Cape Range National Park

Management Plan No 65 2010

Department of
Environment and Conservation

Conservation
Commission
WESTERN AUSTRALIA

CAPE RANGE NATIONAL PARK

Management Plan

2010

Department of Environment and Conservation

Conservation Commission of Western Australia

VISION

By 2020, the park and the Ningaloo Marine Park will be formally recognised amongst the world's most valuable conservation and nature based tourism icons. The conservation values of the park will be in better condition than at present. This will have been achieved by reducing stress on ecosystems to promote their natural resilience, and facilitating sustainable visitor use. In particular, those values that are not found or are uncommon elsewhere will have been conserved, and their special conservation significance will be recognised by the local community and visitors.

The park will continue to support a wide range of nature-based recreational activities with a focus on preserving the remote and natural character of the region. Visitors will continue to enjoy the park, either as day visitors from Exmouth or by camping in the park itself at one of the high quality camping areas.

The local community will identify with the park and the adjacent Ningaloo Marine Park, and recognise that its values are of international significance. An increasing number of community members will support and want to be involved in its ongoing management.

The Indigenous heritage of the park will be preserved by the ongoing involvement of the traditional custodians, who will have a critical and active role in jointly managing the cultural and conservation values of the park.

PREFACE

Cape Range National Park is an outstanding conservation and recreation asset providing an important gateway to the Ningaloo Marine Park. Together these magnificent natural jewels, which have been earmarked for possible World Heritage listing, are recognised amongst the nation's most valued conservation, recreation and tourism icons. The diverse landscapes and habitats of the national park and marine park support an outstanding array of wildlife including spectacular coral reefs and fish species, iconic species such as whale sharks and manta rays and extraordinary assemblages of subterranean creatures many of which are found nowhere else in the world. Cape Range also has important cultural and scientific values with evidence of previous human habitation and culture as well as geological and biological evolution. In recognition of the area's world class qualities, the Commonwealth Government has nominated areas of the Cape Range peninsula and Ningaloo Marine Park for World Heritage. The Conservation Commission of Western Australia is committed to supporting and working with the Government to this end. The management prescriptions in this plan along with those in the *Management Plan for the Ningaloo Marine Park and Murion Islands Marine Management Area 2005-2015* provide for protection of the parks' significant natural and cultural values and are therefore an important contribution towards achieving World Heritage listing for the area. Cape Range National Park and Ningaloo Marine Park are now included on the National Heritage list.

This management plan is for the Cape Range National Park and has been prepared by the Department of Environment and Conservation on behalf of the Conservation Commission or WA.

In accordance with section 55 of the CALM Act, the term of the final management plan will be 10 years from the date of gazettal, or until the plan is superseded by a new management plan.

The Department and the Conservation Commission understand that effective management of Cape Range National Park depends on partnerships with the community. Proposals in this plan have been developed by taking into consideration comments received from the community and key stakeholders during preparation of the plan. This included input from a community advisory committee, submissions to a publicly released issues paper, meetings with stakeholders and feedback from community meetings and workshops principally held by the former Department for Planning and Infrastructure in preparing the *Ningaloo Coast Regional Strategy Carnarvon to Exmouth* (WAPC 2004) (Ningaloo Coast Regional Strategy). This management plan strikes an acceptable balance between ecological and socio-economic demands. Ongoing community involvement in the management of Cape Range National Park will be vital. To this end, the plan provides for education and public participation programs to raise community awareness, understanding and cooperation with management.

There is a particular focus on providing for the involvement of Indigenous peoples in management of the park. The plan gives practical recognition to the need for Indigenous peoples to practice their culture (including to care for country) and protect heritage sites. Strategies to ensure that this can happen have been incorporated into this plan.

Marine and coastal environments are complex, integrated systems and it is therefore essential that management of these areas is also integrated, coordinated and complementary. To this end, the regional context of the park has been a key consideration during the planning process and strategies have been developed with adjacent land and marine uses in mind. The plan has sought to provide for seamless management with other Department managed areas in the region (e.g. the marine park and Jurabi and Bundegi Coastal Parks). This plan has been developed in close collaboration with the development of the *Management Plan for the Ningaloo Marine Park and Murion Islands Marine Management Area 2005-2015*, and both are consistent with the broader planning framework provided by the Ningaloo Coast Regional Strategy.

