Two inland species are at the western limit of their range in Shark Bay.

Small numbers of loggerhead and green turtles are known to visit and nest on the islands' beaches during the breeding season which can extend from early summer through April. Loggerhead turtles are declared threatened fauna under the Wildlife Conservation Act and are the most endangered marine turtle to nest in the Australian region.

No frogs have been recorded on the islands.

Marine Fauna

A diverse and abundant marine invertebrate fauna inhabits the rocky shores, tidal pools and beaches of the intertidal zone. Unlike the other terrestrial reserves which extend to high water mark, Bernier and Dorre Islands Nature Reserve extends to low water mark so the taking of marine fauna within the intertidal zone is

not permitted.

8.2 Other Island Nature Reserves

The fauna values of most islands have been protected by their relative isolation from human disturbances such as grazing, frequent fire and introduced predators. Increasing visitation to and around the islands has the potential to have an adverse impact on fauna. Information and eduction are the key strategies for encouraging appropriate visitor use and minimising disturbance of fauna. Research and monitoring are important to gain a better understanding of island ecosystems, the impacts of visitation and management requirements.

Mammals

Prior to European settlement, the greater stick nest rat was widespread in Shark Bay. It became extinct in Western Australia in the 1920's. In 1990 a number of greater stick nest rats (*Leporillus conditor*) were translocated from South Australia to Salutation Island and have established successfully. CALM monitors the population annually. It is essential that the island remain free of introduced predators.

Salutation Island may also suit the reintroduction of other small species.

Birds

The islands comprise less than 1% of the land within the World Heritage Property, yet about 35% of the bird species that inhabit the Shark Bay region have been recorded on the islands. The islands provide breeding sites for 17 species of sea and shore birds. Seabird breeding occurs almost year round. Between September and April, migratory waders feed on the island shores on their way to and from northern hemisphere breeding grounds. Ground nesting land birds such as the rock parrot, stubble quail and pipit also breed on some islands.

Good data are available on the distribution and nesting activity of seabirds on the islands, but there has been little evaluation of the effects of visitor use on birdlife. Visitors to and around the islands can easily disturb breeding seabirds and cause the loss of eggs or hatchlings. Pelican Island is one of only 9 pelican breeding sites in Western Australia. Breeding pelicans can take flight at the noise of an outboard motor more than 1km away and major nest damage can occur as a result.

Anecdotal evidence from local people suggests that silver gulls have become more evident around the islands and Shark Bay region. Seagull populations are now monitored but there are no comparative data from the past.

Reptiles

The islands have a rich and diverse reptile fauna. The threatened Baudin Island spiny-tailed skink (*Egernia stokesii aethiops*) occurs only on Baudin island and is common on that island.

8.3 Francois Peron National Park

Project Eden

Project Eden is one of the most significant fauna conservation programs occurring in Australia. The purpose of the project is to reconstruct the original fauna of Peron Peninsula as far as possible and make it a haven for threatened native animals. The project aims to:

1. control introduced predators (cats and foxes) and herbivores (goats, sheep and rabbits) on Peron Peninsula;
2. re-establish species of threatened fauna which occurred in the area prior to European settlement; and
3. integrate nature based tourism with conservation.

The translocation of fauna began in September 1997. Woylies (*Bettongia penicillata*) and malleefowl were released after populations of introduced predators had been reduced to predetermined levels.

Project Eden is part of a much more extensive feral predator control and native fauna recovery program known as Western Shield. Facilities are being established near the Peron homestead to breed fauna for translocation on the peninsula and to other protected areas in the state.

Bushfires could seriously disrupt Project Eden, so a fire protection program is being implemented to minimise the impacts of bushfire.

Another essential element of Project Eden is to foster the involvement and support of the local community.

Mammals

At least 18 mammal species occurred on Peron Peninsula prior to European settlement, but only seven native species are now present - the common dunnart, common wallaroo (euro), greater long-eared bat, white striped mastiff-bat, spinifex hopping mouse, sandy inland mouse and the woylie (which was reintroduced in 1997).

Of the 11 species no longer present on the Peninsula two species are extinct - crescent nailtail wallaby (*Onychagalea lunata*) and lesser stick-nest rat (*Leporillus apicalis*); and nine species are potential candidates for translocations. Species which once occurred on the peninsula and may be translocated are the mulgara (*Dasycercus cristicauda*), chuditch (*Dasyurus geoffroii*), red tailed phascogale (*Phascogale calura*), pale field-rat (*Rattus tunneyi*), western barred bandicoot, banded hare-wallaby, rufous hare-wallaby, greater stick-nest rat and the Shark Bay mouse. The bilby (*Macrotis lagotis*) is another candidate species for translocation.

Birds

The Park has a rich variety of birds with more than 100 species having been recorded. The yellow white-eye (*Zosterops lutea*) is at its southern range limit on Peron Peninsula. South west species at their northern range limit are the malleefowl (Leipoa ocellata) and the southern scrub robin (*Drymodes brunneopygia*).

Francois Peron National Park provides habitat for two threatened bird species, the thick-billed grass-wren and the malleefowl. The thick-billed grass wren was once common in arid and semi-arid areas of southern Australia but is now restricted in WA to the Shark Bay area. This species now only occurs in 5% of its former range and the reasons for its decline are unclear. Potential threats to this species have not been researched, though frequent fire may reduce the breeding success of other wren species.

Seabirds, which are often seen nesting on the Park's cliffs, beaches and sandy spits, can be sensitive to human presence. Migratory waders make use of waters in the birridas during winter.

There appears to have been an increase in the numbers of small scrub birds since populations of sheep, goats and foxes have been reduced.

Reptiles and Amphibians

At least 29 reptile species are believed to occur in the Park, of which there are seven gecko species, four legless lizards, six dragon lizards, 18 skinks, one goanna and eight snakes.

The western spiny-tailed skink (*Egernia stokesii badia*) is listed as a threatened species and the woma or Ramsay's python (*Aspidities ramsayi*) is listed as specially protected under the *WA Conservation Act 1950.*

No frogs have been recorded in the Park.

8.4 Shell Beach Conservation Park

The most significant conservation value of the Park is the vast deposits of shell from the bivalve *Fragum erugatum. Fragum* is one of a few species which can exist in the hypersaline environment of Lharidon Bight. It is thought that shell is deposited during storms, and research is in progress to determine the biology and rate of beach accumulation of *Fragum.*

8.5 Zuytdorp Nature Reserve

The reserve lies at the northern extremity of the southwest botanical province and at the edge of the Eremaean botanical province. Many fauna species reach the limit of their geographical range in this region - the study of such species is of value in determining how species adapt to their environment and what factors limit species distribution and abundance.

A biological survey currently being undertaken in the Carnarvon Basin represents the first comprehensive study of the Reserve's fauna.

A wide variety of reptiles occurs in the area, and 43 bird species typical of both the southwest and arid zone avifauna have been recorded. Red and grey kangaroos are common. The original mammal fauna of the Reserve has not been investigated but was probably rich and diverse.

RECOMMENDATIONS

1. **Determine management requirements and implement measures to maintain or enhance the reserves' native fauna populations, with an emphasis on threatened species. (O)**

2. **Support the preparation and implementation of recovery plans for threatened fauna species of the reserves. (H)**

3. **Identify, monitor and manage existing and potential threatening processes or disturbance which may adversely affect the reserves' fauna. (H)**

4. **Develop recreation and management practices which are consistent with protecting the reserves' fauna. (O)**

5. **Promote complementary land use practices by neighbours. (O)**

6. Promote public awareness of the reserves' fauna values by providing information, interpretation and education. (O)

7. Communicate with the public, particularly the local community, to increase awareness of fauna conservation values and programs. (O)

8. Promote research which will assist with management of the reserves' fauna. (O)

9. Encourage research and monitoring of how fauna populations respond to the control of feral animals. (H)

Bernier and Dorre Islands Nature Reserve

10. Continue to ensure that the conservation of threatened fauna is the primary objective for management. (O)

11. Minimise the potential for non-indigenous fauna to be introduced. (O)

12. Provide information to minimise the potential for visitors to disturb fauna. In particular, specify regulations which prohibit campfires and pets. (H)

13. Promote a community based "island watch" system to discourage illicit use and to encourage early warning of wildfire or other forms of disturbance. (H)

14. Conduct education programs to promote local community awareness of the reserve's threatened fauna and the requirements for its protection. (H)

15. Provide additional resources to conduct surveillance and education programs and to co-ordinate community participation in monitoring and management programs. (H)

Other Island Nature Reserves

16. Provide information for visitors to and around the islands to encourage minimal disturbance of the islands' fauna, particularly breeding seabirds. (H)

17. Continue research and monitoring of threatened fauna and breeding seabirds. (O)

18. Investigate the need to restrict access in the waters around Pelican Island Nature Reserve to protect pelican rookeries during the breeding season (May to July). (H)

19. Encourage local people who frequent areas around the islands to become aware of and involved in fauna protection programs. (H)

Francois Peron National Park

22. Integrate the implementation of Project Eden with management of the Park. (O)

23. Manage recreation to protect the Park's fauna from human disturbance. (O)

24. Devise and implement detailed operational plans for the control of feral animals, the management of fire and the translocation of threatened species. (H)

25. Encourage tourism involvement in Project Eden and develop operational guidelines for managing interaction between the Park's visitors and fauna. (H)

Shell Beach Conservation Park

26. Integrate fauna management programs for Project Eden with management of the Park. (O)

27. Continue research on the dynamics of shell accretion. (O)

Zuytdorp Nature Reserve

28. Promote research of the reserve's fauna, with priority for species which may be severely affected by feral animals and other threats. (M)

9.0 CULTURAL HERITAGE

The objectives are to:

- *protect and conserve the reserves' cultural heritage values; and*
- *increase visitor awareness, appreciation and understanding of the cultural heritage of the reserves.*

While the preservation of any feature of archaeological or historic interest is part of the purpose of national parks, conservation parks and nature reserves, the primary responsibilities for heritage management lie with:

- the Aboriginal Affairs Department (under the *Aboriginal Heritage Act 1972*);
- the WA Maritime Museum (under the *WA Maritime Archaeology Act 1973* and the *Commonwealth Historic Shipwrecks Act 1976*); and
- the Heritage Council of WA (under the *Heritage of WA Act 1990*)

Archaeological research in Shark Bay is limited but suggests a sequence of Aboriginal occupation from at least 18,000 to 25,000 years before present. Numerous sites provide evidence of occupation within the past 6,000 years.

The Shark Bay region was mainly associated with the Mulgana and Nanda people, though little is known of their traditional life and customs prior to the arrival of Europeans. There is also little knowledge as to what extent traditional Aboriginal life continued after European settlement.

Since the 1850's, Aboriginal people have been closely involved in the pearling, fishing and pastoral industries. Chinese, Malay and British settlers also worked in the pearling industry and by the early 1900's, these ethnic groups had become integrated with the Aboriginal inhabitants.

A significant episode in Shark Bay's history is the decade of the Lock Hospitals on Bernier and Dorre Islands. Almost 200 Aboriginal patients died on these islands and Aboriginal communities, particularly the people of Carnarvon, are keen to identify and restore gravesites on the islands and ensure that the gravesites are managed appropriately.

Shark Bay is well known as the site of the first European landfall in Australia, but the historical significance of other early expeditions is not so well recognised. Studies and collections made by explorers of the 17th and 18th centuries represent some of the earliest records of Australia's flora and fauna. Many of these records are kept in European museums and are of great value to scientific research.

Much of the history of early European visitors is still to be researched, such as the fate of the Zuytdorp survivors and the campsite established by de Freycinet at Cape Lesueur on Peron Peninsula.

The commercial utilisation of Shark Bay's natural resources provides a wealth of historic sites and material, much of which are yet to be accurately located and documented. Whaling occurred in the area from 1792 to 1963 but no land sites associated with early whaling have been found. Guano mining was the first terrestrial industry in Shark Bay and initiated the area's colonial settlement in 1850. Pearling also developed in the 1850's and numerous small pearling camps were established around the coast. The first pastoral leases were granted in the 1860's and sandalwood was first exported from the region in 1890. The fishing industry began in the early 1900's and has been the community's economic mainstay for most of this century.

Aboriginal Sites

The Aboriginal Heritage Act applies to all registered and undeclared Aboriginal sites and cultural objects in Western Australia. The Aboriginal Affairs Department (AAD) is responsible for the assessment and management of Aboriginal sites, in consultation with Aboriginal communities. Proposals which may affect Aboriginal sites must be approved by the AAD.

Traditional Activities

Hunting and gathering of native foods is an important aspect of traditional Aboriginal relationships with the land. The knowledge and practise of traditional activities in Shark Bay seems to have diminished.

Under the Wildlife Conservation Act, Aboriginal people may take flora and fauna for food from all land except a nature reserve or wildlife sanctuary. Food taken may only be sufficient for a person and family but not for sale. Species which are declared rare or in need of special protection may not be taken (with the exception of the dugong), The consent of the occupier of land is required, which in the case of the terrestrial reserves is the Executive Director of CALM. General provisions of the CALM Act and Wildlife Conservation Act apply to Aboriginal activities, for instance, firearms may not be carried on a reserve.

With regard to native title, there has been no action to date to determine whether native title might exist on any of the terrestrial reserves.

Heritage Sites

Shipwrecks, relics and campsites associated with Shark Bay's pre-1900 maritime history are managed by the WA Maritime Museum (WAMM). A Memorandum of Understanding between CALM and the WAMM defines management responsibilities and consultative processes.

Maritime heritage management is relevant on:

- Zuytdorp Nature Reserve, adjacent to the landing site for survivors of the Zuytdorp wreck;
- island Nature Reserves, some of which have relicts

from guano mining operations; and
- Francois Peron National Park, which supported several pearling camps and may yield artefacts from the early European explorers.

The land camps associated with pearling and guano mining are particularly sensitive to disturbance from increasing visitation. A general requirement for the protection of maritime heritage sites is that visitors should not be allowed to use metal detectors.

Non-maritime sites of cultural heritage significance must be listed on the State Register of Heritage Places or the Shire Municipal Inventory to enable management by the Heritage Council of WA or the Shire. Several sites warrant listing in Shark Bay, but none have been documented or registered as yet.

Sites in the terrestrial reserves which may be considered for heritage listing include the homestead precinct of Francois Peron National Park and the old wells, tanks and fences in the area proposed for addition to the Zuytdorp Nature Reserve.

9.1 Bernier and Dorre Islands Nature Reserve

There is no evidence of Aboriginal occupation on the islands prior to European colonisation.

From 1908 to 1918, Bernier and Dorre Islands were used for the isolation and treatment of Aboriginal people from north Western Australia believed to be suffering from venereal disease. The Lock Hospitals were established with female patients residing in an existing house on Bernier Island, and accommodation for males being built near White Beach on Dorre Island. Remnants of these buildings and artefacts from this era still remain.

It seems that the patients and their families often had little idea of where or why they were taken. Patients were kept on the islands until they were cured or died. Those who were fit enough hunted game, fished and worked to establish and maintain the hospitals.

During an anthropological expedition in 1910/1911, Daisy Bates described the hospitals as "tombs of the living dead". Admissions decreased after 1913, and in 1917 it was suggested that the Lock Hospitals be relocated because of the cost of the scheme. In 1918, the hospitals were closed and the patients and buildings were relocated to Port Hedland. Hospital records were poorly kept so exact figures cannot be ascertained, but more than 700 patients were admitted of whom close to 200 died on the islands.

In 1986, Bernier and Dorre Islands were registered as protected areas under the *Aboriginal Heritage Act 1972*. The islands were also listed on the Register of the National Estate by the Australian Heritage Commission in 1985. The initial National Estate listing was based on the islands' natural values, but in 1987 the area's heritage significance was added to the listing.

Aboriginal groups and the WA Museum are hoping to initiate a project to locate and protect gravesites on the islands.

Dirk Hartog's visit on the Eendracht in 1616 is the first known landing on the islands. In 1696 William de Vlamingh captaining the Geelvinck surveyed and named "Dor Eyland" or Dorre Island - Dor being the Dutch word for dry or barren. During William Dampier's expedition on the Roebuck in 1699, botanical samples were collected from Bernier Island and a brief account of the island's natural history was written.

After the Dutch explorers, no visit was recorded until the 1801 French scientific expedition led by Nicolas Baudin on the Geographe. Bernier Island was surveyed extensively and named after the expedition's astronomer, Pierre François Bernier. In 1818, Louis de Freycinet and his crew of the Uranie landed on the islands.

The first English explorers to collect specimens from the islands were Lieutenant Phillip King on the HM Bathurst in 1822 and Captain HM Denham on the HMS Herald in 1858. At least 4 shipwrecks were recorded around the islands between 1839 and 1916.

During his search for pearl shell beds in 1860, the pioneer Julius Brockman camped on the southern end of Dorre Island. An account from his diary describes his camp fire which "swept the island bare...as a sand patch and what were not burnt of the animals would have no food except seaweed until rain fell again". This was the first of 3 major fires caused by human use.

The islands were leased for pastoral use as early as 1864, but grazing only occurred for about 10 years on Bernier Island and reportedly not at all on Dorre.

Sandalwood cutters operated on Bernier Island in 1896. In the same year and also in 1899, JT Tunney, collector from the WA Museum, took mammal specimens. GC Shortridge visited the islands in 1906 and collected mammals and birds for the British Museum and published a taxonomic classification of the fauna. Otto Lipfert, taxidermist from the WA Museum, published a general account of the mammals and birds seen on his trip in 1910.

9.2 Other Island Nature Reserves

No evidence has been found of Aboriginal occupation on the island Nature Reserves, though there is likely to have been some visitation. Salutation Island is accessible by foot at extreme low tides and during periods of lower sea level more than 6 000 to 7 000 years ago, all of the island Nature Reserves would also have been accessible.

The accumulation of guano on the islands of Shark Bay stimulated the first European land use and settlement of the area. Guano provided the Swan River Colony with one of its earliest commercial exports and in 1850, the government stationed a military force on Dirk Hartog Island to prevent the illegal removal of guano by foreign interests.

Groups of convicts were sent to dig guano on at least 13 islands between 1850 and 1880, but there is generally little information about guano mining operations.

Salutation Island was once used by pastoralists as a ram paddock during winter months. Other use of the islands since 1900 has been for conservation, recreation and research.

9.3 Francois Peron National Park

Research suggests that Peron Peninsula supported a relatively high proportion of Shark Bay's Aboriginal population prior to colonisation. Drawings which exist from expeditions of 1801 and 1803 depict semi-permanent Aboriginal camps.

As at 1998, the Park contains 9 registered Aboriginal sites and a further 28 sites have been found outside, but in close proximity to the Park. The Park's registered sites are all open middens.

Most of the Park's geographic features were named by or in honour of European explorers. The only early expedition known to have established a land base while in Shark Bay was that led by Louis de Freycinet. This scientific expedition made a temporary camp at Cape Lesueur at the end of 1818 and being unable to find fresh water, they successfully distilled sea water.

Some of Shark Bay's principal pearling banks of the late 1800's were in the vicinity of Herald Bight, Middle Bluff and Cape Lesueur. Small settlements were established on adjacent beaches though the lack of fresh water eventually forced the pearlers to move to Freshwater Camp (now Denham).

The northern area of the Park was first leased for sheep grazing in 1881 and Peron Station continued to operate until 1990. It is also likely that sandalwood was pulled to supplement the pastoral income.

In 1930, Shark Bay's fishing industry was established and a cannery and processing works was built at Herald Bight.
It is proposed that several sites associated with the Park's heritage be interpreted in-situ, and that more detailed heritage displays be located at the Peron homestead precinct.

Pastoral History

The original Peron homestead was located in Denham. Since the 1940/50's, the focus of pastoral activity on Peron Station was at the Park's Peron homestead precinct, which is now the main orientation site for visitors to the Park. The structures retained in the precinct include the remains of the Peron homestead, windmills, an overseer's quarters, a shearers' quarters, a cook house, shearing shed and yards, a killing shed, machinery shed, tack room and horse yards.