The Conservation Commission and Department will seek to achieve the plan's objectives by taking the actions specified. Improvements in management are planned through adaptive management strategies built into the document. The Department and Commission are committed to implementation of the plan. Reports by the Conservation Commission on implementation of the plan will make it clear if any actions have not been progressed and for what reasons.

NOMENCLATURE

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

The words Jinigudira, Baijunju and Thalanyji can be spelt in numerous ways. This spelling should also be seen to encompass all other spellings.

For the purposes of this management plan ‘the park’ refers to the Cape Range National Park and ‘the Department’ refers to the Department of Environment and Conservation.

CONTENTS

VISION ii

PREFACE iii

NOMENCLATURE iv

CONTENTS v

PART A. INTRODUCTION 1
1. Brief Overview 1
2. Regional Context 1
3. Management Plan Area 2
4. Key Values 2
5. Public Participation 3

PART B. MANAGEMENT DIRECTIONS AND PURPOSE 4
6. Vision 4
7. Legislative Framework 4
   Legislation 4
   Land Classification 5
   Obligations and Agreements 6
8. Management Arrangements with Aboriginal People 7
9. Management Planning Process 8
10. Performance Assessment 8
11. Existing Tenure 9

PART C. MANAGING THE NATURAL ENVIRONMENT 10
12. Biogeography 10
   Proposals for Additions to the Conservation Reserve System 10
13. Climate Change 13
   Observed and Projected Climate Change 14
   Impacts of Climate Change 14
   Responses to Climate Change 15
14. Geology and Geomorphology 16
   Geology 16
   Geomorphology 16
   Geoheritage 19
15. Water Catchment Protection 20
   Hydrology 20
   Water Management 22
16. Native Plants and Plant Communities 24
   Native Plants 24
   Plant Communities 25
   Management of Native Plants and Communities 25
17. Native Animals and Habitats 26
   Threatened and Other Specially Protected Fauna 27
   Mammals 27
   Bats 29
   Birds 29
   Reptiles and Amphibians 30
   Invertebrates 31
18. Threatened Ecological Communities 36
19. Environmental Weeds 36
   Environmental Weed Management 36
20. Introduced and Other Problem Animals 38

Foxes and Cats 39
Goats 39
Rabbits 40
Black Rat 40
Wild Dogs 40
Fish and Aquatic Invertebrates 41
Other Problem Animals 41
21. Fire 42
Fire History 42
Fire Ecology 43
Fire Management 45
22. Ecosystem Rehabilitation 49

PART D. MANAGING OUR CULTURAL HERITAGE 51
23. Indigenous Cultural Heritage 51
24. Non-Indigenous Heritage 53

PART E. MANAGING VISITOR USE 55
25. Recreation and Tourism Opportunities 56
Regional Context 56
Visitor Management Settings 58
Wilderness 58
26. Access 60
Vehicle Access 61
Beach and Boat Access 62
Pedestrian Access 63
Access for Visitors with Disabilities 63
Access for Management 64
27. Visual Landscape 65
Landscape Character Types 65
Scenic Quality 65
Visual Landscape Management 66
28. Recreational Use 67
Fishing 67
Water-based Activities 68
Abseiling and Rock Climbing 70
Caving 71
Scenic Flights and Other Aircraft 74
Special Events 74
Non-Commercial, Education and Not-for-profit Activities 75
Wildlife Viewing 75
Day Use 77
Overnight Stays 77
Cycling 82
Visitor Services 83
29. Commercial Tourism Operations 84
30. Visitor Safety 85

PART F. MANAGING RESOURCE USE 87
31. Indigenous Customary Activities 87
32. Mineral and Petroleum Exploration and Development 87
33. Basic Raw Materials 89
34. Defence Force Training 91
35. Emergency Services Training 91
36. Utilities and Services 92
37. Scientific and Research Use 93
38. Water Abstraction 94

PART G. INVOLVING THE COMMUNITY 96
39. Information, Education and Interpretation 96
40. Working with the Community 97