A Heritage Assessment of the Peron Homestead and Station Precinct (Suba, 1995) was commissioned to provide guidelines for management of the area's heritage values. This assessment showed that individually, the remaining structures have little heritage significance. However collectively, the precinct's structures and spaces provide an authentic, aesthetic character which should be maintained and used to interpret the area's heritage, particularly the resourcefulness and ingenuity of pastoral life.

A station-life walk trail has been established in the precinct and the overseer's quarters are being renovated to become the Park Visitor Centre. Further interpretation of pastoral heritage will be provided. Interpretation and recreation opportunities will be developed to enhance the precinct's heritage character.
The Peron homestead, built in the 1950's, had become extremely dilapidated prior to its refurbishment in 1997/98. Any new structures built in the Peron homestead precinct will be designed to maintain the precinct's distinctive pastoral character.

Elsewhere in the Park, the remains of pastoral infrastructure includes fencing, water pipes, tanks, troughs and mills. Infrastructure which is unsightly and serves no management purpose is removed and reused. Some infrastructure should remain as a reminder of the Park's pastoral history.

9.4 Shell Beach Conservation Park

There are no known historic sites or events associated with the Park and as at 1996, there are no registered Aboriginal sites in the Park. The Park was previously within Peron Station which was purchased by the WA Government in 1990.

9.5 Zuytdorp Nature Reserve

An archaeological survey of the Zuytdorp coast revealed shell midden sites with dates of 4,600 and 4,000 years before present. From this survey it was concluded that Aboriginal occupation of the area was probably occasional only as there are few resources for human occupation. Other archaeological work within and adjacent to the Reserve has focused on natural wells which occur in the limestone sinkholes. There are no registered Aboriginal sites within the Reserve, but several sites exist in the area proposed as an extension to the Reserve.

There are no known heritage sites of European origin on the Reserve, however the 1712 wreck of the Zuytdorp is immediately adjacent to the Reserve and there is a theory that survivors of the shipwreck may have interacted with Aborigines.

Waters in a 500m radius around the wreck are gazetted under the Commonwealth Historic Shipwrecks Act as a protected zone. The WA Maritime Archaeology Act also applies to the wreck, its relics and associated campsites, and the WA Maritime Museum (WAMM) has a 7.3 ha reserve on the coast for the Protection of the Zuytdorp Wreck. Diving on the wreck is prohibited both for safety reasons and to protect historic relics.

Visitors to the wrecksite travel through the Reserve, so it is essential that CALM and the WAMM work closely to manage visitor use and protect heritage and landscape values of the area.

Pastoral activities were once the main land use in the area and stock routes were used along the Reserve's coast and east boundary. The area proposed for addition to the Reserve contains ruins of water tanks built in the days when sheep were bought from the Murchison River to be loaded on lighters at Flagpole Landing or Tamala. These tanks have considerable heritage value and may be considered for listing on the Municipal Inventory of historic sites or the State Register of Historic Places. The WA Heritage Council is keen for some of the tanks to be stabilised or restored. Other sites of heritage significance in this area include the stock fence at Woomerangee Hill and wells built by station workers.

RECOMMENDATIONS

1. Liaise with local Aboriginal and community groups and relevant agencies concerning the protection of significant heritage sites in the reserves. (O)

2. Ensure that heritage management is consistent with other reserve management objectives. (O)

3. Ensure that visitor and management activities do not have adverse impacts on significant heritage sites and values. (O)

4. Where appropriate, incorporate heritage information in interpretive displays and education programs. (O)

5. Promote research of the reserves' heritage values. (O)

Bernier and Dorre Islands Nature Reserve

6. Manage the remains of the Lock Hospital buildings in liaison with relevant agencies and community groups. (O)

7. Liaise with relevant agencies and community groups in devising strategies for managing visitor impacts on heritage values eg. access to culturally important areas, providing information to interpret heritage values, etc. (O)

Other Island Nature Reserves

8. Provide information to interpret the islands' past use for guano mining. (L)

Francois Peron National Park

9. Provide information to interpret the Park's cultural heritage. Events and/or places of particular significance are Cape Lesueur, Herald Bight, Peron homestead precinct, Aboriginal history, European exploration and colonial development. (H)

10. Consider developing a coastal site to interpret the Park's Aboriginal history. (L)

11. Protect the Peron homestead precinct's heritage value by maintaining and enhancing its pastoral infrastructure and aesthetic character. (O)

12. Complete renovations on the Peron homestead and overseer's quarters. (H)

13. **Obtain professional heritage advice before making any significant alterations to the homestead precinct's buildings and structures. (O)**

14. **Retain pastoral infrastructure which is useful to management and heritage interpretation. (L)**

Zuytdorp Nature Reserve

15. **Liaise with the WA Maritime Museum to provide information to interpret and help protect the area's heritage values, particularly regarding the Zuytdorp wreck. (M)**

10.0 VISUAL LANDSCAPE MANAGEMENT

The objective is to protect and restore the landscape qualities of the reserves.

Visual landscape management is the art and science of managing land, vegetation and water resources so as to maintain or improve their visual quality. Many land uses and management practices can and do change the character of the landscape. Such uses and practices do not always result in visually attractive landscapes, and in most cases, the loss of scenic quality can be avoided through sensitive planning.

The role of landscape management is to ensure that all uses and activities are planned and implemented so as to complement rather than detract from the inherent visual qualities of the environments in which they occur. Careful planning is particularly important in the location and design of roads, fire breaks, utilities, extraction pits, buildings, recreation facilities and signs.

Landscape Values

One of the World Heritage listing criteria met be Shark Bay was that it contains "exceptional natural beauty". Many of the landscape features which meet this criteria occur on the terrestrial reserves, including the Zuytdorp cliffs, Shell Beach, the Peron Peninsula coast, Big Lagoon, birridas and seasonal wildflower displays .

The significance of Shark Bay's visual environment to residents and visitors was confirmed by a user survey of the World Heritage Property (CALM 1994). Survey respondents were asked what they consider to be the special features of the WHA and the second most popular response (after dolphin/human interaction) was the "undeveloped, unspoilt, natural environment".

Shark Bay's exceptional landscape qualities need to be well managed, not only to protect conservation values of international significance, but also to foster the region's potential for nature based tourism. Despite these conservation and economic imperatives, Shark Bay's visual resources are poorly documented and there is little management related information to assist in conserving the aesthetic values of the World Heritage Property.

Landscape Character Types

CALM has made an initial assessment of the Landscape Character Types of Shark Bay (see Appendix 1). Ideally, further study of the reserves' landscape management requirements should be part of an integrated visual resource assessment for the whole of the World Heritage Property.

Landscape values need to be assessed and landscape management guidelines need to be developed for each of the terrestrial reserves. Landscape management zones will be identified in each of the reserves, and guidelines for each zone will identify the standards for operations, acceptable levels of landscape alteration and techniques for minimising impacts.

The management of landscapes adjacent to the reserves can affect the visual quality and visitor's perceptions of the reserves, and so need to be considered.

RECOMMENDATIONS

1. **Implement CALM Policy No. 34 (Landscape Management of CALM's Lands and Waters) in all aspects of reserve management. (O)**

2. **Undertake a systematic assessment of the landscape values of the World Heritage Property and prepare landscape management guidelines for the terrestrial reserves. (H)**

3. **Encourage neighbours and managers of adjacent lands to recognise the importance of visual landscape management and to help protect the area's visual resources. (O)**

4. **Encourage sensitive management of visual resources along the access corridors to tourist destinations. (O)**

MANAGEMENT FOR PROTECTION

11.0 FIRE MANAGEMENT

The objective is to manage fire to protect people, property and conservation values.

Fire Management Policy

CALM's Policy Statement No. 19 outlines strategies for fire suppression, use of fire, liaison, public awareness and research. It states the Department's goals for fire management as:

- to protect community and environmental values on lands managed by the Department from damage or destruction from wildfire; and
- to use fire as a management tool to achieve land management objectives, in accordance with designated land use priorities.

Unplanned fires may be suppressed or left to burn depending on the risk to life, property and environmental values; the environmental impacts of suppression activity; and the feasibility of suppression.

Prescribed fires may be used to achieve a range of objectives including fuel reduction, habitat management and the management of scenic values. The ecological effects of burning will be considered, and before any prescribed burning may be undertaken, written prescriptions must be prepared and approved.

Fire Management Strategies

Fire management strategies have been determined for each of the reserves according to:

- the values threatened by fire;
- the risk of ignition;
- fire behaviour; and
- the availability and capability of resources for fire suppression.

Three burning regimes may be applied in the terrestrial reserves.

1. No Planned Burn Areas

No Planned Burn Areas will not be deliberately burnt for the duration of this plan. Wildfires in these areas which threaten community values will be suppressed if possible or left to burn to low fuel buffers.

2. Prescribed Burn Buffers

Burn buffers protect reserve values and adjoining community assets, by limiting the spread of intense wildfires. Burn buffers may comprise open edge burns, wind driven buffers or scrub rolled buffers.

3. Habitat Management Burns

Habitat management burns are used in areas of particular importance for wildlife conservation, to achieve a mosaic of vegetation ages and a variety of fauna habitats.

Changes may be made to the burning regimes in view of new research information or management circumstances.

11.1 Bernier And Dorre Islands Nature Reserve

Three major fires have been recorded on Dorre Island. They occurred in 1860, July 1909 and September 1973. Each of these fires resulted from human use and burnt much of the island's vegetation. There is no evidence of a major fire on Bernier Island in the last 100 years, though charred stumps on the north end of the island indicate that small fires have probably occurred as a result of lightning strikes.

The risk to life from fire on the Reserve would be minimal as visitors could easily take refuge on the coast. Property at risk from fire on the Reserve comprises two lighthouses, management signs and research markers. The lighthouses are afforded protection by their construction, location and being surrounded by low fuels.

There is significant potential for a large fire to detrimentally affect the Reserve's conservation values, particularly threatened fauna, habitat diversity, landform stability and possibly heritage sites. If fire occurs under the predominant weather conditions, it is unlikely that the fire could be suppressed before it had run its course. It is not however feasible or desirable to establish burn buffers due to the risk of soil erosion and habitat degradation.

Bernier and Dorre Islands Nature Reserve will be designated a 'No Planned Burn Area'. The fire management strategies are to:

- minimise the risk of human induced wildfire by prohibiting all open/wood fires

- facilitate early detection of fire through liaison with the local community and relevant agencies; and
- in the event of fire, conduct immediate monitoring and assess whether suppression is warranted or feasible.

11.2 Other Island Nature Reserves

Larger island Nature Reserves such as Salutation, Baudin and Three Bays Islands support vegetation types that could burn, but there is no knowledge of fire having occurred. Many of the smaller islands are sparsely vegetated and would not carry a fire.

There is little risk to life or property from fire on the islands, though fire could have a detrimental effect on populations of threatened fauna, vegetation and sensitive landforms.

The other island Nature Reserves will be designated 'No Planned Burn Areas'. The fire management strategies are identical to those proposed for Bernier and Dorre Islands Nature Reserve.

11.3 Francois Peron National Park

The fire history of the Park has not been documented. Aerial photography shows evidence of numerous small fires in the past few decades, most of which occurred in the north of the Park and appear to have been caused by human activities.

In the past, the reduction of fuel by grazing has reduced the incidence of fire in Francois Peron National Park, however as numbers of stock, goats and rabbits have now been significantly reduced, the risk of fire increases as vegetation regenerates and fuel loads increase. Changes in fuel conditions will need to be monitored and fire management strategies altered accordingly.

There is some potential for wildfire to threaten life and property in the Park, though the risk is low. Lawns and clearing around the Peron homestead precinct provide protection from fire, though the build up of surrounding fuels will be monitored to determine whether burn buffers are needed. North of the homestead precinct, burn buffers will reduce the risk to life and property. Visitors should be advised of safety precautions and evacuation procedures in the event of fire.

There is little chance of fire spreading from the Park into Denham or Monkey Mia, due to the predominant southerly winds and the protection of these centres by natural fire barriers such as birridas, Little Lagoon and sparse fuels. It is more likely that fire could spread into the Park from these centres, particularly from the rubbish tip in Denham.

The risk to conservation values from wildfire is high given that threatened fauna are to be reintroduced to the Park. The dense ground vegetation in the north of the Park provides ideal habitat for reintroduced fauna, but also makes this the most fire prone area of the Park. Past wildfires have created a mosaic of fuel ages which offers some protection by breaking up fuel continuity.

Burn buffers are being established in the Park and the initial buffers are shown on Map 8. As part of Project Eden, it may also become necessary to conduct habitat management burns for wildlife conservation purposes. The requirements for burn buffers and habitat management burns will be reviewed in response to new information and management circumstances.

The fire management strategies for the Park are to:

- undertake a wildfire threat analysis of the Park and its environs, and update the analysis after each fire event;
- mitigate wildfire threats to life, property and environmental values using prescribed burn buffers;
- undertake strategic fire protection using fuel reduced buffers in the remainder of the Park;
- undertake habitat management burns according to an approved wildlife management program;
- prohibit open/wood fires (gas cookers are allowed), however communal camp fires may be allowed for interpretive purposes in group accommodation sites at the homestead precinct and safari camp; and
- develop mutual aid assistance plans for fire suppression.

These strategies will be regularly reviewed and amended as knowledge increases about fire ecology and fire behaviour in Acacia shrubland.

These strategies reflect the level of fire management resources of CALM's Gascoyne District and the undesirability of constructing additional tracks in the Park. Natural barriers (birridas), existing tracks and burn buffers will be used to break up fuel continuity and reduce the size of wildfires. The use of buffers recognises that there is little likelihood of adequate suppression resources being available to stop a wildfire. Some form of mechanical modification of fuels (scrub rolling) may be needed to minimise the risk of fire escape during buffer burning.

Burn Buffers

The most northern burn buffer will protect recreation sites and the proposed fauna reintroduction area north of the large birrida. A second burn buffer is being established across the middle of the Park, making use of the track to 10 Mile Cliffs.

Consideration will be given to whether burn buffers are needed in the south of the Park and around the homestead precinct to protect against ignitions from use of the Monkey Mia Road. Currently this area is sparsely vegetated and wildfires are likely to be small and patchy, however this situation needs to be monitored as the vegetation will change with the removal of grazing pressure.

11.4 Shell Beach Conservation Park

The wattle thickets of Shell Beach Conservation Park will burn but grazing has probably reduced the incidence of fire as there have been no major fires in the area for several decades.

A birrida to the north of the Park and grazed pastures to the south minimise the potential for fire to spread onto or from adjacent property.

There is little risk to life or conservation values from fire in the Park. There is easy road access for evacuation and a wide beach for refuge, and the cleared car park would provide some protection for visitors' vehicles in the event of fire. Prescribed burning to protect the Park is not warranted.

Shell Beach Conservation Park will be designated a 'No Planned Burn Area'. The fire management strategies are to:

- minimise the risk of human induced fire by prohibiting all open/wood fires; and
- in the event of fire, undertake fire suppression that avoids creating additional tracks on the Park and protects fences and other Park facilities.
-

11.5 Zuytdorp Nature Reserve

Numerous fires have occurred in the inland portion of Zuytdorp Nature Reserve over the past few decades. Up until the 1980s, it was common for fires to be lit in the area to encourage herb regeneration to feed goats and sheep. Lightning strikes are now the most common cause of fire. In January 1992, a lightning storm resulted in five fires which burnt large areas of the Reserve.

There is little risk to life from fire on the Reserve, as visitors could take refuge on the coast where sparse vegetation is unable to carry fire. The risk to property from fire is minimal, as there are negligible facilities on the Reserve, and the grazed pastures surrounding the Reserve minimise the potential for fire to spread onto adjacent property.

As fires occur naturally in the area, there is little concern for the effect of fire on vegetation and other conservation values.

Due to the Reserve's size, remoteness and lack of access, fire suppression would be extremely difficult and it is not feasible to establish buffer burns.

Zuytdorp Nature Reserve will be designated a 'No Planned Burn Area'. The fire management strategies are to:

- minimise the risk of human induced wildfire by prohibiting all fires (gas cookers will be allowed);
- ensure early detection of fire through liaison with the local community and relevant agencies; and
- in the event of fire, mobilise immediate monitoring and assess whether suppression is warranted or feasible.

RECOMMENDATIONS

Prescribed Burning

1. **Implement buffer burning and, where necessary, habitat management burning in Francois Peron National Park. The remainder of the terrestrial reserves will be designated 'No Planned Burn Areas'. (O)**

2. **Monitor the impacts of the designated burning regimes and if necessary, modify these regimes to take into account new information and management circumstances. (H)**

Pre-suppression

3. **Develop plans for fire suppression on Bernier, Dorre and other island Nature Reserves, including the requirements for equipment and transport. (H)**

4. **Use methods that minimise soil erosion and do not adversely affect conservation values in maintaining fire management access tracks. (O)**

5. **Maintain strategic water supply points**

within Francois Peron National Park. (O)

6. Prohibit open/wood fires in the terrestrial reserves (gas cookers will be allowed) except for approved communal wood fires which may be provided in Francois Peron National Park at the homestead precinct and safari camp. (H)

Suppression

7. In the event of wildfire on the reserves, monitor fires and assess whether suppression is warranted according to the values at risk, the fire behaviour and the feasibility of suppression. (O)

8. Contain wildfires that start in or may enter Francois Peron National Park. Wildfire should be contained within a management block defined by the burn buffers. (O)

Liaison

9. Liaise with Shires, the Bush Fires Board, local brigades, adjacent land holders and the local community regarding fire management on the reserves, including mutual aid arrangements. (H)

Information and Education

10. Provide information on the reserves' values and fire risks to improve visitors' awareness of fire safety and survival, and encourage their support for fire management programs. (O)

Research and Monitoring

11. Monitor the impacts of burning regimes and wildfires on environmental values. (O)

12.0 PLANT DISEASES

The objective is to prevent the introduction of plant diseases.

No serious plant diseases are known to exist in Shark Bay. Western Australia's most damaging plant disease, Phytophthora dieback, has been recorded as far north as Kalbarri National Park. The heath vegetation of Zuytdorp Nature Reserve is susceptible to dieback, though the risk is very low as the soils of the Reserve are generally too dry to sustain the disease.

RECOMMENDATIONS

1. Assess the risks of plant diseases being introduced to Shark Bay and where necessary take precautions to prevent infestations. (H)

2. Monitor areas of the reserves which may be susceptible to plant disease. (O)

13.0 INTRODUCED PLANTS

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

Weeds usually only become established in areas which have been disturbed by grazing, clearing or fire. Once an area has become disturbed, weeds can be introduced by vehicles, pedestrians, animals or wind.

Major weeds already present in Shark Bay and on some reserves include:

- Boxthorn (*Lycium ferocissimum*) - a serious, invasive weed that may colonise offshore islands and undisturbed sites
- Prickly turnip (*Brassica tournefortii*) - which has extensively invaded grazed Acacia shrublands and is the most common weed in Shark Bay
- *Urospermum picroides* - a thistle which has extensively invaded limestone outcrops
- Double gee (*Emex* sp.)
- Calthrop (*Tribulus terrestris*)
- Buffel grass (*Cenchrus ciliaris*)
- Ruby dock (*Rumex vesicarius*)

13.1 Bernier and Dorre Islands Nature Reserve

At least 12 introduced plant species are known to exist on the Reserve, probably as a legacy of pastoral attempts and occupation in the early 1900's. There is no evidence to suggest that introduced plants are having a significant, detrimental effect on the Reserve's values.

13.2 Other Island Nature Reserves

Weeds are reasonably common on the islands. Most are annual weeds which are introduced by birds and spread over areas that have been disturbed by seabird colonies. Weeds have not invaded the undisturbed heath.

The most common weeds should be monitored, including several grasses (*Avena* species - wild oats, *Hordeum* species - wild barley, *Bromus diandrus-brome* grass) and herbs (*Chenopodium murale, Centaurium melitensis* and *Sochus oleraceus*).

Boxthorn is a highly invasive shrub that should be controlled if detected.