PART H. IMPLEMENTING THE PLAN 99
41. Administration 99
42. Research and Monitoring 99
Research Requirements 99
43. Term of the Plan 100

GLOSSARY 101

REFERENCES 106
Personal Communications 111

APPENDICES 121
APPENDIX 1 Key Performance Indicators 121
APPENDIX 2 Threatened and other Specially Protected Fauna in Cape Range National Park 125
APPENDIX 3 Potential Fauna Reintroductions into the Cape Range National Park 126
APPENDIX 4 JAMBA, CAMBA and rokamba Species – Cape Range National Park 127
APENDIX 5 Guiding principles for Fire Management in Landscapes Dominated by Spinifex Grasslands 128
APPENDIX 6 Management Settings Criteria 129
APPENDIX 7 Guidelines for Landscape Management 135
APPENDIX 8 (A) Previous Planning Studies/Documents Recommending Additions to Cape Range National Park 136
APPENDIX 8 (B) Planning and Environmental Guidelines for Sustainable Tourism on the Ningaloo Coast. 140

FIGURES
Figure 1 Area Subject to Further Planning by the WAPC 12
Figure 2 Wilderness Quality 59

TABLES
TABLE 1 Exotic Animals Recorded in the Park 38
TABLE 2 Coastal Tourism Framework (*Ningaloo Coast Regional Strategy – Carnarvon to Exmouth*) 57
TABLE 3 Walk Trails Within Cape Range National Park 63
TABLE 4 Areas of High Scenic Quality in the Park 65
TABLE 5 Cave Classification System 72
TABLE 6 Accommodation, Camping and Day Use Sites – Cape Range National Park 79

MAPS
Map 1 North West Cape Tenure 112
Map 2 Location of Red Dune Fields within Unallocated Crown Land 113
Map 3a State Geoheritage Sites North West Cape 114
Map 3b Register of the National Estate Geoheritage Site North West Cape 115
Map 4 Groundwater Resources 116
Map 5 Ningaloo Coast Regional Strategy 117
Map 6 Visitor Management Settings 118
Map 7 Existing Recreation Sites 119
Map 8 Proposed Recreation Sites 120

PART A. INTRODUCTION

1. BRIEF OVERVIEW

Cape Range National Park is located near Exmouth, about 1 200 km north of Perth on the north-west coast of Western Australia. The park encompasses 50 581 ha of the Cape Range peninsula, a heavily dissected karstic range and fringing coastal plain adjacent to the northern part of the Ningaloo Marine Park (see Map 1).

The park is valued for its range of ecological values—undoubtedly of local and regional significance, but also increasingly recognised for its national and global importance. The park forms part of an area nominated for World Heritage, and is on the National Heritage List. The Conservation Commission of Western Australia (Conservation Commission) is committed to World Heritage nomination.

The plan provides for the protection of the park's significant values. The conservation values of the park include ancient and relictual subterranean fauna, diverse habitats, and the presence of species occurring at the limits of their geographical range or as geographically isolated populations. The principal landscape-scale threats to the native plant and animal species are feral animals and weeds, changes to natural hydrological regimes and inappropriate fire regimes.

The plan provides for the protection of an exceptional landform sequence from the modern day Ningaloo Reef to the now fossilised remnants of former reef and past shorelines of Cape Range and associated wave cut terraces. This landform sequence, plus the flora and fauna it supports is unique and provides a window to the evolution of reefs, changing sea levels and the movement of the continents over time. This allows scientists to gain an understanding of biological and ecological evolution over the past 200 million years.

The park is highly valued for the scenic quality of its rugged coastline bordered by the Ningaloo Reef, and its recreation qualities. Visitation to the park is increasing, with visitor numbers more than doubling since 1987. A greater emphasis is now placed on appreciating the natural environment and less on fishing as the key reason for visiting (Carlson and Wood 2004). With increasing visitation levels there is a greater need to ensure that management strategies are in place to address conflicting recreational uses, competition for access to recreation sites, and the potential for visitation related environmental impacts. Ensuring that the remote and natural Cape Range experience is maintained will also be important. The plan provides a wide range of recreational opportunities while ensuring the key values of the park are maintained.