13.3 Francois Peron National Park

Introduced plants are a legacy of the Park's pastoral history. Some introduced plants increase the Park's fire hazard, though to date, there has been no study of the disturbance, abundance, spread or environmental impacts of weeds in the Park. Weed populations should be monitored to see if the removal of grazing causes a decline in the abundance of introduced plants.

Two serious weeds which are present on Peron Peninsula and have potential to spread to the Park are ruby dock and buffel grass. These weeds are easily identified and should, if possible, be eradicated if detected in the Park.

Double gee is evident at most recreation sites and is easily spread by recreational use and management activity. Calthrop occurs extensively and prickly turnip is a common weed which has replaced native annuals in heavily grazed areas. Tobacco bush (*Nicotiana glauca*) is becoming more common in open disturbed sites south of the Park, but it has not been recorded in the Park.

Exotic trees have become well established around the homestead precinct over the past 40 years. These include tamarisks, Moreton Bay figs, olives, date palms and Aloes (*Agave americana*). These plantings are not invasive and are not known to have any adverse environmental effects. These exotic species provide excellent shade amenity and are an important part of the homestead precinct's heritage value and character. As such, future landscaping within the homestead precinct may include new plantings of exotic species which already exist at the site and are known to have little environmental impact.

Several old tamarisks at Herald Bight and at a site on the northwest coast should remain as a historic reminder of the area's past uses, but new plantings of exotic species are not warranted in the Park, other than at the homestead precinct.

13.4 Shell Beach Conservation Park

Prickly turnip, calthrop, double gee and buffel grass are common in the Park and are readily spread.

13.5 Zuytdorp Nature Reserve

The distribution and effects of weeds in this Reserve have not been studied, but weeds would likely occur around vehicle tracks and other disturbed areas.

RECOMMENDATIONS

1. **Monitor the response of weed populations to the removal of grazing. (H)**
2. **Establish and maintain an inventory of introduced plants on the reserves, and monitor these populations as resources permit. (M)**
3. **Prioritise and conduct weed control programs. (H)**
4. **Undertake weed control at key recreation sites as a means of maximising visitor comfort and minimising the spread of weeds (eg. double gee and calthrop). (H)**
5. **Ensure that recreational use and management activities cause minimal disturbance of native vegetation and minimise the potential for introducing or spreading weeds. (O)**
6. **Liaise with Agriculture WA, the Shire and adjacent land managers regarding weed control and the prevention of introducing weeds in the reserves. (O)**
7. **Provide interpretation for visitors regarding the spread and control of weeds. (O)**
8. **Retain introduced trees at the Peron homestead precinct and Herald Bight and consider using existing species in new plantings in the homestead precinct subject to the species' not causing environmental problems. (O)**

14.0 INTRODUCED ANIMALS

The objective is to minimise the impacts of introduced animals on the reserves' values.

14.1 Bernier and Dorre Islands Nature Reserve

Five introduced mammal species have been recorded on the Reserve but are no longer present. Most of these species were probably introduced during periods of human occupation from 1896 to 1918.

Cats and house mice were recorded in a 1910 survey, but not subsequently. Goats did not persist on Dorre Island but they thrived on Bernier Island and were finally eradicated in 1984. Sheep were grazed on Bernier Island for less than 10 years in the early 1900's and apparently were not taken to Dorre Island. A horse was kept on Bernier Island during the Lock Hospital era.

There would be a significant risk to conservation values if feral animals (particularly predators) were introduced onto the islands.

14.2 Other Island Nature Reserves

The house mouse was recorded on Three Bays Island during surveys in 1989 and in 1997. No other introduced animals are known to occur on the island Nature Reserves.

14.3 Francois Peron National Park

Project Eden commenced in 1995 to control introduced predators and herbivores on Peron Peninsula, to enable the re-establishment of threatened fauna species which occurred in the area prior to European settlement. The reintroduction of threatened fauna began in September 1997 when populations of introduced predators had been reduced to predetermined levels.

Baiting and trapping have been the main forms of control for foxes and cats. Few foxes have been sighted on the Peninsula since mid 1996, and cat numbers have been significantly reduced.

Rabbits are prolific on Peron Peninsula. Baiting will be used for rabbit control and myxomatosis has been introduced. Rabbit Calicivirus Disease was introduced in November 1996 with little success.

Since 1991 almost 40 000 goats and sheep have been trapped or shot. Few goats and sheep remain and an intensive eradication program is in progress. Cattle have been eradicated from the Park.

House mice are prevalent but have not been targeted for control during Project Eden.

14.4 Shell Beach Conservation Park

The control of introduced animals in the Park will be integrated with Project Eden control programs. A barrier fence across Taillefer Isthmus on the Park's boundary keeps goats, sheep, foxes, cats and rabbits from reinvading Peron Peninsula. Intensive baiting will also occur in this area.

14.5 Zuytdorp Nature Reserve

The Reserve is heavily populated by goats and the damage to vegetation and landforms is extensive. Feeding competition by goats has probably depleted food stocks for native herbivores. Goat control must be conducted over a broad area and in cooperation with adjacent land managers to be effective.

Other introduced animals on the Reserve include foxes, rabbits, cats and possibly camels.

RECOMMENDATIONS

1. **Develop, prioritise and implement operational plans for the control of introduced animals. (H)**

2. **Liaise with Agriculture WA, the Shark Bay Land Conservation District Committee and adjacent land managers to coordinate introduced animal control programs. (O)**

3. **Provide information for the local community and visitors to interpret introduced animal control programs, and to advise of regulations which prohibit domestic animals on the reserves. (O)**

4. **Develop and promote a code of conduct for boating to minimise the risk of introducing animals onto islands. (H)**

5. **Prepare contingency plans detailing actions to be taken if an introduced animal invades a reserve in which it has not been previously recorded. (H)**

15.0 REHABILITATION

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

Degraded areas of the reserves include vehicle tracks that are not essential for recreation or management access, poorly sited recreation areas and pits for the extraction of raw materials. The results of disturbance can cause soil erosion and/or compaction, degradation of visual landscapes, changes to natural assemblages of plants and animals and safety hazards.

Degraded sites will be rehabilitated in accordance with CALM Policy Statement No. 10 (Rehabilitation of Disturbed Land). As outlined in this policy statement, CALM will:

- prevent disturbance-causing activities wherever possible;
- plan recreation and management activities to minimise the extent of disturbance; and
- ensure that land which has been disturbed is rehabilitated, as far as practicable, to meet the needs of the designated land use.

15.1 Bernier and Dorre Island Nature Reserve

Extensive sand drifts on Bernier Island are believed to have been exacerbated by several decades of grazing by goats. The area of unconsolidated sand has no apparent adverse effects on fauna values. Extensive rehabilitation of the sand drifts is neither warranted or practical.

Pedestrian access has caused minor disturbance of steep landforms near a least one of the coastal landing sites, Disaster Cove.

15.2 Other Island Nature Reserves

Guano mining on several of the islands caused major changes to plant assemblages though rehabilitation is not warranted.

15.3 Francois Peron National Park

Feral predators and grazing have altered the ecology of the Park, but it is possible that these disturbances will rehabilitate naturally as feral animals are controlled and the Park's flora and fauna recovers. Regular monitoring will be conducted to assess the natural rehabilitation processes.

The Park's roads and recreation sites were established during the pastoral era and have resulted in the degradation of coastal landforms and scenic values. Minor road works and site redevelopments have been implemented to restore severely disturbed coastal sites, but all recreation sites need to be refurbished and a major realignment of all roads is required. Disused station tracks and fence lines will be progressively rehabilitated.

Red Cliff, near Monkey Mia, requires extensive rehabilitation to restore landforms around the extraction pit and on the coast. The extraction pit has a major detrimental impact on landforms and scenic values, and is a constraint to the area's recreational potential. The pit was last used during the construction of the Denham-Monkey Mia Road in 1989. Proposed developments at Monkey Mia are likely to generate significant demand for further extraction from this pit. Severe erosion gullies occur on the coast adjacent to the pit, and major works are required to restore washouts and realign vehicle and pedestrian access in the area.

A disused airstrip reserve located in a birrida adjacent to the Park's south boundary is proposed for inclusion in the Park. The strip's hardened surface was ripped by the Shire in 1995 to encourage rehabilitation.

15.4 Shell Beach Conservation Park

In 1993, the beach was ripped to alleviate the compaction and visual degradation caused by a previous shell grit quarry and many years of vehicle traffic. Further rehabilitation work is needed to smooth the furrowed rip lines.

Fencing was installed to prohibit vehicle access on the beach at the main visitor site, but the rest of the Park is not fenced and uncontrolled vehicle access is causing significant degradation of coastal landforms.

15.5 Zuytdorp Nature Reserve

The impacts of goats on the Reserve have not been assessed but are likely to be causing significant degradation of landform stability, scenic values and wildlife habitats.

Several vehicle tracks along the coast are superfluous and should be rehabilitated. A temporary airstrip cleared in 1993 will not be maintained and will be left to

rehabilitate naturally.

RECOMMENDATIONS

1. **Rehabilitate degraded areas in accordance with a rehabilitation program which defines priorities and monitoring requirements. (H)**

2. **Rehabilitate Red Cliff in Francois Peron National Park as a priority and in accordance with a site development and rehabilitation plan for the area. (H)**

3. **Control recreational use and management activities, particularly vehicle and pedestrian access, to minimise the degradation of landform stability and scenic values. (O)**

4. **Facilitate the natural rehabilitation of disturbed areas by controlling the degrading processes, such as feral animals and uncontrolled vehicle access. (O)**

RECREATION AND TOURISM

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

16.0 RECREATION AND TOURISM STRATEGY

CALM's "Recreation and Tourism Strategy 1996-2000" describes the Department's approach to managing nature-based tourism and recreation. The Strategy provides a framework for CALM's planners and managers, and provides a set of principles for developing and delivering opportunities, services and facilities while continuing to protect the natural areas on which these activities are based.

As stated in the Strategy, the vision for CALM's Recreation and Tourism Program is to:

Provide world-class recreation and tourism opportunities, services and facilities for visitors to lands and waters managed by CALM while maintaining in perpetuity Western Australia's natural and cultural heritage.

The Strategy incorporates principles for ecological sustainability, visitor safety, providing equity for use of CALM's estate, providing the spectrum of opportunities required by our customers, enriching visitor experiences and being accountable for the services and facilities provided. It also provides a basis for developing partnerships that involve other groups in providing services and managing the public estate with CALM.

These principles guide the development of the Midwest Region's Recreation and Tourism Action Plan and the Gascoyne District's annual works programs.

The Strategy is complemented by CALM's Policy Statement No. 18 : Recreation, Tourism and Visitor Services, which provides operational and administrative guidelines for the management of recreation and tourism.

16.1 Recreation Opportunities

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

The natural attributes and unspoiled environment are the principal qualities that appeal to residents and visitors to Shark Bay.

A 1993 survey of users of the World Heritage Property showed that most people believe that the most important feature of Shark Bay is its natural attributes. In particular, the undeveloped and unspoiled natural environment and the flora and fauna are regarded as special values.

About 100 000 people visited the Shark Bay World Heritage Property in 1997 and it is likely that visitor numbers will increase significantly during the next 10 years. Increasing visitation has the potential to degrade those values which attract people in the first place. It is therefore important that recreation and tourism facilities are developed in a manner which preserves the area's intrinsic appeal as a relatively undeveloped natural environment.

A regional perspective is essential when planning for recreation opportunities in the reserves. Close liaison with the Shires and other relevant authorities will encourage an integrated approach to management of the region's recreation and tourism assets and opportunities.

CALM will provide nature based recreation opportunities that:

- enhance visitor appreciation of natural and cultural values;
- are sustainable;
- do not impair recreation experiences due to conflicting uses;
- maintain the natural qualities of recreation settings;
- provide for the basic needs and safety of all visitors; and
- where practical, meet the needs of a variety of user groups.

RECOMMENDATIONS

1. **Protect the unique features and recreation opportunities that attract visitors to the area. (O)**

2. **Liaise with the Shires and other relevant authorities to ensure that recreation opportunities provided in the reserves complement opportunities available elsewhere in the region. (O)**

3. **Provide recreation facilities which meet the needs of visitors and have minimal impact on the environment. (O)**

4. **Monitor the environmental impacts of visitation and use this information to refine management practices. (O)**

5. **Liaise with tourism organisations and commercial tour operators to ensure that the reserves are promoted appropriately. (O)**

16.2 Access

The objective is to provide and maintain a structured access system which is consistent with the protection of the reserves' values.

Most of the roads and vehicle tracks on the reserves have developed on an unplanned basis over many years. This has led to an uncoordinated network of tracks, many of which are badly located, are in poor condition and are unsuitable for both recreation and conservation purposes. It is proposed to rationalise vehicle access by realigning and stabilising designated routes, and closing and rehabilitating tracks which are not required. Track rationalisation is necessary due to factors such as unnecessary duplication, erosion, degradation of scenic quality and visitor safety.

Rationalisation of vehicle access in the reserves needs to consider:

- location of feature sites and interpretive opportunities;
- susceptibility to erosion;
- protection of biota;
- protection and enhancement of visual qualities;
- access requirements for management;
- visitor needs and expectations; and
- visitor safety.

Walk trails can enhance visitors' experiences of the reserves. Walking is an activity enjoyed by people of all ages, interests and levels of fitness. A range of walk trails is required to meet the needs of this diverse user group.

A number of opportunities to explore the reserves by foot will be developed, incorporating a range of experiences, landscapes and lengths of walks. Due to the extremely hot climate, lack of surface water and the area's isolation, some caution will be taken in designing new walk trails.

Pedestrian access will be developed using the following guidelines:

- walks will be provided in areas capable of sustaining use;
- walks should be circuits or loops where possible;
- walk routes should be located to provide maximum visual diversity and access to key interpretive elements;
- access will be discouraged or prohibited if necessary;
- access for people with disabilities will be provided where possible.

Horse-riding is not permitted in nature reserves and is only permitted in national parks and conservation parks where the impacts can be managed. Potential impacts include the introduction of weeds, spread of disease, damage to flora, disturbance of fauna, soil erosion and conflict with other users. There is currently no demand for horse-riding in any of the terrestrial reserves. Whilst individuals have access to South Peron for "free-range" riding, it may be appropriate to permit guided commercial horse-treks in Francois Peron National Park given the Park's pastoral heritage. Similarly, there may be potential for camel treks in the Park. Horse and camel riding will not be permitted in any of the other terrestrial reserves.

Many areas of the reserves are accessible by boat. Boating generally has little impact on the physical environment of the terrestrial reserves, though boat traffic can disturb fauna at some locations or during particular times such as seabird breeding seasons. Boat access at key recreation sites may need to be controlled to avoid conflicts with other visitors.

RECOMMENDATIONS

1. **Rationalise access in each of the reserves. (O)**

2. **Where necessary, manage access to control the intensity, duration, location and times of use. Access limitations will be introduced if recreational use poses undue risks to visitor or the reserves' natural or cultural values. (O)**

3. **Maintain and improve vehicle access in keeping with CALM's roading standards and the development of facilities. (O)**

4. **Prioritise the development of walk trails in the reserves. (H)**

5. **Monitor the condition of access in the reserves and maintain and upgrade as required. (O)**

6. **Prohibit access for individual horse or camel riding on the reserves, but consider applications for commercial guided treks in Francois Peron National Park on specific tracks or trails. (O)**

7. **Monitor and manage boating adjacent to the reserves, to ensure that boating does not conflict with conservation objectives and other recreational users of the reserves. (O)**

8. **Consider interpretive opportunities when designating recreational access. (O)**

16.3 Recreation Areas

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

Many of the reserves' recreation areas are unplanned and of a fairly poor standard. Recreation areas are often poorly defined and subject to environmental degradation. Visitor safety is an issue at a number of sites.

Almost all existing recreation areas require some form of redevelopment. A few areas will be closed for recreation, and several new recreation areas and opportunities will be developed.

The redevelopment of recreation areas should help alleviate the impacts of use. Visitor impacts and changing visitor expectations need to be monitored regularly and managed.

RECOMMENDATIONS

1. **Ensure that site development plans are produced before development works are undertaken. (O)**

2. **Monitor changes at recreation sites and keep regular photographic records. The main indicators of change will be landform stability and vegetation cover. (O)**

3. **Conduct visitor surveys to monitor changes in visitor use and visitor expectations. (O)**

4. **Maintain and upgrade recreation areas and facilities as required. (O)**

5. **Close and rehabilitate recreation sites which cannot sustain the existing levels of usage or are inappropriately located. (O)**

16.4 Commercial Tourism Activities

The objective is to ensure that commercial tourism activities are conducted in a manner consistent with the protection of the reserves' values.

To enhance visitor use and enjoyment of CALM-managed lands, permission may be granted for commercial concessions to provide appropriate visitor services. Through these services, potential exists to promote environmental awareness and generate income to assist in the management of the reserves.

With the growing popularity of nature based tourism, opportunities exist for partnerships between CALM and private sector tourism operators. CALM has a complementary role with the tourism industry in managing and presenting natural assets. Commercial visitor services will be managed to provide visitors with opportunities to appreciate the reserves, and at the same time ensure that the reserves' natural and cultural values are preserved in perpetuity.

All commercial visitor services operating on CALM-managed reserves must have a licence or lease issued by CALM. Licences are granted for services such as tours which enter and use land on an itinerate basis and generally do not involve substantial infrastructure. Leases are granted for services which occupy land and involve exclusive rights of access for uses requiring substantial infrastructure, such as accommodation and retail facilities.

Commercial tourism activities will be monitored to determine their environmental impacts. Operating conditions will be regularly reviewed and modified to address specific problems. If necessary, licences can be cancelled.

Commercial operators deal with visitors on a regular basis and play a significant role in disseminating information. Close liaison and training should be facilitated to improve commercial operators' understanding of the area's values and management issues, and to enhance visitors' experiences. This is sometimes difficult to achieve where there is a rapid turnover of tour leaders and operators are not locally based.

RECOMMENDATIONS

1. **Identify opportunities for commercial visitor services on the reserves. (O)**

2. **Issue leases and licences consistent with statutory requirements and the purpose of the reserve. (O)**

3. **Regulate commercial visitor services through the numbers of licences and leases issued and operating conditions, to ensure that they do not compromise the value and sustainability of the natural resource. (O)**

4. **Require commercial operators to maintain appropriate safety standards with respect to their clients and other visitors. (O)**

5. **Liaise with tour operators, the WA Tourism Commission and local tourism groups so that they are aware of management initiatives and to ensure the promotion of the reserves is consistent with management objectives. (O)**

6. **Facilitate liaison with and training of commercial operators through appropriate means. (M)**

16.5 Visitor Safety

The objective is to minimise the potential for injuries and misadventure to visitors, in a manner that does not render the environment sterile or unnecessarily diminish visitor use and enjoyment.

CALM's Visitor Risk Management Policy (Policy Statement No. 53) outlines the Department's responsibilities for considering the safety and welfare of visitors to CALM managed lands and waters.

The policy provides clear guidelines for implementing visitor risk management programs. Some of the key strategies of this policy are to:

- carry out periodic safety audits on all recreation sites, facilities and visitor services;
- maintain an information system to monitor the condition of sites and facilities and the occurrence of safety incidents;
- obtain appropriate indemnity from commercial users of CALM managed estate; and
- provide public safety programs to enable visitors to act in an informed manner in providing for their own safety.

A visitor risk management program for the reserves will be established and regularly updated. This program will evaluate the risks to visitors, assign priorities for risk management within available resources and establish action plans for risk control.

The main factors which have contributed to safety incidents on the reserves are the arid climate, hazardous terrain and remoteness. Most of these risks can be largely managed by providing pre-visit information and on-site signs at strategic locations. Additional on-site facilities may be required, such as the establishment of safe lookout sites at key recreation areas on the coastal cliffs.

There are several safety issues peculiar to Francois Peron National Park which are addressed in Section 19.0.