This plan should not be viewed in isolation but as an integral part of management regimes that occur in adjacent and related areas (e.g. Ningaloo Marine Park, Jurabi Coastal Park, Bundegi Coastal Park and unallocated Crown land north of the park).

2. REGIONAL CONTEXT

The park is located within the Western Australian Planning Commission's (WAPC) Gascoyne Planning Region of Western Australia. This region covers approximately 138 000 km^2 and comprises the Shires of Exmouth, Carnarvon, Upper Gascoyne and Shark Bay. The park is within the local government area of the Shire of Exmouth.

The region includes internationally recognised features such as the Ningaloo Reef and the Shark Bay World Heritage Area. The park along with the Jurabi and Bundegi Coastal Parks serve as important gateways to the Ningaloo Marine Park. The hinterland includes such natural features as the Kennedy Ranges and Mt Augustus. The region's attractions include coastal landscapes, beaches, national parks, and numerous opportunities for recreation and eco-tourism.

The Gascoyne Planning Region's resident population of approximately 10,000 is concentrated in Carnarvon, Exmouth, Denham, Coral Bay, Gascoyne Junction and Burringurrah (Gascoyne Development Commission 2006). Although the region's resident population is the lowest within regional Western Australia, it attracts a significant number of tourists and medium-term visitors, primarily in the winter months from June to September. It is estimated that the resident population of the region will grow to 11,000 by 2009 and further increase to 11,400 by 2019 (Department for Planning and Infrastructure cited in Gascoyne Development Commission 2006).

The major industries of the region include tourism, retail trade, mineral and petroleum development, fishing, horticulture and pastoralism. During 2003/4 there were approximately 276,000 domestic and international visitors to the region, contributing about $172 million to the economy (Gascoyne Development Commission 2006). By comparison, the next highest contributor to the region's economy during 2004/2005 was retail trade with an estimated $84 million. These figures reflect the regional importance of the tourism industry and the natural assets upon which it is based. Such natural attractions, which are vested in the Conservation Commission and the Marine Parks and Reserves Authority and managed by the Department (including the Cape Range National Park and Ningaloo Marine Park), are promoted as significant tourism drawcards, and the way in which they are managed will continue to influence the tourism and recreational potential of the region. Liaison with Tourism WA (formerly the Western Australian Tourism Commission), regional tourism organisations and local government are important in promoting and managing the conservation and nature-based recreation values of the park. Records collected by the Department indicate that Cape Range National Park received approximately 250,000 visits during 2009/2010.

3. MANAGEMENT PLAN AREA

This management plan covers the existing Cape Range National Park. Where appropriate the plan considers issues relevant to areas for possible vesting with the Conservation Commission (see Section 12). In the event that any areas discussed in Section 12 of this plan are added to the conservation reserve system, they will, with the exception of coastal pastoral lease exclusion areas, be managed under and in accordance with this management plan. In the event of land from the coastal pastoral lease exclusion areas being transferred to the management control of the Department, a separate management document will be prepared which will be consistent with the objectives and underlying principles of this management plan.

4. KEY VALUES

Key values of the Cape Range National Park include:

Conservation Values

- a reserve securing protection of land within a bioregion currently underrepresented within the conservation reserve system;
- an extensive karst hydrological system that supports an extremely diverse subterranean fauna of high biodiversity conservation significance including locally disjunct, endemic and relictual species;
- rich fossil deposits, including Pleistocene coral reefs that represent several periods of coral reef development;
- a particularly rich flora for an arid limestone environment;
- the presence of tropical, temperate and arid flora and many taxa at the limit of their range;
- the presence of subterranean fauna which due to factors such as its rich diversity, ancient affinities, isolation over millions of years and differing origins is of high biodiversity conservation significance and scientific importance;
- a rich and diverse vertebrate and invertebrate fauna, attributable to the range of habitats available on the peninsula (e.g. mangroves, inter-tidal marine areas, sandy ridges, subterranean wetlands, alluvial plains, rocky ranges and caves);
- the occurrence of fauna species that are threatened, endemic, locally restricted, and/or at the limits of their range;
- turtle rookeries; and
- demonstration of the process of speciation of disjunct populations.