RECOMMENDATIONS

1. **Establish and implement a visitor risk management program for the reserves, in accordance with the Visitor Risk Management Policy. (H)**

2. **Incorporate safety messages in information for visitors to the reserves. (O)**

3. **Provide facilities at key recreation sites to maximise visitor safety. (H)**

4. **Ensure staff are trained in visitor risk assessment and management procedures. (H)**

17.0 BERNIER AND DORRE ISLANDS NATURE RESERVE

Bernier and Dorre Islands Nature Reserve is one of the most important areas for nature conservation in Australia. In 1970, Bernier Island was gazetted a "limited access area" for day use only and Dorre Island was gazetted a "prohibited area" closed to all persons without specific approval. The intent of these access restrictions was to protect the islands' conservation values and allow scientists to measure any disturbance caused by human use against an untouched area. However, these restrictions have never been fully enforced and visitors from Carnarvon have camped on both islands for many years.

This plan proposes that both islands be available for day use recreation and that overnight use be prohibited. Due to the history of local people camping on the Reserve, there was considerable debate during the preparation of this plan over whether overnight use should or should not be allowed. It was felt that if limited and controlled camping was permitted, many local visitors would appreciate this access concession and would likely respect controls and limitations on their use, such as no campfires. However the main concern with allowing overnight use is that it would generate an enormous amount of interest and increased use by recreational boaters and fishers from around the State and elsewhere. If camping was allowed, the expected additional

recreational use would significantly increase the risks to conservation values. Increased numbers of visitors would also likely have a detrimental effect on the enjoyment of the islands by local users.

During the preparation of this plan, advice was sought from the NPNCA and CALM's Corporate Executive on the issue of overnight use of the Reserve. Their recommendation to prohibit overnight use on the Reserve recognises that the exceptional conservation values of the Reserve should not be compromised for the convenience of a few recreational visitors. This recommendation will not be welcomed by many boat users living in Carnarvon, so its implementation must be well resourced to ensure effective community consultation and education. These access provisions should not prevent use of the islands in emergencies where human safety is at risk, such as in the advent of an accident or unexpected bad weather.

Recreation Values and Use

For much of the time, Bernier and Dorre Islands are windswept and difficult to land on, and the 50 km passage from Carnarvon can be very rough. But during fine weather, the islands can be reached relatively easily and are visited by local people for recreation.

It is estimated that 15 to 20 recreational vessels based in Carnarvon may be used to periodically access Bernier and Dorre Islands. For local boating residents, the islands are an important recreational resource. Occasionally the islands are visited by groups associated with the Carnarvon Yacht Club, fishing clubs, commercial fishing boats and fishing charters. Sailors travelling past the area might sometimes anchor at the islands and come ashore.

In 1994, a survey questionnaire was distributed amongst Carnarvon residents who land on the islands. It was found from this survey that most respondents (76%) land on the islands less than seven times each year, usually during winter. Most visiting parties (69%) consist of three to five people and most visitors (76%) will camp onshore. Most campers (62%) only stay for one night during each trip and many overnight visitors primarily use the islands to anchor and camp whilst fishing in the area.

The survey confirmed that most day visits (92%) and overnight use (94%) occur at the four main anchorage sites which are Hospital Bay and Red Cliff Point on Bernier Island, and Disaster Cove and White Beach on Dorre Island. Boats usually anchor offshore but at Disaster Cove, shallow-draft vessels are moored to the shore with ropes. Most overnight visitors (80%) camp on the beach or dunes, and many (53%) will stay on the beach and not walk inland.

Comments made by survey respondents showed that the majority of visitors endorse the need for a high degree of protection for the islands' conservation values. Most visitors feel that low-key recreational use should be allowed and the unspoilt naturalness must be protected. Many respondents stated that developments such as buildings, jetties and an airstrip are inappropriate. Several comments suggested that visitors could assist with management of the islands by monitoring use.

Potential Visitor Impacts

The visitor survey showed that most visitors camping ashore have a campfire and a third of these fires are fuelled by wood collected on the islands. Firewood collection can degrade local habitats, but the most significant threat to the islands' habitats and conservation values is the risk of wildfire. Open/wood fires should therefore not be permitted.

Another significant threat to the islands' conservation values is from visitors bringing animals ashore, particularly introduced predators such as cats, foxes or rats which can have a severe impact on threatened fauna populations. Visitors will be encouraged to report any sightings of non-indigenous animals. Vessels other than dinghies should not be beached to minimise the risk of pests such as mice or cockroaches being introduced.

The islands' threatened fauna appear not to be adversely affected by encounters with people. However, beach nesting animals such as seabirds and turtles may be disturbed by visitor activities. Education will be required to minimise the potential for visitors to disturb native fauna.

Habitat degradation has occurred in some areas as a result of camping. Some landforms may be vulnerable to damage from pedestrian traffic, particularly the soft, steep coastal cliffs adjacent to the main visitor sites. Minor erosion from pedestrian use is evident at Disaster Cove, though there has been no thorough assessment of the impacts of visitation on landforms.

The number of visitors who currently use the islands is fairly low and is not likely to increase whilst camping is prohibited. Nonetheless, it is essential that accurate visitor information and statistics be maintained to help determine visitor management strategies.

To ensure that recreational use has minimal impact on the Reserve's conservation values, CALM will implement programs for community consultation, information, education, visitor registration, surveillance and enforcement.

Commercial Tourism Activities

There have been various proposals to establish airstrips,

jetties, resorts and other tourist accommodation and facilities on the islands. In recent years, island-based tourism facilities have been suggested as a means of developing Carnarvon's potential fishing charter industry, to provide quick and easy access to adjacent fishing grounds. Such developments are however clearly not compatible with protecting the islands' conservation values.

Currently, fishing charter groups occasionally land on the Islands and there may be future interest for diving, whale watching or surfing tours at or near the islands. There has also been recent interest from the Aboriginal community to conduct cultural tours of the islands.

Commercial services on nature reserves are only permitted and licensed for scientific and educational purposes. In considering applications for commercial tours on the islands, CALM will liaise with the Aboriginal Affairs Department to determine appropriate licence conditions for the protection of cultural values.

The viability of prospective tourism ventures on the islands will be constrained by unpredictable weather patterns and boating conditions.

RECOMMENDATIONS

1. **Prohibit the establishment of permanent structures or facilities for recreation or tourism such as accommodation, jetties or aircraft landing grounds. (O)**

2. **Do not promote the Reserve for recreation. (O)**

3. **Allow day use access on both islands but prohibit camping. Overnight use may be permitted for approved research and management projects. (O)**

4. **Liaise with the Carnarvon and wider communities in matters relating to recreation management. (O)**

5. **Encourage the Carnarvon community to be involved in management of the Reserve (eg. through the Honorary CALM Officer program). Consider establishing a "Friends of the Islands" group. (H)**

6. **Assess recreation sites and prepare recreation development plans for Hospital Bay, Red Cliff Point, Disaster Cove and White Beach. (M)**

7. **Prohibit open/wood fires, but allow gas barbecues to be provided at designated recreation sites. (O)**

8. **Implement community involvement and education programs to promote use of gas cookers and discourage open/wood fires. (H)**

9. **Provide information for visitors about the islands' values, conditions and regulations for use of the Reserve, guidelines for minimal impact use, and safety hazards and precautions. (H)**

10. **Collect and maintain appropriate visitor information and statistics. (H)**

11. **Only consider access for commercial tours which are part of an approved scientific program. (O)**

18.0 OTHER ISLAND NATURE RESERVES

Recreation Values and Use

There has been no survey of recreational use on the existing and proposed island Nature Reserves. Visitation is however evident on several islands, particularly Salutation, Baudin and Three Bays Islands. These 3 islands are relatively large and have safe anchorages, diverse scenic values and sandy beaches for landing and recreation. Most of the other islands are difficult to land on and are not attractive for recreation. The waters around most islands are used for fishing and diving.

Potential Visitor Impacts

The presence of humans on the islands has significant potential to disturb the islands' fauna and damage the vegetation. Monitoring of use and impacts is required, and if the conservation values of particular islands cannot sustain the effects of visitation, access restrictions will be introduced.

There are no defined paths on the islands and pedestrian movement can degrade landforms, trample vegetation and introduce or spread weeds. Visitors are not allowed to make campfires or bring animals ashore, but the remoteness of the islands makes the enforcement of regulations difficult. Misuse can adversely impact on the islands' conservation values.

The movement of boats and diving around the islands can disturb colonies of breeding birds, resulting in eggs and hatchlings being taken by predatory birds. Most islands are used for breeding at some time during each year and the boating public needs to be made aware of how to avoid disturbing the island's birdlife.

Restrictions on access to and around some islands may need to be introduced where bird breeding colonies are particularly sensitive to disturbance.

Recreation Areas and Facilities

On-site facilities will be limited to those required for visitor education and to define areas of use. Information is needed at key sites on the mainland to advise visitors on use of the islands and their surrounding waters.

Commercial Tourism Activities

Charter boat operators are not known to take tours onto any of the island Nature Reserves. CALM would only permit commercial tours on the island Nature Reserves which are for scientific and educational purposes.

Charter boat operators should be well briefed on the islands' sensitivity to disturbance and should be encouraged to assist with monitoring visitor use and seabird breeding in the vicinity of the islands.

RECOMMENDATIONS

1. **Allow day use visitation on the island Nature Reserves, subject to access restrictions which may be required to protect conservation values. (O)**

2. **Prohibit overnight use on all of the islands. (O)**

3. **Strictly enforce the prohibition of open fires. (O)**

4. **Provide information to raise public awareness about appropriate behaviour on and around the Islands. (H)**

5. **Seek assistance from the community with management of the islands, particularly with monitoring seabird breeding and visitor activity on or around the islands. (H)**

19.0 FRANCOIS PERON NATIONAL PARK

Francois Peron National Park is likely to become one of the major destinations for visitors to Shark Bay due to:

- the Park's proximity to the main visitor centres of Denham and Monkey Mia;
- its spectacular scenery and wildlife values, including features of World Heritage significance;
- the diverse opportunities for nature-based recreation;
- the heritage, charm and potential for development of the Peron homestead precinct: and
- public interest in Project Eden.

Recreation Values and Use

In 1996, approximately 25 000 people visited the homestead precinct and about 10 000 visitors travelled to the coastal sites north of the homestead precinct. This represents a major increase in visitation since the purchase of the pastoral lease in 1990. There has also been increasing interest in and demand for a range of nature-based recreation activities in the Park, and it has become evident that visitor expectations exceed the quality of facilities and experiences currently available. Natural features of special attraction to visitors are largely coastal - lagoons, beaches, cliffs, mangroves, dunes, headlands and pristine coastlines.

The 1993 Shark Bay World Heritage Property User Survey showed that the main activities in the Park were sightseeing, fishing and soaking in the artesian hot tub. Survey respondents were asked how the Park could be improved and the most popular response was to improve the road to the homestead precinct and generally upgrade Park roads. Respondents also suggested that the Park should be left as is and not over commercialised, and many felt that there should be more information, interpretation and education.

A public workshop held in Denham in 1994 sought input from local people about future management of the Park. Most of the issues raised by the community related to recreation and tourism. Recommendations made by the workshop groups have largely been incorporated into this plan and include:

- the rehabilitation of degraded coastal sites and definition of recreation areas;
- provision of walk trails with long and short walks and opportunities for wilderness hikers;
- provision of toilets and gas barbeques;
- development of the homestead precinct as the Park's focal point and information centre;
- provision of more facilities and minor commercial use at the homestead precinct;
- preservation of the homestead precinct's cultural values;
- upgrading the road to the homestead as a high priority;
- upgrading most roads for 2WD access; and
- conservation of natural areas.

The Park contains or enables access to several features of World Heritage significance including spectacular coastal scenery, Big Lagoon, birridas, wildflowers, threatened species and a diverse and abundant marine fauna. One of

the goals for management of the World Heritage Property is to present these features and encourage greater appreciation of their universal values.

Management Zones

Zoning is used in national parks to communicate management intentions and define the level of recreation that can be sustained on particular areas of land. Francois Peron National Park has been zoned according to the area's environmental and cultural values, land use capabilities, visitor needs and management requirements.

Two types of management zone have been allocated to Francois Peron National Park (see Map 8):

Natural Environment Zone

The management priority of this zone is to maintain the environment in its natural state with minimal impairment. Major recreation sites will not be developed, though areas may be able to sustain a selected range of low-density activities with minimal facilities. Non-motorised recreation activities will be preferred. Public vehicle access will be provided as indicated on Map 8. Some use of management tracks may be permitted for nature based tourism activities. The visual evidence of management will be minimised.

Recreation Zone

Recreation zones will be managed to accommodate a broad range of recreation opportunities in ways that respect the natural landscape and are safe and convenient. These zones include sites which can sustain a range of recreation activities of moderate to high intensity. The impacts of visitor activities will be managed through the provision and sensitive design of access and facilities. Vehicle access should be separated from pedestrian use where possible. Visible evidence of management may be moderate to high.

Vehicle Access

Vehicle access in the Park is generally recommended for 4WD vehicles only and roads are generally in poor condition. All existing roads were built for pastoral purposes and are inadequate for tourism and recreational purposes. Many roads traverse sensitive landforms such as birridas and steep dunes, and recreational traffic has accelerated landform degradation at many locations. The existing roads are unsightly and offer few opportunities for travellers to appreciate the landscape and coastal vistas. There are also instances where roading degrades the Park's scenic quality and is a risk to visitor safety.

Minor road works have been implemented to protect and rehabilitate coastal sites which were severely degraded by vehicle access. Eventually all of the Park's roads will need to be realigned and constructed to standards which allow for increased visitation, minimal environmental disturbance and improved visitor safety.

Conceptual new road alignments are shown in Map 8. The main considerations in determining the proposed road system are:

- the attraction of features at existing destinations and potential recreation sites;
- interpretive opportunities;
- the capacity for landforms and biological communities to sustain vehicular, pedestrian and boat access;
- the condition, safety and environmental impacts of existing roads;
- scenic opportunities along existing and proposed alignments;
- feasibility and cost of construction and maintenance; and
- access requirements for management, such as for research, safety and fire management.

As most visitors to Shark Bay travel in private 2WD vehicles, there is increasing demand and justification for providing 2WD access in the Park. The provision of 2WD roads would enable more equitable access for visitors to the World Heritage Property, and greatly enhance the regions tourism opportunities. However, some areas of the Park should be kept for 4WD access to maximise the range of recreation activities and experiences available in the Park.

Within the next 10 years, it is proposed that a new 2WD road will be provided to Big Lagoon. When this occurs, Big Lagoon will become a day use area closed to camping. The road north of Big Lagoon will need to be realigned but it should remain a 4WD access during the term of this plan. A long-term roading plan needs to be developed to identify the priorities and staging of road works.

The construction of a new 2WD road from the Monkey Mia Road to the homestead precinct is a very high priority as the existing road is severely degraded and hazardous. This new road would also facilitate the development of the homestead precinct as a major site for Park management, visitor orientation, interpretation, education and other recreational and tourism uses. The homestead precinct has the potential to generate significant tourism revenue which can then be used to fund works for the protection, rehabilitation and development of other sites in the Park.

Management tracks will be retained primarily for the management of conservation values though some access for nature based tourism may be permitted.

Other Access

Pedestrian trails have only been developed at the homestead precinct but trails are proposed at other visitor sites. Defined walk trails and lookout points are priorities at sites where uncontrolled access is degrading Park values, such as at Cape Peron where steep dunes are being eroded. Walk trails are also important to guide visitors to features which are sometimes not apparent or are difficult to access by vehicle.

Bushwalking and overnight hiking in remote areas of the Park will become more popular as a means to explore and appreciate nature and the environment at close quarters. Such use will be managed to encourage safety and minimal environmental impact. Hikers may need to camp at designated sites.

Planning for pedestrian access needs to consider:

- interpretive opportunities;
- catering for disabilities and various fitness levels;
- visitor safety;
- potential environmental impacts such as erosion, the introduction and spread of weeds, fauna disturbance and fire risk; and
- track maintenance requirements.

Past interest in conducting commercial camel and horse treks in the Park indicates there may be demand for these activities. Guided treks may provide opportunities for interpreting the Park's pastoral heritage and giving visitors a different perspective of the Park. Such activities would be controlled and monitored to minimise environmental impacts. Individual or "free-range" riding will not be allowed in the Park and can be accommodated on South Peron.

Boat launching areas in the Park will continue to be managed to minimise impacts such as erosion, compaction, removal of vegetation, littering and conflicts with other Park users. Much of the Park's coastline is suitable for boats to land at remote beaches for camping and day trips. This type of use will be monitored and if necessary, such activities will be managed to minimise impacts and conflicts.

Another way to experience the Park is by aircraft. Current use has no known impacts, but increasing numbers of charter flights could impact on the enjoyment of the Park by other visitors. If necessary, flight guidelines will be developed for the Park. There is an airstrip adjacent to the Park and no fixed wing aircraft landing will be allowed in the Park, other than for management purposes. Helicopter transport may be considered in the future and proposals will be assessed on a case by case basis.

Recreation Areas and Facilities

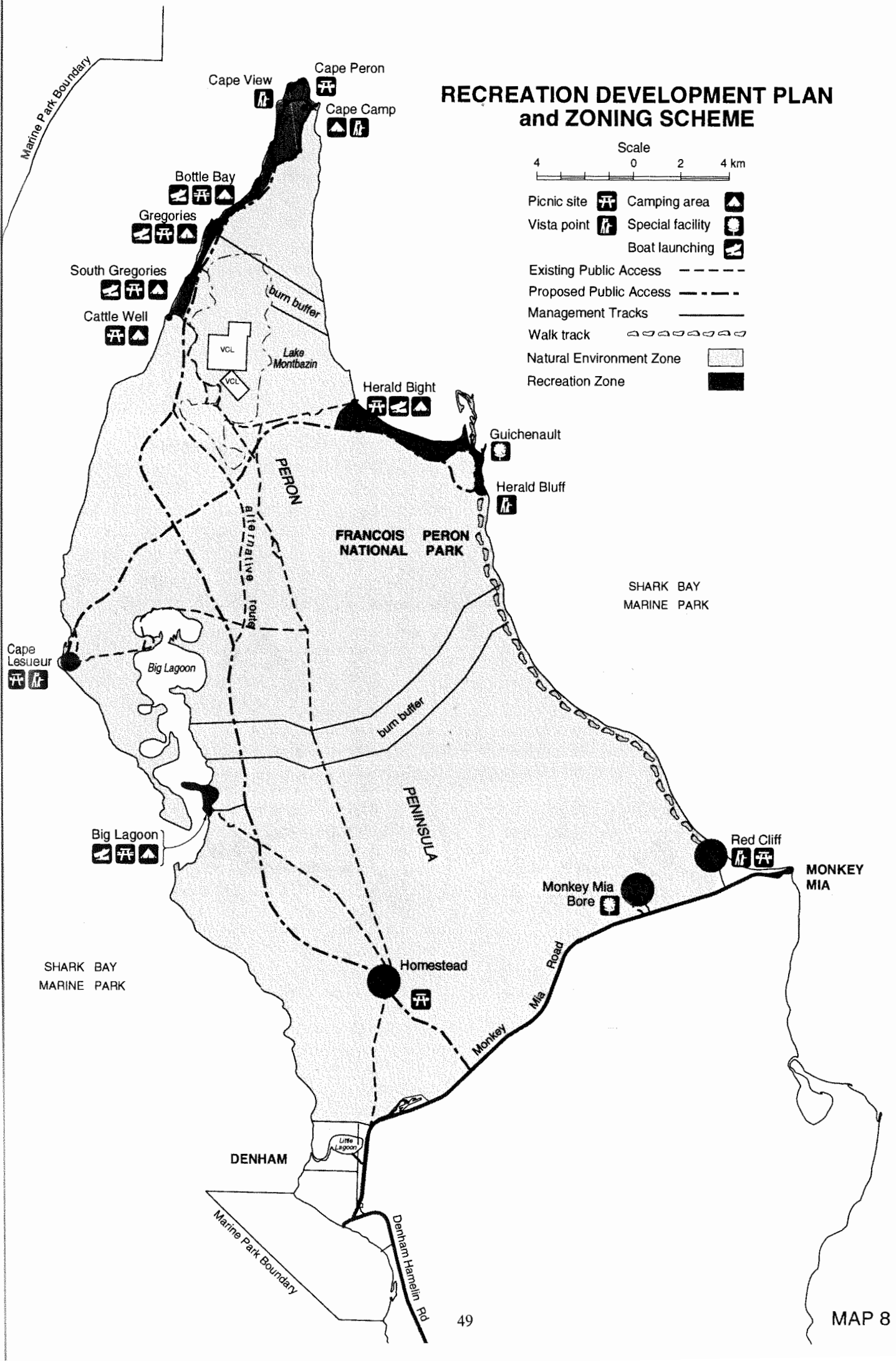
Recreation areas in the Park are a legacy of the pastoral era when sites evolved without consideration for carrying capacity or long term sustainability. Coastal sites are generally of a poor standard with evident signs of landscape degradation and loss of amenity. Some sites, notably coastal cliffs and birridas, present safety risks to visitors.

The Recreation Development Plan and Zoning Scheme Francois Peron National Park (Map 8) shows areas that have been assessed as being able to sustain day use, camping and boat launching. Several existing sites will be closed to recreation or overnight use due to factors such as the lack of attractions or features, limited site capacity, access difficulties, erosion problems, degradation of scenic quality, and the rationalisation of access costs and benefits.

Several new recreation areas have been identified for future development. Cape Camp has good capacity for sustaining use and to provide for campers when the site at Cape Peron becomes a day use area. Cape Camp is also proposed for a commercial safari camp. Guichenault Point and Herald Bluff offer spectacular vistas and great opportunities for day visitors to experience a diverse range of coastal features. Development of this area will be subject to an assessment of biological values and potential human impacts. Monkey Mia Bore is an interesting site with good potential for recreation, interpretation and possibly the development of a commercial tourism facility.

Major redevelopment works are required at most existing sites to rehabilitate and minimise disturbance of landforms and biological communities, and to improve the sites' ability to sustain camping and increasing numbers of day visitors. Coastal sites will be provided with basic facilities only, which may include toilets, information, pedestrian access, vehicle barriers and gas barbeques.

Due to the risk of wildfire, wood fires will be prohibited at most recreation sites. Communal wood fires may be provided at the homestead precinct and the proposed safari camp site, subject to there being adequate fire protection in these areas and a source of fuel from outside the Park.


RECREATION DEVELOPMENT PLAN
and ZONING SCHEME
Scale
4 0 2 4 km
Picnic site
Camping area
Vista point
Special facility
Boat launching
Existing Public Access
Proposed Public Access
Management Tracks
Walk track
Natural Environment Zone
Recreation Zone
Marine Park Boundary
Cape View
Cape Peron
Cape Camp
Bottle Bay
Gregories
South Gregories
Cattle Well
burn buffer
VCL
VCL
Lake Montbazin
Herald Bight
Guichenault
Herald Bluff
PERON
alternative route
FRANCOIS PERON NATIONAL PARK
SHARK BAY MARINE PARK
Cape Lesueur
Big Lagoon
burn buffer
PENINSULA
Big Lagoon
Red Cliff
MONKEY MIA
Monkey Mia Bore
Homestead
Monkey Mia Road
SHARK BAY MARINE PARK
DENHAM
Little Lagoon
Marine Park Boundary
Denham Hamelin Rd
MAP 8

Of all recreation sites in the Park, the homestead precinct has the greatest capacity to sustain intensive visitor use and development. The recently developed hot tub, heritage walk trail, picnic grounds and information displays are very popular and there is increasing demand for more facilities and better road access. The homestead precinct will become the focal point for Park management, visitor information, interpretation, recreation and nature based tourism (see Map 9 Concept Development Plan Peron Homestead Precinct). The integrity of the precinct's heritage and pastoral character will be retained, and new facilities will be designed to complement the established character.

With the proposed new 2WD road to the homestead precinct, visitation should increase enormously. Additional facilities and activities will be developed which focus on the areas natural and cultural values. Commercial facilities are appropriate at the homestead precinct (see next section).

During the next few years, Project Eden is likely to become one of Shark Bay's special attractions. It will be necessary to establish particular sites where visitors can experience Project Eden and the Park's special fauna. At the homestead precinct, interpretive displays are being developed and wildlife viewing and fauna exhibits are proposed. Elsewhere in the Park, sites may be established for wildlife viewing or monitoring.

There are many other potential recreation opportunities in the Park. Vast areas of shrubland and extensive stretches of coastline are unroaded and are ideal for wilderness activities and experiences. The Park's pre-pastoral heritage has great interpretive potential, and inland features such as birridas are currently unexplored for recreation.

Commercial Tourism Activities

The Park is close to Shark Bay's two main visitor destinations, Denham and Monkey Mia. The Park's appeal for commercial visitor services is currently constrained by poor roads and the lack of facilities, however proposals to upgrade recreation areas and develop facilities will likely attract commercial interests. It is important that guidelines are set to determine what activities and services are appropriate.

CALM will support private enterprise in developing opportunities to cater for visitors, particularly services which promote an appreciation of the Park's natural and cultural values. Concessions will only be allowed if they are consistent with preserving Park values and cannot be adequately provided for outside the Park.

Tourism services should be based on non-intrusive, low impact use and development.

Several local tour companies currently use the Park and itinerate 4WD tours occasionally visit. Vehicles with more than about 12 passengers are usually not permitted in the Park due to the damage large vehicles cause to existing roads.

There is considerable potential to provide a variety of new visitor services which may include bushwalking, fauna observation and monitoring, heritage activities, overnight use and boating.

Two areas of the Park would suit the development and leasing of commercial overnight accommodation facilities - the homestead precinct and a coastal site in the north of the Park such as Cape Camp. The scale and design of commercial facilities will be sympathetic to the environment and impacts will be regularly monitored. Conditions of commercial licences may require operators to develop facilities or provide special services.

A safari camp is proposed in the north of the Park in association with a basic tent camping area. The safari camp concept has been successful in other Parks and natural areas where the emphasis is to ensure minimal environmental impact.

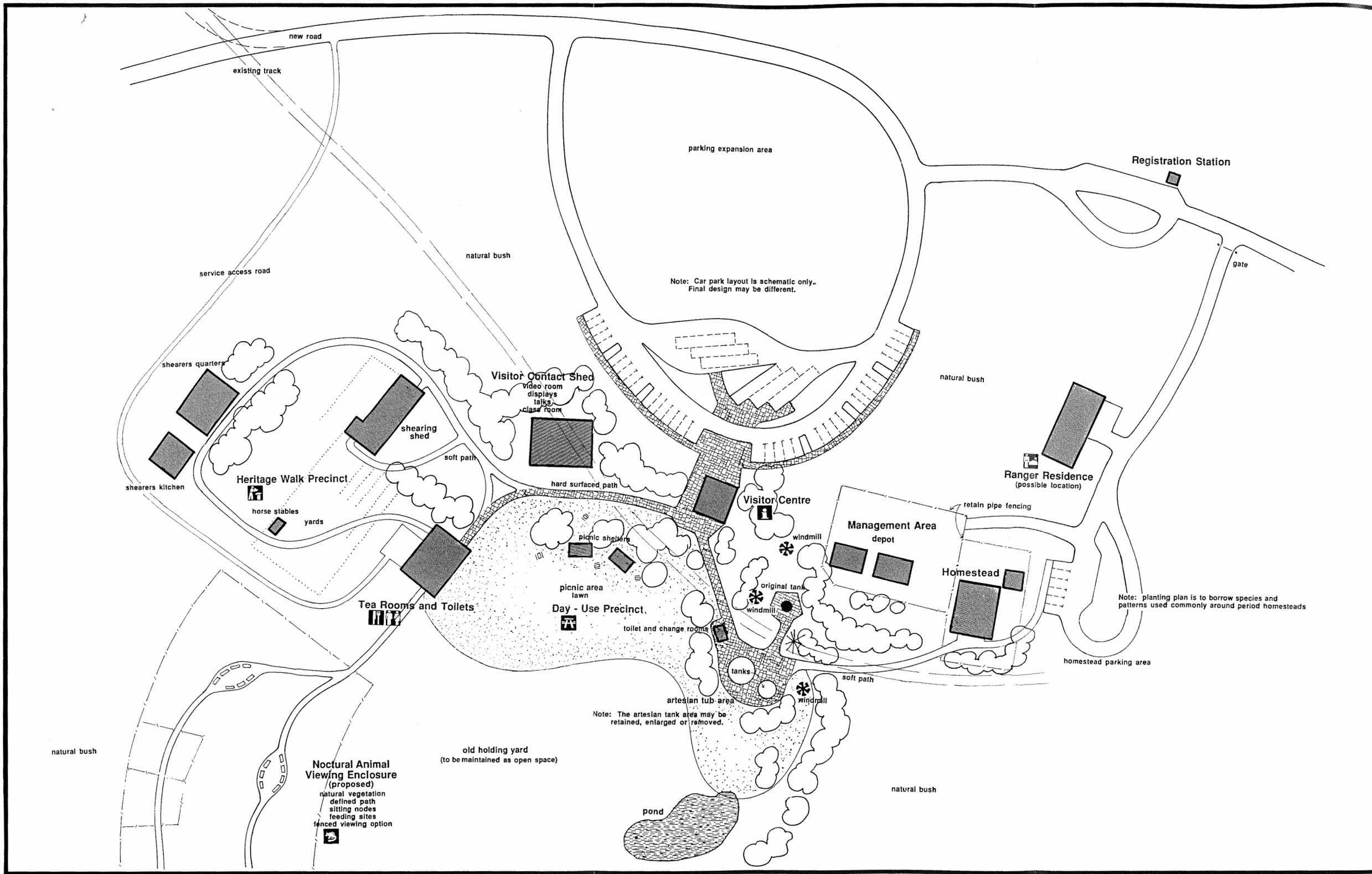
The Peron homestead is being refurbished to provide bunkhouse-style accommodation for students and special interest groups of up to 30 people.

Other commercial services which may be provided at the Peron homestead precinct include guided walks and activities, tour bookings and departures, and tearooms for the sale of refreshments, basic provisions, tour bookings, quality souvenirs and local crafts.

Project Eden has the potential to become a major tourism attraction with various opportunities for commercial involvement, particularly at the homestead precinct. An essential part of Project Eden is to integrate tourism with conservation whereby visitors help fund the ongoing protection of threatened fauna, in exchange for experiencing one of Australia's most important conservation projects.

There may be potential for commercial guided horse or camel treks in the Park, to provide an interesting visitor experience which helps interpret the Park's heritage. Such proposals will be subject to strict conditions to minimise environmental impacts.

Commercial operators have shown interest in providing boating activities on Big Lagoon. The major constraints for such use will be the protection of



Francois Peron National Park

PERON HOMESTEAD

Concept Development Plan

Recreation Planning and Design Section
December 1997

MAP 9

seagrass meadows and coastal formations, visitor safety and potential conflicts with other users. For these reasons, guided tours are preferable to services which hire boats to individuals.

In addition, Big Lagoon is in the Shark Bay Marine Park and visitor services provided on the adjacent national park will need to be consistent with the Shark Bay Marine Reserves Management Plan.

Monkey Mia Bore has good recreation potential and the development of this site would greatly enhance the region's tourism opportunities. However expenditure on this site has a low priority compared to the many other sites which require CALM funding. As such, CALM may seek expressions of interest from local tourism businesses to develop this area on behalf of the Department.

The range of potential commercial visitor services should not be limited to the above mentioned examples. Applications will be assessed on their merits.

Visitor Safety

The Peron homestead hot tub is a flowing artesian pool with an average temperature of 38 degrees Celsius and seating for up to 10 people. The tub requires regular maintenance and monitoring of water quality. Signs advise visitors of the risks associated with using the hot tub and lighting would be beneficial to visitor safety.

Road conditions in the Park are degenerating and traffic is increasing. The poor condition of the 6km track from the Denham-Monkey Mia Road to the Peron homestead precinct is a hazard for increasing volumes of traffic. The construction of a new, well designed road will resolve this problem. The large birrida in the north of the Park is another hazard and many visitors have become severely bogged despite warning signs.

Asbestos cladding on two buildings in the Peron homestead precinct will be removed or stabilised during renovations.

RECOMMENDATIONS

1. **Implement the Recreation Development Plan and Zoning Scheme as shown in Map 8. (H)**

2. **Provide 2WD access from the Monkey Mia Road to Big Lagoon, and 4WD access north of this point. (M)**

3. **Construct a new 2WD road to the homestead precinct as a priority. (H)**

4. **Develop a Roading Plan to clarify stages, standards and priorities for road works. (H)**

5. **Monitor and if necessary, restrict the use of vehicles which cause road damage. (O)**

6. **Provide access and facilities for people with disabilities at key recreation sites. (H)**

7. **Prohibit fixed wing aircraft landing, other than for essential management purposes. Assess applications for helicopter landing on a case by case basis. (O)**

8. **Prohibit access for individual horse or camel riding in the Park, but consider applications for commercial guided activities. (O)**

9. **Prohibit wood fires at most recreation sites. A communal wood fire may be provided at group accommodation sites in the homestead precinct and safari camp. (O)**

10. **Finalise and implement the Concept Development Plan for the homestead precinct (see Map 9). (H)**

11. **Design new structures and facilities in the homestead precinct to be sympathetic with the pastoral character (eg. corrugated iron walls and roofing, earth or concrete floors, spinifex shelters, steel pole barriers, etc). Refer to recommendations in Section 8. Cultural Heritage regarding protection of the precinct's aesthetic and heritage character. (O)**

12. **Locate new buildings and structures in the homestead precinct so as not to compromise the historical integrity of the site or detract from the spatial relationship between existing buildings. (O)**

13. **Ensure that visitor service concessions are compatible with conservation and recreation objectives. (O)**

14. **Encourage potential tourism opportunities which relate to Project Eden. (H)**

15. **Continue to monitor and manage water quality and other safety issues associated with the hot tub. (O)**

16. **Designate and develop safe lookout sites on the coastal cliffs. (H)**

17. Develop a birrida interpretation site to reinforce to visitors the risk of driving on birridas. (M)

18. Apply industry standards for managing asbestos clad buildings. (O)

20.0 SHELL BEACH CONSERVATION PARK

Shell Beach is one of the most visited features in Shark Bay with about 100 000 visits each year. Most visitors take only a short time to explore the shell deposits. The Park will remain for day use only.

In 1994, works were undertaken to rehabilitate the shell beach which had become crushed and compacted from vehicle traffic. Fencing was installed to prevent vehicle access on the main beach area and recreation facilities were relocated and upgraded. Information, toilets, seating, paths and ample parking are now provided. There is a demand for shade in this area.

Much of the Park is unfenced and there are numerous vehicle tracks along the coast west of the main visitor site. As access is not defined in this area, beach and dune formations are being degraded. This area does however have good potential for the development of day use facilities as it is very attractive and features an unusual combination of shell and microbial communities. A new day use recreation site is proposed on the promontory to enhance the range of visitor experiences and tourism opportunities in the region, and to provide the infrastructure necessary to stop further degradation by vehicles.

About 1.5 km northwest of the main visitor site is the Shell Beach Lookout which is used for photographing and viewing the expanse of Shell Beach. The site is poorly defined for vehicles and pedestrians, has minor erosion problems and is unattractive due partly to its proximity to the main road.

An alternative lookout site is proposed to be developed within the Park just north of the existing site. The proposed lookout site is visually more attractive than the existing site and has better potential for encouraging visitors to walk and explore the area. Vehicle access would ideally be via the road proposed to the new recreation area on the promontory.

Visitors seldom land boats along the Park's coast. The occasional landing of private vessels on Shell Beach would have little impact on other recreational users, but the landing of large tourism vessels should be discouraged as they would detract from the area's naturalness and disturb other visitors. No boat launching facility is to be provided in the Park.

Tour operators regularly use the Park. Commercial uses which detract from the area's naturalness, such as a kiosk, will not be allowed.

RECOMMENDATIONS

1. Implement the Recreation Development Concept Plan as shown in Map 5. (M)

2. Restrict vehicle access to designated tracks, rehabilitate disused tracks and prohibit vehicles on the beach where possible. (O)

3. Prohibit overnight use of the Reserve. (O)

21.0 ZUYTDORP NATURE RESERVE

Recreation Use and Values

The large inland portion of the Reserve has few established vehicle tracks, is not appropriate for recreation and is seldom used for this purpose. This area will remain undeveloped.

The coastal portion of the Reserve receives a low level of recreation use. No data have been collected, but anecdotal information suggests there may be about 500 visitors per year. Visitors visit the coast in winter to fish, camp, explore and appreciate the dramatic scenery and remoteness. The Zuytdorp wrecksite is a significant feature which may attract more visitation in the future. The wreck is not however visible from the shore, and diving on the wreck is both extremely dangerous and prohibited.

Access

Access to and through the Reserve is constrained by very rough 4WD tracks and the lack of accurate maps and signposting. The most direct route to the Reserve is via the road within the Emu-proof fence reserve, however Agriculture WA prohibits public access on this reserve. Visitors are therefore required to get permission to travel through the adjoining pastoral properties and a permit is required from the WA Maritime Museum to allow access onto the reserve surrounding the wrecksite. Many people visiting the area do so without the required approvals.

Several tracks run parallel to the coast within about 1 km of the cliffs. Many of the coastal tracks are badly degraded and have become unstable and unusable. Some track rehabilitation has been done by the WA Maritime Museum, but a full assessment of the area is required to

rationalise access. Superfluous and severely degraded tracks will be rehabilitated, and visitor safety will be a major consideration in designating access. It is unlikely that the standard of vehicle access will be greatly improved during the life of this plan.

The concept of constructing a 2WD or 4WD coast road from Kalbarri to Tamala Station has gathered momentum in recent years and is viewed by some as a great potential tourism resource. This proposal does however have significant potential for detrimental impacts on the area's natural and cultural values. It may also be detrimental to the region's long-term tourism opportunities and economy, as there will be increasing demand and fewer places available for remote, 4WD adventure experiences. A feasibility study of the coast road proposal is being conducted by Main Roads WA.

Pedestrian access from the cliff tops to the shore is down steep, loose-rubble tracks which are poorly defined. Pedestrian access is extremely hazardous and a major safety issue. The parking area and walk trail near the wrecksite need better definition and upgrading, and this may be the only location in the area where it is possible to provide pedestrian access to the shore. The limestone platforms and intertidal reefs along the shore are attractive for recreation, though king waves are a safety risk.

Visitor Impacts

Current low levels of camping have had relatively little impact on the Reserve's values. Wilderness camping will be allowed along the coast but camping areas may be designated subject to the preparation of a Recreation Development Plan. The duration of overnight stays in the Reserve may need to be limited to minimise environmental impacts and to enable the solitude to be enjoyed by other visitors.

Campfires will continue to be prohibited as a means of minimising the risk of wildfire and minimising the degradation of habitats through the collection of firewood. Gas cookers will be permitted.

Recreation Areas and Facilities

The Zuytdorp wrecksite is one of the main features of the area even though it is totally concealed. The land around the wrecksite needs to be upgraded to define vehicle and pedestrian access and to provide information to interpret the wrecksite. The land adjacent to the wrecksite is vested with the WA Maritime Museum, but it is logical that this site be upgraded in conjunction with CALM's management of the surrounding area. A Site Development Plan should be prepared and approved before major works begin.

An assessment and Recreation Development Plan is required for the coastal portion of the Reserve to determine areas for use and facilities to be provided.

Commercial Tourism Activities

Tour operators are not known to use the Reserve, although there is likely to be future interest in providing 4WD adventure tours to the cliffs and wrecksite. Approved concessions will have a strong emphasis on interpreting natural and cultural values.