Cultural Values

- confirmed evidence of the earliest known occupation (Pleistocene) based on a marine economy in Australia;
- numerous sites and landscapes of Indigenous cultural significance;
- non-indigenous cultural heritage associated with the pastoral and mineral exploration industry; and
- potential for demonstrating a successful joint management arrangement between the Department and the Coral Coast Park Council.

Recreational and Tourism Values

- terrestrial and adjacent marine environments that offer remote nature-based recreation and tourism opportunities;

- outstanding scenic landscapes of great contrast (the deeply dissected red-coloured range and the vibrant blue of the shallow offshore reef, separated by a flat coastal plain) and extensive views of Ningaloo Reef and Exmouth Gulf from parts of Cape Range;
- terrestrial and adjacent marine environments that provide opportunities for viewing a diverse range of native flora and fauna;
- natural and cultural values which attract nature based tourism and significantly contribute to regional expenditure; and
- remote qualities of the park.

Education and Research Values

- evidence in various geological, geomorphological and biological features which combine to give unique insights into a range of scientific pursuits (e.g. biogeography, paeloclimatology, archaeology, anthropology); and
- opportunities for visitors to interpret and acquire knowledge regarding natural and cultural values.

Community Values

- opportunities for community involvement in management of the park.

5. PUBLIC PARTICIPATION

This management plan has been developed in consultation with key stakeholders, park users and other interested parties in the following ways:

- individuals and organisations helped to identify issues to be considered during the development of the draft management plan by submitting 'Have Your Say' brochures;
- an 'Issues Paper' was developed, advertised and distributed to assist the public in participating in the management planning process;
- a community advisory committee (the Coral Coast Parks Advisory Committee) was formed and numerous meetings were held to discuss management issues and facilitate community input during development of the plan;
- an Aboriginal Park Council (the Coral Coast Park Council) was formed to provide advice, with a particular focus on cultural matters and potential joint management arrangements;
- meetings were held with key stakeholders in Exmouth, Coral Bay, Carnarvon and Perth;
- public exhibitions/displays during the preparation of the draft;
- progress updates were issued via a regular newsletter to stakeholders who had registered their details;
- a range of consultation mechanisms were used to ensure relevant government agencies were informed of or engaged in the planning process; and
- written submissions received during a 3 month formal public submission period were analysed and considered in the preparation of the final management plan.

PART B. MANAGEMENT DIRECTIONS AND PURPOSE

6. VISION

The vision for the Cape Range National Park is that:

By 2020, the park and the Ningaloo Marine Park will be formally recognised amongst the world's most valuable conservation and nature based tourism icons. The conservation values of the park will be in better condition than at present. This will have been achieved by reducing stress on ecosystems to promote their natural resilience, and facilitating sustainable visitor use. In particular, those values that are not found or are uncommon elsewhere will have been conserved, and their special conservation significance will be recognised by the local community and visitors.

The park will continue to support a wide range of nature-based recreational activities with a focus on preserving the remote and natural character of the region. Visitors will continue to enjoy the park, either as day visitors from Exmouth or by camping in the park itself at one of the high quality camping areas.

The local community will identify with the park and the adjacent Ningaloo Marine Park, and recognise that its values are of international significance. An increasing number of community members will support and want to be involved in its ongoing management.

The Indigenous heritage of the park will be preserved by the ongoing involvement of the traditional custodians, who will have a critical and active role in jointly managing the cultural and conservation values of the park.

The vision of this plan is derived from State legislation and policy, and community input. The vision also reflects the key values of the park and the importance of sustainably managing those values (see *Key Values* in Section 4).

7. LEGISLATIVE FRAMEWORK

Legislation

National parks are vested in the Conservation Commission and managed by the Department of Environment and Conservation (the Department) according to the CALM Act and associated regulations. Sections 54-56 of the Act specify that:

- the Commission is responsible for the preparation of management plans, through the agency of the Department, for all land vested in it;
- a management plan must contain a statement of policies or guidelines to be followed in the management of the area, and a summary of the operations proposed to be taken over the life of the plan;
- a management plan for a national park shall be designed 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"*.

Each plan is periodically subject to assessment by the Conservation Commission (section 19 of the CALM Act) and remains in force until such time as a new plan is prepared. The procedure to make an amendment to a gazetted management plan is governed by section 61 of the CALM Act and involves a public consultation process.

The CALM Act also covers such matters as defining categories of lands and waters managed by the Department, establishing controlling bodies, establishing and defining the functions of the Department and the controlling bodies, management planning and auditing, permits, licences, contracts, leases, offences and enforcement.

The Department is responsible for administration of the *Wildlife Conservation Act 1950* (Wildlife Conservation Act) and the *Environmental Protection Act 1986* (Environmental Protection Act) and associated regulations amongst other legislation.

There is a range of other statutes affecting the Department's activities or conferring specific powers on the Department. Some are briefly described below. These and other statutes of relevance to the park are referred to throughout this plan where relevant.

The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) includes provisions for protecting "matters of national environmental significance" such as World heritage, National heritage, nationally-listed threatened species and ecological communities, Wetlands of International Importance and listed migratory species. There are for example, provisions for environmental impact assessment and approvals of actions likely to have a significant impact on "matters of national environmental significance". The park contains a number of nationally listed threatened species and listed migratory species. Areas of the Cape Range peninsula, including Cape Range National Park and the adjacent Ningaloo Marine Park, have been nominated for World Heritage and have been placed on the National Heritage list by the Commonwealth Government. It is likely that nomination of subterranean karst wetlands within the area for inclusion on the list of Wetlands of International Importance will also be progressed in the near future (see *Obligations and Agreements* within this section for more information). The EPBC Act also includes provisions for bilateral Government agreements pertaining to accredited environmental assessments, approval processes or accredited management plans.

State planning legislation such as the *Planning and Development Act 2005* (Planning and Development Act) allows the WAPC to prepare planning strategies for the State. Planning strategies are prepared to coordinate and promote regional land use planning and land development, and guide government departments, authorities and local government. For example, the WAPC may prepare a statutory region scheme for an area which would include the Ningaloo coast and the Cape Range National Park under the Planning and Development Act (WAPC 2004). Development of the regional scheme may take some years and therefore as an interim measure the WAPC has developed the 'Ningaloo Coast Regional Interim Development Order 2007' under the Planning and Development Act. This enables it to regulate, restrict or prohibit development of land where the region scheme is to apply and where it may affect the preparation or implementation of the region scheme. Some new developments within the national park may need to be referred to the Department of Planning under the Ningaloo Coast Regional Interim Development Order. This management plan will provide the framework for undertaking strategic consultation with the Department of Planning regarding new developments in the park.

Under the *Aboriginal Heritage Act 1972* (Aboriginal Heritage Act), the Department is required to report Aboriginal heritage sites and ensure that sites are protected. The (Commonwealth) *Native Title Act 1993* (Native Title Act) requires that native title claimants and representative bodies be notified when a management plan is being prepared or public works undertaken. The Yamatji Marlpa Barna Baba Maaja Aboriginal Corporation (Yamatji Land and Sea Council) is the native title representative Aboriginal body for the park and has a number of functions prescribed under the Native Title Act.

Fisheries management throughout Western Australia is the statutory responsibility of the Department of Fisheries under the *Fish Resources Management Act 1994*, although the Department has powers to designate national park areas as a restricted area where fishing is prohibited under the *Conservation and Land Management Regulations 2002* (CALM Regulations). Within Ningaloo Marine Park, recreational fishing is regulated and managed by the Department of Fisheries in consultation with the Department, as outlined in the *Management Plan for the Ningaloo Marine Park and Murion Islands Marine Management Area 2005-2015*.

The *Mining Act 1978* (Mining Act) and the *Petroleum and Geothermal Energy Resources Act 1967* (Petroleum and Geothermal Energy Act) generally take precedence over the CALM Act in respect of national parks and other terrestrial reserves, and may override the contents of this management plan with regards to mining and petroleum matters (refer to section 4 of the CALM Act).

Land Classification

Section 62 of the CALM Act provides for the classification of lands into various categories, or zones. Two categories are proposed to be employed (or potentially employed) in Cape Range National Park: prohibited area and temporary control area.