RECOMMENDATIONS

1. **Allow for day use and camping along the coastal margin, but do not promote the Reserve for recreation. (O)**

2. **Prohibit general access for recreation on the inland portion of the Reserve. Special purpose uses may be permitted if there are benefits for Reserve management. (O)**

3. **Participate in the coast road feasibility study, and liaise with Main Roads WA and other relevant agencies on this matter. (O)**

4. **Prepare and implement a Recreation Development Plan for the coastal portion of the Reserve. (M)**

5. **Liaise with the Maritime Museum to provide appropriate visitor facilities at the wrecksite and with regard to applications for commercial tours in the area. (M)**

6. **Provide information to advise visitors of the Reserve's values, safety risks and precautions, regulations and guidelines for minimal impact use. (M)**

7. **Only licence commercial tours which are primarily and predominantly for the study of natural and cultural values. (O)**

COMMUNITY RELATIONS

Community Relations Goal
Promote informed appreciation of natural and cultural values, and facilitate liaison with the community on their management.

22.0 INFORMATION, INTERPRETATION AND EDUCATION

The objective is to increase awareness, appreciation and understanding of the reserves' values.

Effective information, interpretation and education programs are essential to achieve many of the management goals and objectives of this Plan. These programs consist of:

- Information - providing basic data about the reserves, eg access, facilities, attractions, activities, regulations, code of care and cost;
- Interpretation - explaining and enhancing appreciation of natural and cultural features; and
- Education - providing resource materials, presentations, organised field activities and other programs designed to facilitate learning (particularly for school groups and visitors with special interests).

An integrated information, interpretation and education program will be developed for the reserves. These programs will be designed to foster appropriate use of the reserves, enhance the visitors' experience and encourage support for reserve management. A good understanding of visitors' expectations and impressions of the reserves is essential when preparing information programs. Mechanisms for facilitating these programs include signs, displays, publications (such as brochures and Park notes) and visitor activities.

It is important that the information conveyed is integrated throughout the reserves and the World Heritage Property. An interpretation strategy is required to identify thematic stories for key sites and recurring messages about minimising visitor impacts while enhancing appreciation of the reserves' values.

As the area is attracting increasing numbers of non-English speaking tourists, consideration should be given to providing multi-lingual information in print and through tour operators and guides. Discretion is needed with bilingual signs to avoid visual pollution of the landscape. Japanese and German are the main foreign languages used.

RECOMMENDATIONS

1. **Develop an information, interpretation and education program for the reserves, integrated with other interpretation planning for the World Heritage Property. (M)**

2. **Regularly monitor visitor expectations and impressions of the reserves to help determine their information needs and the effectiveness of communicative media. (O)**

3. **Liaise with other agencies involved in tourism promotion to develop an integrated approach for providing information about the reserves. (H)**

4. **Provide discrete multi-lingual information at key tourist destinations where appropriate. (M)**

23.0 COMMUNITY INVOLVEMENT

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

Effective community participation is an essential component of management, providing a forum for the community to contribute to the management of the area and be informed about the reserves' values and management. Liaison with neighbours and other land managers can enhance integrated land management which is of particular importance when management issues go beyond the boundaries of the reserves such as fire, weeds and visual landscape management. Contingency plans should be prepared in consultation with community groups to deal with emergency situations, such as fires and rescue operations.

Community involvement is an integral part of CALM's operations. The community is encouraged to be involved in planning and management at all levels of the organisation, including through volunteer programs.
The principal benefits from community involvement are:

- greater opportunities for public awareness and input;
- sound management decisions resulting from the best available information from the community;
- greater public acceptance of decisions from participation in decision making processes;
- better relationships between CALM and the public through the development of an appreciation for the department's role, responsibilities and actions; and
- the availability of additional resources, including information, labour, and financial support.

Input from visitors will be sought through staff contact and surveys to monitor public expectations and attitudes about the services CALM provides. Regular liaison with tour operators is essential to maintain high standards for the management and presentation of the Reserves' assets.

Advisory Committee

An Advisory Committee was established by CALM to provide advice on the preparation of this management plan. Once the management plan for the terrestrial reserves has been approved by the Minister for the Environment, the Advisory Committee will be disbanded. The Shark Bay World Heritage Property Community Consultative Committee and Scientific Advisory Committee provide opportunities for liaison and input in relation to the entire World Heritage Property including the terrestrial reserves.

RECOMMENDATIONS

1. **Facilitate community involvement. (O)**

2. **Liaise with neighbours, land managers, local authorities, tourism industry and relevant Government agencies to ensure their involvement and cooperation in reserve management. (O)**

3. **Create opportunities for people to be involved in volunteer projects and tertiary student education projects. (O)**

COMMERCIAL AND OTHER USES

Other Uses Goal
Ensure that other uses are managed in a manner that minimises their impact on the reserves' values.

24.0 COMMERCIAL FISHING

The objectives are to maintain access for commercial fishing and ensure that fishing operations are compatible with management for conservation and recreation.

Commercial fishing is one of the major industries of Shark Bay and it occurs adjacent to most of the terrestrial reserves. It is accepted that access through Francois Peron National Park and Zuytdorp Nature Reserve is important for commercial fishing. Access will continue to be allowed where use is consistent with conservation of the reserves' values and management of recreation.

There is no potential for land based aquaculture and pearling facilities to be established on any of the terrestrial reserves due to their high conservation values. This position is consistent with the Draft Gascoyne Aquaculture Development Plan.

Francois Peron National Park

Commercial beach seiners drive through the Park to launch boats and unload product at Big Lagoon, Cattle Well, Herald Bight and Cape Rose. Park roads and boat launching sites are also used to access aquaculture facilities offshore from Herald Bight, Cape Rose and Red Bluff. In some instances, commercial fishers may be permitted to use roads which are not available for recreational use. Commercial fishing has had little effect on Park values and recreation, other than to contribute to the degradation of roads. Past requests to establish land based fishing facilities in the Park have not been approved.

Zuytdorp Nature Reserve

Commercial abalone fishing occurs on the reefs adjacent to the Reserve. Nine licensed abalone fishermen operate in the area and drive through the Reserve to access fishing grounds.

One abalone fisherman had a shack and campsite on the Reserve, but he removed these structures in 1997.

Most professional fishermen shuck the abalone and dispose of the shell below high water mark, but there are several sites where the shell has been dumped in heaps on the cliff edge or on the beach.

RECOMMENDATIONS

1. **Liaise with commercial fishers, the Fisheries Department and other relevant agencies regarding use of the reserves for commercial fishing. (O)**

2. **Allow licensed fishers to use designated roads and tracks on the reserves. (O)**

3. **Manage overnight commercial use as for recreational use. (O)**

4. **Prohibit the establishment of facilities on the reserves for commercial fishing, aquaculture and pearling. (O)**

25.0 MINING, MINERAL AND PETROLEUM EXPLORATION

The objective is to ensure that exploration and mining activities have minimal impact on the reserves values.

Policies

Current government policy allows exploration and mining in terrestrial and marine conservation areas in accordance with the *Mining Act 1978*, *Petroleum Act 1967* , *Petroleum Pipelines Act 1969* and *Petroleum (Submerged Lands) Act 1982*. These Acts prevail over the CALM Act in respect of the terrestrial reserves.

The NPNCA is opposed to mining in nature reserves and national parks because mining is not compatible with the purposes for which such lands are vested in the Authority. The Authority, however, acknowledges Government's prerogative to determine policy in this area and

(a) is involved in the process of reviewing applications for exploration, prospecting and mining;

(b) identifies the most important biological values and natural landscape features of the conservation estate and seeks to protect them from any detrimental impact; and

(c) recommends appropriate conditions and restrictions so as to minimise detrimental environmental

impacts.

Reserved land is not available for petroleum exploration until such time as the area has been declared "Crown Land" within the meaning of the Petroleum Act. Once "Crown Land" has been declared, the Minister for the Environment and the NPNCA can only comment on matters related to flora and fauna conservation.

In accordance with the 1997 State / Commonwealth agreement for the Shark Bay World Heritage Property, the WA Environmental Protection Authority will be providing advice regarding environmental aspects of petroleum exploration and development activities within the Property. The Shark Bay World Heritage Property Ministerial Council will then decide whether petroleum exploration and development activities are compatible with the protection, conservation and presentation of the Property and, if so, will agree on a framework for the administration and regulation of these activities.

The State / Commonwealth agreement also states that EPA assessments of proposals that appear likely, if implemented, to have a significant effect on the environment of the World Heritage Property, will involve the Commonwealth and will take full account of the potential environmental impacts of proposals on the outstanding universal values of the Property.

Prospective Development

Salt, gypsum, loose shell and shell coquina are mined in Shark Bay. The region is also considered prospective for petroleum and mineral sands but remains relatively under-explored. No exploration or mining tenements exist on the terrestrial reserves, though mining tenements exist as enclaves in the Francois Peron National Park.

Bernier and Dorre and Other Island Nature Reserves

There are no known significant mineral deposits on these reserves. Guano was mined from several islands in Freycinet Estuary from 1850 to about 1890.

If petroleum exploration and extraction is established in the area, there may be proposals to establish temporary or permanent infrastructure on islands, such as navigation beacons, pipelines and facilities for storage and loading.

Francois Peron National Park

Two gypsum mining leases (M09/7 and M09/8) are enclaves in the Park. These leases were granted in 1984 and expire in 2005. The leases have not been activated though the lessee has indicated that a notice of intent will be submitted to mine the existing leases and other areas of the Park. In 1987 the lessees applied for mining leases on these other areas of the Park but the leases were never granted and the applications were withdrawn in 1990. The development of mining leases would likely have a detrimental affect on the Park's recreational value, visual resources and possibly conservation programs.

Shell Beach Conservation Park

A shell grit quarry operated in the area of the Park from the 1940's to 1989, prior to the Park's gazettal. A Shire vested shell grit quarry operates just east of the Park. This quarry and associated infrastructure are within the view shed from the Park and are the subject of visitor complaints about shell mining.

Zuytdorp Nature Reserve

There has been some interest in the past to explore areas of the Reserve for mineral sands, but as at 1998 no mining tenements exist in the Reserve.

RECOMMENDATIONS

1. **Comply with Government and NPNCA policies on exploration and mining. (O)**

2. **Request that DOME encourage the protection of the unique gypsiferous dune formations in preparing mining plans for the gypsum lease enclaves of Francois Peron National Park. (O)**

3. **Refer mining proposals for the gypsum lease enclaves in Francois Peron National Park to the Environmental Protection Authority for assessment. (O)**

4. **Liaise with DOME to incorporate the area of the gypsum mining leases into Francois Peron National Park when tenements expire or are withdrawn. (O)**

5. **Liaise with relevant agencies to ensure that shell quarrying operations have minimal impact on the scenic values of Shell Beach Conservation Park. (O)**

6. **Consider the islands' conservation values in addressing any proposals for on-shore facilities associated with petroleum exploration and extraction. (O)**

7. **Refer proposals for developing mining facilities on the islands to the Environmental Protection Authority for assessment. (O)**

26.0 BASIC RAW MATERIALS

The objective is to ensure that basic raw material extraction has minimal impact on the reserves' values.

Basic raw materials (BRM) include gravel, sand, limestone, clay, rock and shell grit resources which are used for construction purposes. Within the terrestrial reserves, BRM are needed for road construction and maintenance and recreation site developments. A study of BRM requirements and availability in the World Heritage Area was conducted by DOME during 1995/96.

Several of the reserves' landscapes are of World Heritage value. Care must be taken with the siting and rehabilitation of extraction pits, and materials for surfacing roads and paths should blend with the landscape.

Policies

Access to basic raw materials from conservation estate will only be granted by the NPNCA:

- where the road or facility being constructed is within the boundaries or a road reserve enclave of that same reserve;
- where the use of the BRM provides access for the protection and management of the reserve; or
- where a more environmentally acceptable alternative is not available.

Strategies for the supply of BRM and the rehabilitation of BRM sites are detailed in NPNCA and CALM policy statements.

Bernier, Dorre and Other Island Nature Reserves

Small amounts of BRM may be needed for the establishment of minor facilities such as paths and signs. Amphibious vehicle access tracks to the two lighthouses on Bernier and Dorre Islands are unlikely to need surfacing as lighthouse maintenance is increasingly by helicopter.

Francois Peron National Park

The Park has a significant and ongoing requirement for BRM for road building and to a lesser extent, for the development of other recreation facilities. The availability of good quality BRM in the Park for roads is scarce.

In the north of the Park, the most suitable material for road building occurs in birridas. BRM for roads in the south of the Park may be obtained outside the Park, though costs may be considerable. Consideration should be given to constructing the proposed road to the homestead precinct as a bitumen road to reduce long term requirements for BRM.

Prior to the declaration of the Park in 1993, BRM requirements for Monkey Mia were sourced from Red Cliff which is located in the Park on the boundary with Monkey Mia Reserve. Proposed developments at Monkey Mia are likely to generate significant requirements for BRM, and both CALM and private developers are likely to seek access to BRM from Red Cliff.

The extraction pit and adjacent coast at Red Cliff require urgent and extensive rehabilitation. As there are few (if any) viable alternative extraction sites for BRM in the area, further extraction from Red Cliff may be requested for the development of public facilities at Monkey Mia. If approved, private developers would be charged for BRM to assist with the costs of rehabilitation.

If further BRM extraction at Red Cliff is approved by the NPNCA and Parliament, the pit would be excised from the Park and placed in a Section 5(g) Reserve under the CALM Act for the period of extraction. After extraction is completed the area would be reinstated into the Park.

Shell Beach Conservation Park

BRM for Park roads and paths has in the past been extracted from the adjacent VCL.

Zuytdorp Nature Reserve

BRM may be needed for minor road works and site developments on the Reserve, though the availability of BRM in the area is not known.

RECOMMENDATIONS

1. **Comply with CALM and NPNCA policies for basic raw materials and landscape management. (O)**
2. **Ensure that use of any source site for BRM be guided by a development and rehabilitation plan. (O)**
3. **Plan visitor facilities and other management activities to minimise the amount and impacts of material**

extraction. (O)

4. **Ensure that material extraction does not adversely affect conservation values including cultural heritage sites, landform stability and visual integrity. (O)**

5. **Liaise with other agencies to evaluate BRM availability and requirements for roading in the reserves. (H)**

6. **Facilitate the rehabilitation of the extraction pit and coast at Red Cliff. (H)**

27.0 UTILITIES AND SERVICES

The objectives are to facilitate management of the reserves through the provision of support services, and ensure that utilities and services have minimal impact on the reserves' values.

The reserves are largely free of utilities and service corridors for energy transmission, transport, communications and other services. Future proposals for utilities and services should be assessed to determine physical, biological, social and visual impacts. Proposals which may have a significant adverse impact on the environment will be referred to the Environmental Protection Authority and will be subject to environmental impact assessment.

Bernier and Dorre Islands Nature Reserve

The Australian Maritime Safety Authority operates 2 lighthouses which are on reserved enclaves in the Reserve. No other utilities or services exist on this Reserve.

Other Island Nature Reserves

These Reserves contain no utilities or services and are not likely sites for such facilities.

Francois Peron National Park

Utilities and services in the Park comprise a lighthouse near Cape Peron, 3 operational bores, a VHF radio tower, towers for monitoring fauna fitted with radio tracking devices, a telephone cable to the homestead precinct and workshops in the homestead precinct.

Fauna breeding facilities are being developed near the homestead precinct and staff accommodation is being considered in the vicinity of the homestead precinct to maximise security for the Park's assets.

Underground communication cables exist adjacent to the Park in the Denham-Monkey Mia Road Reserve. A past proposal to establish a Telecom tower in the Park did not proceed as alternative sites were available outside the Park. There is future potential for powerlines to be constructed from Denham to Monkey Mia. Powerlines and other utilities established adjacent to the Park should be carefully sited to protect the scenic qualities of the Park and the tourist drive along the Denham-Monkey Mia Road.

The Park's bores provide for a variety of purposes including fire management, feral animal control, recreation and to provide for native wildlife accustomed to the supply of overflow waters.

The Homestead Bore, drilled in 1923, is free-flowing and produces about 50,000 kilolitres per annum. It is believed that the bore casing is in poor condition as the flow rate and water temperature are decreasing. The artesian waters from this bore are used to service the fauna breeding facilities, homestead accommodation and various recreation facilities.

The Monkey Mia Bore is about 7km west of Monkey Mia. The flow from this bore is controlled and has a capacity of about 50,000 kilolitres per annum. A licence was issued in 1995 for the removal of up to 4,000 kilolitres of water per annum from this bore, for use on a tourism development adjacent to the Park.

Shell Beach Conservation Park

An underground fibre optic communications cable is located in the road reserve adjacent to the Park.

Zuytdorp Nature Reserve

The Reserve contains no utilities or services, but there is a proposal to consider building a coast road in the area to link Kalbarri with Shark Bay. This proposed road could have a major impact on the Reserve's values.

Future management may require the establishment of communications facilities on the Reserve.

RECOMMENDATIONS

1. **Ensure that the establishment and maintenance of utilities and services have minimal impact on conservation, landscape and recreation values. (O)**

Francois Peron National Park

2. **Allow for the establishment and maintenance of utilities which are necessary for Park management or public safety. Visually obtrusive utilities should be located outside the Park if possible. (O)**

3. **Encourage careful siting of future utilities and services along the Monkey Mia Road, to protect the scenic quality of the tourist drive along the Park's south**

boundary. (O)

4. **Liaise with the Water Corporation of WA regarding the use of artesian waters and the environmental effects of such use. (H)**

5. **Assess the condition of the Park's bores and determine management options. (H)**

KNOWLEDGE

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

28. RESEARCH, MONITORING AND EVALUATION

The objectives are to:
- *implement research and monitoring programs to increase knowledge of the reserves' natural environments, values and use; and*
- *evaluate the impacts of visitors and management.*

CALM Policy Statement No. 28 (Reporting, Monitoring and Re-evaluation of Ecosystems and Ecosystem Management) provides a comprehensive approach to improving knowledge and management.

Management of the reserves should be based on up-to-date and sound knowledge. The effectiveness of management practices needs to be evaluated from time to time, so that adjustments and refinements can be made.

The evaluation of impacts should relate to:
- the effectiveness of management practices; and
- the social and environmental effects of management practices.

Priorities for research and monitoring should consider situations where:
- rates of resource or social change are the highest;
- quality of base data is the poorest;
- understanding of the effects of management actions is the poorest; and
- there have been unanticipated changes in factors such as access and adjacent land uses.

Social research will be conducted to determine whether recreation and interpretation facilities are meeting the expectations and needs of visitors and management.

Research and monitoring programs can benefit from involving volunteers and educational institutions, as this can potentially reduce costs and help provide information to the broader community. CALM currently coordinates and promotes research undertaken within the reserves.

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

RECOMMENDATIONS

1. **Identify and prioritise the requirements for research, monitoring and evaluation on the reserves. (H)**

2. **Implement research and monitoring programs as resources permit and integrate studies throughout the World Heritage Property. (O)**

3. **Encourage volunteers, educational institutions and other organisations to be actively involved in scientific studies. (O)**

4. **Ensure that scientific studies do not adversely impact on the reserves' values. (O)**

IMPLEMENTATION

29.0 MANAGEMENT RESOURCES

The objective is to obtain sufficient resources to implement the recommendations of this plan.

The terrestrial reserves are serviced by CALM officers from the Gascoyne District Office, which includes field officers based at Denham and one officer based at Carnarvon. Implementing this plan over the next ten years will place considerable demands on existing staff. Volunteer assistance in implementing the plan may alleviate some of these demands.

The State Government provides funds to manage the reserves, the Commonwealth Government contributes funds for the management of World Heritage values and external funding has been provided for special projects. Implementing this plan will require additional funding resources and alternative means of funding will be investigated, such as grants and sponsorship.

Visitor fees are set by the Minister for the Environment and used to assist in managing the reserves, especially as a means of providing facilities and services for visitors. Visitor fees are currently only charged for Francois Peron National Park.

The implementation of this plan requires extra resources in several key areas, including greater capability for Carnarvon-based staff to manage Bernier and Dorre Islands Nature Reserve, and the establishment of a ranger's residence at the homestead precinct in Francois Peron National Park. Local officers from other government agencies may be able to assist with reserve management, particularly with surveillance in remote areas.

RECOMMENDATIONS

1. **Provide adequate staff to implement the recommendations contained in this plan. (O)**

2. **Obtain sufficient financial resources from both Government and private sources to implement this plan. (O)**

3. **Investigate and implement revenue raising mechanisms which increase resources available for management but do not have a detrimental impact on reserve values. (H)**

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

5. **Seek assistance with reserve management from other Government agencies where appropriate (eg. Fisheries WA, Shire Rangers). (O)**

30.0 PRIORITIES AND REVIEW

The objectives are to implement the plan according to priorities and regularly review implementation.

The recommendations of this plan will be implemented on a priority basis by CALM's Gascoyne District, subject to the availability of resources. Appendix 2 presents management priorities for all recommendations in this plan. Priorities will be reviewed on an annual basis or as circumstances change.

Section 61 of the CALM Act provides for the plan to be amended as required. If major changes to the plan are proposed, the revised plan will be released for public comment.

The NPNCA is responsible for monitoring the implementation of this management plan. To facilitate review of the plan and its implementation, a team of CALM officers will be formed to report annually to the NPNCA.

The term of this plan is 10 years.

RECOMMENDATIONS

1. **Prepare a 10-year implementation plan taking into account the priorities outlined in Appendix 2. (H)**

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

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

4. **Provide assistance to the NPNCA to monitor implementation of this plan in its mid term and towards the end of its term as part of the plan's review. (O)**

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Appendix 1 - Landscape Character Types

EDEL SUB TYPE VISUAL QUALITY CLASSIFICATION - FRAME OF REFERENCE			
SCENIC QUALITY	**LANDFORM**	**VEGETATION**	**WATERFORM**
HIGH	* Steep cliffs and dissected slopes e.g. Zuytdorp Cliffs. * Diverse coastline edges with platforms, beaches and headlands e.g. Steep Point. * Primary dunes which display areas of active weathering e.g. Blowout on Dirk Hartog Island. * Islands, sandbars and tidal flats e.g. Egg Island. * Ridges and dune formations of distinctive height configuration or combinations which provide contrast to landform patterns common in surrounding areas e.g. Herald Heights.	* Distinctive areas of native vegetation which create unusual forms, lines, colours or textures in comparison to the surrounding landscape e.g. Samphire in salt pans. * Windshaped or dwarfed vegetation e.g. cliff top heath. * Striking displays of seasonal colour e.g. blooming Wattles. * Strongly defined patterns of vegetation due to botanical zone transition e.g. tree heath and arid species.	* All salt pans or birridas, filled or dry. * Unusual shoreline motion due to rocks, islands or platforms e.g. Mushroom Rock. * Areas exhibiting a mosaic of shades due to shallow sandbars, intertidal flats or seagrass banks.
MODERATE	* Dune formations which are not visually dominant and are surrounded by similar landforms. * Gently undulating topography which is not distinctive or prominent.	* Expanses of relatively uniform vegetation cover with some variation in colour, texture and pattern found in the surrounding landscape.	* Waterforms where present, rate no lower than high in the VLCT.
LOW	* Landform lacking in the visual variety common in the surrounding landscape. * Noticeably eroded areas of landscape.	* Specimens or patches of introduced vegetation which appear alien in the surrounding landscape. * Areas of native vegetation which are noticeable degraded. * Areas of vegetation which appear homogenous in form, line, colour or texture	* Waterforms where present, rate no lower than high in the VLCT

EDEL SUB TYPE - AESTHETIC CHARACTER SUMMARY
LANDFORM
Form: gently inclined, near level terrain, domed dunes, abrupt Zuytdorp Cliffs; tapered Bellefin and Heirisson Prongs; ragged peninsulas, rounded birridas, sheer to steeply angled slopes of cliffs; prominent headland of Zuytdorp Point; steeply sloping frontal dunes; low, wavecut limestone platforms; low fragments of land; abrupt limestone headlands; broad intertidal flats; small, low limestone inlands; flat-floored birridas. Line: semi-parallel dune ridges and peninsulas oriented north-south; elongated birridas; near straight, unbroken line of Zuytdorp Cliffs; horizontally striated cliffs; long beaches; elongated blowouts; crescent dunes; prominent horizontal limestone bench platforms; sweeping shores of Henri Freycinet Harbour; elongated peninsulas; parallel ripples of sand. Colour: pale grey limestone, horizontally striated cliffs; bright, pale sand; burnt terracotta shaded sands; cream limestone rubble; bright beaches; pale yellow-pink sand; pale yellow sand soils. Texture: rugged Zuytdorp Cliffs; rocky slopes; boulder strewn cliff base; smooth beaches; rocky headland of Steep Point; boulder strewn beaches; large fragments of angular limestone rubble; sandy beaches; rippled indentations in intertidal flats. Scale: enclosing amphitheatre of dunes surrounding birridas; wide expanses of pale, bright sand of tidal flats; broad encompassing, cloud-streaked skies; broad, long, open views over landscape sometimes interrupted at mid to background by low domed dunes.
VEGETATION
Form: low heath; domed Umbrella bush; low, dense mat plants; pincushion-like plants; tree heath; tall thickets; spreading Kurara; spinifex hummocks; isolated islands of vegetation on mobile dunes; low, rounded bushes; spreading Ashby's Banksia; Line: dead twigs and sinuous branches scattered over ground; bare vertical and diagonal sprays of stems; long root fingerlings on blowouts; stilted mangroves; thin canopy of leaves; wispy mallees; ribbony trunk of Dongara Mallees; Colour: red-brown Samphires; brown strands of seagrass; dark, rich green Umbrella bushes; pale olive vegetation; bright green Pigface; soft grey Coastal Daisy Bush; khaki yellow shades; grey stems tipped with green foliage; red hearted mauve or white blooms of Sand Hibiscus; pale pink Coastal Coppercups; brown-khaki shaded shrubs; contrasting shades of introduced grasses and heath; pale green Spinifex hummocks; Texture: succulent Pigface; grey twigs and dead branches; fuzzy leaved Sand Hibiscus; tufted grasses; scrubby Saltbush; serrated leaves of Ashby's Banksia; lustrous leaved Mallalie; scattered patches of dead vegetation scattered over birridas; Scale: taller thickets and true heath enclose views in some areas; otherwise views only limited by landform; vegetation in many areas appears prostrate over the gently inclined landform;
WATERFORM
Form: broad waters of Naturalist Channel; shallow waters of Shark Bay; broad, tidal flats; tranquil waters; dynamic, surging swells; rounded birridas; Line: elongated birridas; long shallow fingers of water; border of white foam at base of cliffs; Colour: blue waters; clear, turquoise waters of the Bay; white, foaming breakers; turquoise fingers of water; limpid waters; royal blue and turquoise mosaic; shimmering blue waters; dark shades denoting seagrass; Texture: calm; punishing swells of Indian Ocean; smooth, open waters of Henri Freycinet Harbour; foaming breakers at base of cliffs; glassy surface of bay;
LAND USE
Form: broad, open areas of introduced grasses; corrugated iron tanks; flat evaporite pans; large, domed stockpiles of salt and guano on Slope Island; building remnants on Bernier and Dorre Islands; Line: upright windmills; geopetric windmills; horizontal line of corrugated iron tanks; linear tracks radiating from wells; linear rows of wooden posts; geometric fencelines, drunkenly subsiding fencelines; fence-line effect; long, linear barrages across evaporation pans; elongated causeway; tracks snaking over dunes; line of anti-vermin fence; erect lighthouses; Colour: grey wooden fence posts; dazzling white salt crystals in evaporite pans and stockpiles Texture: wooden fences; steel windmills; corrugated iron tanks; stone water tanks; stone buildings of keepers' residences.

PERON SUB TYPE VISUAL QUALITY CLASSIFICATION - FRAME OF REFERENCE			
SCENIC QUALITY	**LANDFORM**	**VEGETATION**	**WATERFORM**
HIGH	* Diverse coastline edges with cliffs, platforms and headlands e.g. Cape Peron North. * Landforms of unique, distinctive or contrasting colours or forms e.g. Shell Beach. * Dune formations of distinctive height or shape which are visually prominent in the surrounding landscape. * Islands, sandbars and tidal flats e.g. Pelican Island	* Strongly defined patterns of vegetation due to botanical zone transition e.g. tree heath and arid species. * Distinctive areas of vegetation patterns which result from form, line, colour or textural combination which contrasts with the surrounding vegetation and landscape e.g. vegetation surrounding birridas.	* All salt pans or birridas, filled or dry. * Areas exhibiting a mosaic of shades due to shallow sandbars, intertidal flats or seagrass banks.
MODERATE	* Gently undulating country which is not visually dominant and is surrounded by similar landforms.	* Vegetative patterns evident but common in surrounding landscape.	* Waterforms where present, rate no lower than high in this LCT
LOW	* Expanses of virtually flat landforms which provide few landmarks with which to orient.	* Extensive areas of similar vegetation with very limited variation in form, line, colour or texture. * Areas of native vegetation which are noticeably degraded. * Specimens or patches of introduced vegetation which appear alien in the surrounding landscape.	* Waterforms where present, rate no lower than high in this LCT.

PERON SUB TYPE - AESTHETIC CHARACTER SUMMARY
LANDFORM
Form: subdued sandplain; low, scattered dunes; limestone outcrops; flat floored depressions; large, irregular birridas; small round or oval birridas; gently sloping lands; low beaches; abrupt cliffs; bulbous domes of stromatolites; broad tidal flats; Line: narrow arm of Taileffer Isthmus; narrow channels linking some birridas; elongated dune depressions; curved beaches; long, thin horizontal slices of dazzling white beaches extending to far distances; horizontally bedded cliffs; horizontal layering of colours; gently curved embayment of Hamelin Pool; linear sand ripples; Colour: rich terracotta; red sandstone; paler, creamy grey to pink soils over limestone; pale rubble; fine, bright white gypsum; bright bleached beach sands; slices of dazzling white beaches; horizontally bedded sandstone cliffs; dominant horizontal layering of colours; grey limestone; dazzling shores of Shell Beach; white *Fragum* shells; grey rock platforms dusted with golden brown Texture: sandy soils; rough limestone outcrops; pale scattered rubble; hard crust of fine gypsum; smooth beaches; sandstone cliffs; rough limestone cliffs; uneven algal 'rock platforms'; gravelly sand; mud-like algal mats; rippled sand of tidal flats; Scale: enclosure of birridas by dunes; broad views over low, open, exposed terrain, occasionally interrupted by distant dunes;
VEGETATION
Form: low shrublands; spreading Wanyu; patchy thickets; low domed Umbrella Bush; spreading Kuara; tree heath; domes of Spinifex; blanket of Samphire; ring of Grey Saltbush; tangled Shark Bay Daisy bush; Line: low horizontal canopy with few emergents; spindly stilt-like White Mangroves; tangled vine of Shark Bay Daisy; Colour: olive shrublands; darker green Umbrella Bush; pale Spinifex; brown-red Samphires; grey Saltbush; silvery Cotton Bush; bright purple and yellow Shark Bay Daisy; Texture: stiff Kurara; dusty ring of Grey Saltbush; Scale: scattered taller thickets and tree heath remnants enclose views in some areas, otherwise views generally broad over landscape, limited only by landform.
WATERFORM
Form: broad, shallow, almost landlocked bodies of water; flat-floored saltpans; large, irregularly shaped birridas; small round or oval birridas; Line: elongated birridas with narrow linking channels to other depressions or to coast; marine waters merging as one with hazy horizon; Colour: crystalline waters; rich aqua greens, limpid blue waters; reflections of colour; royal blue and turquoise mosaic; Texture: placid waters; mirrored waters; smooth waters.
LAND USE
Form: compacted shell block material; cylindrical corrugated iron and stone water tanks; Line: long reflected stripes of colour across the smooth, mirrored waters; upright wooden fence posts; linear fencelines; geometric windmills; horizontal lines of corrugated iron tanks; fence-line effect; angular wooden jetty; Colour: creamy grey shell block buildings; numerous colourful fishing craft; reflected colours on the placed waters; grey wooden jetty and fence posts; steel windmills; corrugated iron; Texture: rough shell blocks; fishing boats dotted over smooth waters; trampled, sandy solid; wooden jetty and fence posts; corrugated iron; stone water tanks; steel windmills.

Appendix 2 - Prioritised Recommendations

Recommendations for all Terrestrial Reserves

Ongoing Priority

Section 4.0 Adjacent Land Use

1. Liaise with the Shires, managers and users of adjacent lands and waters, to establish cooperation for the protection of the terrestrial reserves and adjacent land use values.

Section 5.0 Climate

1. Ensure that facilities and management activities are planned to accommodate the area's climate, including the threat of cyclones and associated tidal surges, the effects of high salinity and requirements for shade.

Section 6.0 Geology, Geomorphology and Hydrology

1. Consider the vulnerability of geological features, landforms and soils in all management operations, such as new access, site developments and fire management.

2. Monitor the effects of recreation and other use on landforms.

3. Consider the potential impacts on surface and ground water during all management activities.

4. Consider the potential impacts of salinity on all management activities.

Section 7.0 Vegetation and Flora

1. Design facilities and management practices to minimise adverse impacts on flora and vegetation values, particularly threatened and priority flora.

2. Monitor plant communities or species that are threatened, unique or in some way warranting special consideration.

3. Provide opportunities for visitors to increase their knowledge and develop appreciation of the Reserves' vegetation and flora.

Section 8.0 Fauna

1. Determine management requirements and implement measures to maintain or enhance the reserves' native fauna populations, with an emphasis on threatened species.

4. Develop recreation and management practices which are consistent with protecting the reserves' fauna.

5. Promote complementary land use practices by neighbours.

6. Promote public awareness of the reserves' fauna values by providing information, interpretation and education.

7. Communicate with the public, particularly the local community, to increase awareness of fauna conservation values and programs.

8. Promote research which will assist with management of the reserves' fauna.

Recommendations for all Terrestrial Reserves

Ongoing Priority (cont)

Section 9.0 Cultural Heritage

1. Liaise with local Aboriginal and community groups and relevant agencies concerning the protection of significant heritage sites in the Reserves.

2. Ensure that heritage management is consistent with other Reserve management objectives.

3. Ensure that visitor and management activities do not have adverse impacts on significant heritage sites and values.

4. Where appropriate, incorporate heritage information in interpretive displays and education programs.

5. Promote research of the Reserves' heritage values.

Section 10.0 Visual Landscape Management

1. Implement CALM Policy No. 34 (Landscape Management of CALM's Lands and Waters) in all aspects of reserve management.

3. Encourage neighbours and managers of adjacent lands to recognise the importance of visual landscape management and to help protect the area's visual resources.

4. Encourage sensitive management of visual resources along the access corridors to tourist destinations.

Section 11.0 Fire Management

1. Implement buffer burning and, where necessary, habitat management burning in Francois Peron National Park. The remainder of the terrestrial reserves will be designated 'No Planned Burn Areas'.

4. Use methods that minimise soil erosion and do not adversely affect conservation values in maintaining fire management access tracks.

7. In the event of wildfire on the reserves, monitor fires and assess whether suppression is warranted according to the values at risk, the fire behaviour and the feasibility of suppression.

10. Provide information on the reserves' values and fire risks to improve visitors' awareness of fire safety and survival, and encourage their support for fire management programs.

11. Monitor the impacts of burning regimes and wildfires on environmental values.

Section 12.0 Plant Diseases

2. Monitor areas of the reserves which may be susceptible to plant disease.

Section 13.0 Introduced Plants

5. Ensure that recreational use and management activities cause minimal disturbance of native vegetation and minimise the potential for introducing or spreading weeds.

6. Liaise with Agriculture WA, the Shire and adjacent land managers regarding weed control and the prevention of introducing weeds in the reserves.

7. Provide interpretation for visitors regarding the spread and control of weeds.

Recommendations for all Terrestrial Reserves

Ongoing Priority (cont)

Section 14.0 Introduced Animals

2. Liaise with Agriculture WA, the Shark Bay Land Conservation District Committee and adjacent land managers to coordinate introduced animal control programs.

3. Provide information for the local community and visitors to interpret introduced animal control programs, and to advise of regulations which prohibit domestic animals on the reserves.

Section 15.0 Rehabilitation

3. Control recreational use and management activities, particularly vehicle and pedestrian access, to minimise the degradation of landform stability and scenic values.

4. Facilitate the natural rehabilitation of disturbed areas by controlling the degrading processes, such as feral animals and uncontrolled vehicle access.

Section 16.1 Recreation Opportunities

1. Protect the unique features and recreation opportunities that attract visitors to the area.

2. Liaise with the Shires and other relevant authorities to ensure that recreation opportunities provided in the reserves complement opportunities available elsewhere in the region.

3. Provide recreation facilities which meet the needs of visitors and have minimal impact on the environment.

4. Monitor the environmental impacts of visitation and use this information to refine management practices.

5. Liaise with tourism organisations and commercial tour operators to ensure that the reserves are promoted appropriately.

Section 16.2 Access

1. Rationalise access in each of the reserves.

2. Where necessary, manage access to control the intensity, duration, location and times of use. Access limitations will be introduced if recreational use poses undue risks to visitor or the reserves' natural or cultural values.

3. Maintain and improve vehicle access in keeping with CALM's roading standards and the development of facilities.

5. Monitor the condition of access in the reserves and maintain and upgrade as required.

7. Monitor and manage boating adjacent to the reserves, to ensure that boating does not conflict with conservation objectives and other recreational users of the reserves.

8. Consider interpretive opportunities when designating recreational access.

Section 16.3 Recreation Areas

1. Ensure that site development plans are produced before development works are undertaken.

2. Monitor changes at recreation sites and keep regular photographic records. The main indicators of change will be landform stability and vegetation cover.

3. Conduct visitor surveys to monitor changes in visitor use and visitor expectations.

Recommendations for all Terrestrial Reserves

Ongoing Priority (cont)

Section 16.3 Recreation Areas (cont)

4. Maintain and upgrade recreation areas and facilities as required.

5. Close and rehabilitate recreation sites which cannot sustain the existing levels of usage or are inappropriately located.

Section 16.4 Commercial Tourism Activities

1. Identify opportunities for commercial visitor services on the reserves.

2. Issue leases and licences consistent with statutory requirements and the purpose of the reserve.

3. Regulate commercial visitor services through the numbers of licences and leases issued and operating conditions, to ensure that they do not compromise the value and sustainability of the natural resource.

4. Require commercial operators to maintain appropriate safety standards with respect to their clients and other visitors.

5. Liaise with tour operators, the WA Tourism Commission and local tourism groups so that they are aware of management initiatives and to ensure the promotion of the reserves is consistent with management objectives.

Section 16.5 Visitor Safety

2. Incorporate safety messages in information for visitors to the reserves.

Section 22.0 Information, Interpretation and Education

2. Regularly monitor visitor expectations and impressions of the reserves to help determine their information needs and the effectiveness of communicative media.

Section 23.0 Community Involvement

1. Facilitate community involvement.

2. Liaise with neighbours, land managers, local authorities, tourism industry and relevant Government agencies to ensure their involvement and cooperation in reserve management.

3. Create opportunities for people to be involved in volunteer projects and tertiary student education projects.

Section 24.0 Commercial Fishing

1. Liaise with commercial fishers, the Fisheries Department and other relevant agencies regarding use of the reserves for commercial fishing.

2. Allow licensed fishers to use designated roads and tracks on the reserves.

3. Manage overnight commercial use as for recreational use.

4. Prohibit the establishment of facilities on the reserves for commercial fishing, aquaculture and pearling.

Section 25.0 Mining, Mineral and Petroleum Exploration

1. Comply with Government and NPNCA policies on exploration and mining.

Recommendations for all Terrestrial Reserves

Ongoing Priority (cont)

Section 26.0 Basic Raw Materials

1. Comply with CALM and NPNCA policies for basic raw materials and landscape management.

2. Ensure that use of any source site for BRM be guided by a development and rehabilitation plan.

3. Plan visitor facilities and other management activities to minimise the amount and impacts of material extraction.

4. Ensure that material extraction does not adversely affect conservation values including cultural heritage sites, landform stability and visual integrity.

Section 27.0 Utilities and Services

1. Ensure that the establishment and maintenance of utilities and services have minimal impact on conservation, landscape and recreation values.

Section 28.0 Research, Monitoring and Evaluation

2. Implement research and monitoring programs as resources permit, and integrate studies throughout the World Heritage Property.

3. Encourage volunteers, educational institutions and other organisations to be actively involved in scientific studies.

4. Ensure that scientific studies do not adversely impact on the reserves' values.

Section 29.0 Management Resources

1. Provide adequate staff to implement the recommendations contained in this plan.

2. Obtain sufficient financial resources from both Government and private sources to implement the plan.

4. Develop volunteer programs.

5. Seek assistance with reserve management from other Government agencies where appropriate (eg. Fisheries WA, Shire Rangers).

Section 30.0 Priorities and Review

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

Section 30.0 Priorities and Review (cont)

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

4. Provide assistance to the NPNCA to monitor implementation of this plan in its mid term and towards the end of its term as part of the plan's review.

Recommendations for all Terrestrial Reserves

High Priority

Section 7.0 Vegetation and Flora

4. Complete a detailed flora survey of the World Heritage Property, and determine and map plant community types.

5. Promote research on changes to flora composition caused by the removal of feral herbivores on Peron Peninsula and the effects of fire and other factors affecting survival and regeneration.

Section 8.0 Fauna

2. Support the preparation and implementation of recovery plans for threatened fauna species of the reserves.

3. Identify, monitor and manage existing and potential threatening processes or disturbance which may adversely affect the Reserves' fauna.

9. Encourage research and monitoring of how feral populations respond to the control of feral animals.

Section 10.0 Visual Landscape Management

2. Undertake a systematic assessment of the landscape values of the World Heritage Property and prepare landscape management guidelines for the terrestrial reserves.

Section 11.0 Fire Management

2. Monitor the impacts of the designated burning regimes and if necessary, modify these regimes to take into account new information and management circumstances.

6. Prohibit open/wood fires in the terrestrial reserves (gas cookers will be allowed) except for approved communal wood fires which may be provided in Francois Peron National Park at the homestead precinct and safari camp.

9. Liaise with Shires, the Bush-fires Board, local brigades, adjacent land holders and the local community regarding fire management on the reserves, including mutual aid arrangements.

Section 12.0 Plant Diseases

1. Assess the risks of plant diseases being introduced to Shark Bay and where necessary take precautions to prevent infestations.

Section 13.0 Introduced Plants

3. Prioritise and conduct weed control programs.

4. Undertake weed control at key recreation sites as a means of maximising visitor comfort and minimising the spread of weeds (eg double gee and calthrop).

Section 14.0 Introduced Animals

1. Develop, prioritise and implement operational plans for the control of introduced animals.

4. Develop and promote a code of conduct for boating to minimise the risk of introducing animals onto islands.

5. Prepare contingency plans detailing actions to be taken if an introduced animal invades a reserve in which it has not been previously recorded.

Recommendations for all Terrestrial Reserves

High Priority (cont)

Section 15.0 Rehabilitation

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

Section 16.2 Access

4. Prioritise the development of walk trails in the reserves.

Section 16.5 Visitor Safety

1. Establish and implement a visitor risk management program for the reserves, in accordance with the Visitor Risk Management Policy.

3. Provide facilities at key recreation sites to maximise visitor safety.

4. Ensure staff are trained in visitor risk assessment and management procedures.

Section 22.0 Information, Interpretation and Education

3. Liaise with other agencies involved in tourism promotion to develop an integrated approach for providing information about the reserves.

Section 26.0 Basic Raw Materials

5. Liaise with other agencies to evaluate BRM availability and requirements for roading in the reserves.

Section 28.0 Research, Monitoring and Evaluation

1. Identify and prioritise the requirements for research, monitoring and evaluation on the reserves.

Section 29.0 Management Resources

3. Investigate and implement revenue raising mechanisms which increase resources available for management but do not have a detrimental impact on reserve values.

Section 30.0 Priorities and Review

1. Prepare a 10-year implementation plan taking into account the priorities outlined in Appendix 2.

Medium Priority

Section 13.0 Introduced Plants

2. Establish and maintain an inventory of introduced plants on the reserves, and monitor these populations as resources permit.

Section 16.4 Commercial Tourism Activities

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

Section 22.0 Information, Interpretation and Education

1. Develop an information, interpretation and education program for reserves, integrated with other interpretation planning for the World Heritage Property.

4. Provide discrete multi-lingual information at key tourist destinations where appropriate.

Recommendations for Bernier and Dorre Islands Nature Reserve

Ongoing Priority

Section 8.0 Fauna

10. Continue to ensure that the conservation of threatened fauna is the primary objective for management.

11. Minimise the potential for non-indigenous fauna to be introduced.

Section 9.0 Cultural Heritage

6. Manage the remains of the Lock Hospital buildings in liaison with relevant agencies and community groups.

7. Liaise with relevant agencies and community groups in devising strategies for managing visitor impacts on heritage values eg. access to culturally important areas, providing information to interpret heritage values, etc.

Section 17.0 Bernier and Dorre Islands Nature Reserve

1. Prohibit the establishment of permanent structures or facilities for recreation or tourism such as accommodation, jetties or aircraft landing grounds.

2. Do not promote the reserve for recreation.

3. Allow day use access on both islands but prohibit camping. Overnight use may be permitted for approved research and management projects.

4. Liaise with the Carnarvon and wider communities in matters relating to recreation management.

7. Prohibit open/wood fires, but allow gas barbecues to be provided at designated recreation sites.

11. Only consider access for commercial tours which are part of an approved scientific program.

Section 25.0 Mining, Mineral and Petroleum Exploration

6. Consider the islands' conservation values in addressing proposals for on-shore facilities associated with petroleum exploration and extraction.

7. Refer proposals for developing mining facilities on the islands to the Environmental Protection Authority for assessment

High Priority

Section 3.0 Land Tenure

1. Classify Dorre Island as a "limited access area" under Section 62 of the CALM Act, to allow for day use but no overnight recreational use.

Section 8.0 Fauna

12. Provide information to minimise the potential for visitors to disturb fauna. In particular, specify regulations which prohibit campfires and pets.

13. Promote a community based "island watch" system to discourage illicit use and to encourage early warning of wildfire or other forms of disturbance.

Recommendations for Bernier and Dorre Islands Nature Reserve

High Priority (cont)

14. Conduct education programs to promote local community awareness of the reserve's threatened fauna and the requirements for its protection.

15. Provide additional resources to conduct surveillance and education programs and to co-ordinate community participation in monitoring and management programs.

Section 11.0 Fire Management

3. Develop plans for fire suppression on Bernier, Dorre and Other island Nature Reserves, including the requirements for equipment and transport.

Section 17.0 Bernier and Dorre Islands Nature Reserve

5. Encourage the Carnarvon community to be involved in the management of the Reserve (eg. through the Honorary CALM Officer program). Consider establishing a "Friends of the Islands" group.

8. Implement community involvement and education programs to promote use of gas cookers and discourage open/wood fires.

9. Provide information for visitors about the islands' values, conditions and regulations for use of the Reserve, guidelines for minimal impact use, and safety hazards and precautions.

10. Collect and maintain appropriate visitor information and statistics.

Medium Priority

Section 17.0 Bernier and Dorre Islands Nature Reserve

6. Assess recreation sites and prepare recreation development plans for Hospital Bay, Red Cliff Point, Disaster Cove, and White Beach.

Recommendations for Other Island Nature Reserves

Ongoing Priority

Section 8.0 Fauna

17. Continue research and monitoring of threatened fauna and breeding seabirds.

Section 18.0 Other Island Nature Reserves

1. Allow day use visitation on the island Nature Reserves, subject to access restrictions which may be required to protect conservation values.

2. Prohibit overnight use on all of the islands.

3. Strictly enforce the prohibition of open fires.

Section 25.0 Mining, Mineral and Petroleum Exploration

6. Consider the islands' conservation values in determining the requirement for on shore facilities associated with petroleum exploration and extraction.

7. Refer proposals for developing mining facilities on the islands to the Environmental Protection Authority for assessment

High Priority

Section 3.0 Land Tenure

2. Reserve all island Nature Reserves and unreserved islands of Shark Bay as a single Class A Nature Reserve vested with the NPNCA for the purpose of "Conservation of Flora and Fauna". (This does not include Bernier and Dorre Islands and the Faure and Dirk Hartog Island pastoral leases).

4. Determine appropriate names for each island in consultation with the local community.

Section 8.0 Fauna

16. Provide information for visitors to and around the islands to encourage minimal disturbance of the islands' fauna, particularly breeding seabirds.

18. Investigate the need to restrict access in the waters around Pelican Island Nature Reserve to protect pelican rookeries during the breeding season.

19. Encourage local people who frequent areas around the islands to become aware of and involved in fauna protection programs.

Section 11.0 Fire Management

3. Develop plans for fire suppression on Bernier, Dorre and Other Island Nature Reserves, including the requirements for equipment and transport.

Section 18.0 Other Island Nature Reserves

4. Provide information to raise public awareness about appropriate behaviour on and around the Islands.

5. Seek assistance from the community with management of the islands, particularly with monitoring seabird breeding and visitor activity on or around the islands.

Recommendations for Other Island Nature Reserves
Medium Priority Section 3.0 Land Tenure 3. Consider introducing access restrictions on some islands, subject to assessing the islands' values and their sensitivity to visitor use and human impacts.
Low Priority Section 9.0 Cultural Heritage 8. Provide information to interpret the Islands' past use for guano mining.

Recommendations for Francois Peron National Park

Ongoing Priority

Section 3.0 Land Tenure

6. Subject to the expiry of gypsum mining tenements M09/7 and M09/8, amalgamate these areas into the Park.

Section 4.3 Adjacent Land Use

2. Liaise with the Shire and other agencies involved in the future tenure and management of VCL along the Monkey Mia Road, to encourage land use which does not detract from the values of the Park.

Section 6.3 Geology, Geomorphology and Hydrology

5. Continue to liaise with the WA Water Corporation regarding the use and management of surface and ground water resources.

7. Request that DOME encourage the protection of the unique gypsiferous dune formations in preparing mining plans for gypsum leases.

8. Liaise with DOME to amalgamate the area of the gypsum mining leases into the Park when tenements expire.

Section 8.0 Fauna

22. Integrate the implementation of Project Eden with management of the Park.

23. Manage recreation to protect the Park's fauna from human disturbance.

Section 9.0 Cultural Heritage

11. Protect the Peron Homestead precinct's heritage value by maintaining and enhancing it's pastoral infrastructure and aesthetic character.

13. Obtain professional heritage advice before making any significant alterations to the homestead precinct's buildings and structures.

Section 11.0 Fire Management

1. Implement buffer burning and, where necessary, habitat management burning in Francois Peron National Park. The remainder of the terrestrial reserves will be designated 'No Planned Burn Areas'.

5. Maintain strategic water supply points within Francois Peron National Park.

8. Contain wildfires that start in or may enter Francois Peron National Park. Wildfire should be contained within a management block defined by the burn buffers.

Section 13 Introduced Plants

8. Retain introduced trees at the Peron homestead precinct and Herald Bight and consider using existing species in new plantings in the homestead precinct subject to the species' not causing environmental problems.

Section 16.2 Access

6. Prohibit access for individual horse or camel riding on the reserves, but consider applications for commercial guided treks in Francois Peron National Park on specific tracks or trails.

Recommendations for Francois Peron National Park

Ongoing Priority (cont)

Section 19.0 Francois Peron National Park

5. Monitor and if necessary, restrict the use of vehicles which cause road damage.

7. Prohibit fixed wing aircraft landing, other than for essential management purposes. Assess applications for helicopter landing on a case by case basis.

8. Prohibit access for individual horse or camel riding in the Park, but consider applications for commercial guided activities.

9. Prohibit wood fires at most recreation sites. A communal wood fire may be provided at group accommodation sites in the homestead precinct and safari camp.

11. Design new structures and facilities in the homestead precinct to be sympathetic with the pastoral character (eg corrugated iron walls and roofing, earth or concrete floors, spinifex shelters, steel pole barriers, etc). Refer to recommendations in Cultural Heritage Section 8 regarding protection of the precinct's aesthetic and heritage character.

12. Locate new buildings and structures in the homestead precinct so as not to compromise the historical integrity of the site or detract from the spatial relationship between existing buildings.

13. Ensure that visitor service concessions are compatible with conservation and recreation objectives.

15. Continue to monitor and manage water quality and other safety issues associated with the hot tub.

18. Apply industry standards for managing asbestos clad buildings.

Section 25.0 Mining, Mineral and Petroleum Exploration

2. Request that DOME encourage the protection of the unique gypsiferous dune formations in preparing mining plans for the gypsum lease enclaves of Francois Peron National Park.

3. Refer mining proposals for the gypsum lease enclaves in Francois Peron National Park to the Environmental Protection Authority for assessment.

4. Liaise with DOME to incorporate the area of the gypsum mining leases into Francois Peron National Park when tenements expire or are withdrawn.

Section 27.0 Utilities and Services

2. Allow for the establishment and maintenance of utilities which are necessary for Park management or public safety. Visually obtrusive utilities should be located outside the Park if possible.

3. Encourage useful siting of future utilities and services along the Monkey Mia Road, to protect the scenic quality of the tourist drive along the Park's south boundary.

High Priority

Section 3.0 Land Tenure

5. Reserve the Vacant Crown Land on Guichenault Point by incorporating this area into the Park.

7. Incorporate the disused Shire airstrip (Reserve 29432) into the Park.

Recommendations for Francois Peron National Park

High Priority (cont)

Section 6.0 Geology, Geomorphology and Hydrology

6. Assess the condition of all bores on the Park and determine management options.

Section 8.0 Fauna

24. Devise and implement detailed operational plans for the control of feral animals, the management of fire and the translocation of threatened species.

25. Encourage tourism involvement in Project Eden and develop operational guidelines for managing interaction between the Park's visitors and fauna.

Section 9.0 Cultural Heritage

9. Provide information to interpret the Park's cultural heritage. Events and/or places of particular significance are Cape Lesueur, Herald Bight, Peron homestead precinct, Aboriginal history, European exploration and colonial development.

12. Complete renovations on the Peron homestead and overseer's quarters.

Section 11.0 Fire Management

6. Prohibit open/wood fires in the terrestrial reserves (gas cookers will be allowed) except for approved communal wood fires which may be provided in Francois Peron National Park at the homestead precinct and safari camp.

Section 13.0 Introduced Plants

1. Monitor the response of weed populations to the removal of grazing.

Section 15.0 Rehabilitation

2. Rehabilitate Red Cliff in Francois Peron National Park as a priority and in accordance with a site development and rehabilitation plan for the area.

Section 19.0 Francois Peron National Park

1. Implement the Recreation Development Plan and Zoning Scheme as shown in Map 8.

3. Construct a new 2WD road to the homestead precinct as a priority.

4. Develop a Roading Plan to clarify stages, standards and priorities for road works.

6. Provide access and facilities for people with disabilities at key recreation sites.

10. Finalise and implement the Concept Development Plan for the homestead precinct (see Map 9).

14. Encourage potential tourism opportunities which relate to Project Eden.

16. Designate and develop safe lookout sites on the coastal cliffs.

Section 26.0 Basic Raw Material

6. Facilitate the rehabilitation of the extraction pit and coast at Red Cliff.

Recommendations for Francois Peron National Park
High Priority (cont) Section 27.0 Utilities and Services 4. Liaise with the Water Corporation of WA regarding the use of artesian waters and the environmental effects of such use. 5. Assess the condition of the Park's bores and determine management options.
Medium Priority Section 6.0 Geology, Geomorphology and Hydrology 9. Develop an appropriate site to interpret the evolution and geology of birridas. Section 19.0 Francois Peron National Park 2. Provide 2WD access from the Monkey Mia Road to Big Lagoon, and 4WD access north of this point. 17. Develop a birrida interpretation site to reinforce to visitors the risk of driving on birridas.
Low Priority Section 9.0 Cultural Heritage 10. Consider developing a coastal site to interpret the Park's Aboriginal history. 14. Retain pastoral infrastructure which is useful to management and heritage interpretation.

Recommendations for Shell Beach Conservation Park

Ongoing Priority

Section 4.0 Adjacent Land Use

3. Liaise with the Shire and other relevant agencies to minimise the impacts of shell quarrying operations on the scenic values of Shell Beach.

Section 6.4 Geology, Geomorphology and Hydrology

10. Continue research into the accretion of *Fragum erugatum* shell.

Section 8.0 Fauna

26. Integrate fauna management programs for Project Eden with management of the Park.

27. Continue research on the dynamics of shell accretion.

Section 20.0 Shell Beach Conservation Park

2. Restrict vehicle access to designated tracks, rehabilitate disused tracks and prohibit vehicles on the beach where possible.

3. Prohibit overnight use of the Reserve.

Section 25.0 Mining, Mineral and Petroleum Exploration

5. Liaise with relevant agencies to ensure that shell quarrying operations have minimal impact on the scenic values of Shell Beach Conservation Park.

High Priority

Section 3.0 Land Tenure

8. Amend the Reserve's classification from Class C to Class A.

Section 4.0 Adjacent Land Use

4. Liaise with managers of adjacent land to manage vehicle access into the Park.

Medium Priority

Section 20.0 Shell Beach Conservation Park

1. Implement the Recreation Development Concept Plan as shown in Map 5.

Recommendations for Zuytdorp Nature Reserve

Ongoing Priority

Section 4.0 Adjacent Land Use

5. Liaise with the WA Maritime Museum regarding management of the area and the possible inclusion of Reserve 29282 into the Zuytdorp Nature Reserve.

Section 7.0 Vegetation and Flora

6. Support the acquisition of lands adjacent to Zuytdorp Nature Reserve to improve the representation of vegetation communities on conservation reserves.

Section 21.0 Zuytdorp Nature Reserve

1. Allow for day use and camping along the coastal margin, but do not promote the Reserve for recreation.

2. Prohibit general access for recreation on the inland portion of the Reserve. Special purpose uses may be permitted of there are benefits for Reserve management.

3. Participate in the coast road feasibility study, and liaise with Main Roads WA and other relevant agencies on this matter.

7. Only licence commercial tours which are primarily and predominantly for the study of natural and cultural values.

High Priority

Section 3.0 Land Tenure

9. Amend the Reserve's classification from Class C to Class A.

10. Continue negotiations to acquire land from Nanga and Tamala Stations for reservation as nature reserve. Reserve this area as part of Zuytdorp Nature Reserve.

Section 7.0 Vegetation and Flora

6. Support the acquisition of lands adjacent to Zuytdorp Nature Reserve to improve the representation of vegetation communities on conservation reserves.

Medium Priority

Section 3.0 Land Tenure

11. Liaise with the lessees of Murchison House Station regarding the possible southward extension of Zuytdorp Nature Reserve.

Section 8.0 Fauna

28. Promote research of the reserve's fauna, with priority for species which may be severely affected by feral animals and other threats.

Recommendations for Zuytdorp Nature Reserve
Medium Priority (cont)
Section 9.0 Cultural Heritage
15. Liaise with the WA Maritime Museum to provide information to interpret and help protect the area's heritage values, particularly regarding the Zuytdorp wreck.
Section 21.0 Zuytdorp Nature Reserve
4. Prepare and implement a Recreation Development Plan for the coastal portion of the Reserve.
5. Liaise with the Maritime Museum to provide appropriate visitor facilities at the wrecksite and with regard to applications for commercial tours in the area.
6. Provide information to advise visitors of the Reserve's values, safety risks and precautions, regulations and guidelines for minimal impact use.