Prohibited areas are those that may not be entered except as authorised by the Director General of the

Department, and then only to carry out activities pursuant to the plan. The southern wall of the Yardie Creek Gorge and an adjacent buffer was proposed as a prohibited area in 2002 to prevent disturbance to wildlife in the gorge (in particular black-flanked rock wallabies). This prohibited area may be extended if required. This category may also be invoked elsewhere in similar circumstances over the life of the plan.

Temporary control areas (or similar alternative mechanisms available under the CALM Act or CALM Regulations) may also be used to provide temporary or seasonal protection to fauna. For example, a temporary control area could be used to protect seabirds or turtles nesting on the beach. The need for use of temporary control areas will be assessed on a case-by-case basis.

Obligations and Agreements

Australia is a participant or signatory to a number of important international conservation agreements, some of which affect management of the Cape Range National Park. They include the following:

World Heritage Convention

Australia ratified the 'Convention Concerning the Protection of the World Cultural and Natural Heritage' in 1974. This international treaty encourages the identification, protection and preservation of cultural and natural heritage that is considered to be of "outstanding universal value" to humanity. The convention defines both natural and cultural criteria for inscription of World Heritage properties. Properties may be inscribed on the basis of their outstanding universal natural or cultural values (or both). As a signatory of the World Heritage Convention Australia has a duty to identify, protect, conserve, present and transmit to future generations and, if appropriate, rehabilitate the World Heritage values of World Heritage properties (Environmental Protection and Biodiversity Conservation Act Regulations 2000 schedule 5).

Two of Australia's current World Heritage properties are within Western Australia; Shark Bay and Purnululu National Park. The Ningaloo Coast has been nominated for World Heritage listing, in recognition of the area's natural heritage values. This plan is aimed at ensuring the values of the park and especially those of outstanding universal value are recognised and protected. If World Heritage listing of the area is achieved, this plan may form part of a broader property management system aimed at protecting the values for which the World Heritage property is inscribed.

Australia's World Heritage properties are protected under the Commonwealth's EPBC Act. This Act provides automatic protection for World Heritage properties by ensuring that an environmental impact assessment process is undertaken for proposed actions that will, or are likely to, have a significant impact on the World Heritage values of the property. This process allows the relevant Commonwealth Minister responsible for the EPBC Act to grant or refuse approval to take an action, and to impose conditions on the taking of an action.

The Convention on Wetlands (Ramsar, Iran 1971)

The 'Convention on Wetlands' (more commonly known as the Ramsar Convention) is an intergovernmental treaty dedicated to the conservation and wise use of wetlands. It encourages contracting parties to designate sites containing representative, rare or unique wetland types, or that are important for conserving biological diversity (Ramsar sites). These sites need to be managed to ensure their special ecological values are maintained or improved. Australia became a Contracting Party in 1974.

Subterranean karst wetlands were included as a category within the Ramsar classification system in 1996. Although the karst wetlands within the park have not been listed to date, the Department will consider nomination for inclusion on the list of Wetlands of International Importance (i.e. designation as a Ramsar site) over the life of the plan.

Burra Charter

In 1979 the Australia International Council on Monuments and Sites (ICOMOS) adopted a charter for the conservation of places of cultural significance, now known as the *Australia ICOMOS Burra Charter 1999* (Burra Charter). Widely adopted as the standard for the conservation of places of cultural significance in Australia, the charter sets guidelines that include defining significance, establishing significance, conservation policy, and procedures for undertaking studies and reports. The charter can be applied to all types of places of cultural significance including natural, indigenous and historic places with cultural values.

Bonn Convention

Australia is a contracting party to the 'Convention on the Conservation of Migratory Species of Wild Animals' (Bonn Convention), which came into force in 1992. Under this convention countries are expected to protect species that regularly migrate across international boundaries. Migratory species listed under the convention are further protected under the EPBC Act.

The three species of marine turtle recorded in the park—green turtle (*Chelonia mydas*), hawksbill turtle (*Eretmochelys imbricata*) and loggerhead turtle (*Caretta caretta*)—are listed under the Bonn Convention. Australia is also a signatory to the *Memorandum of Understanding on the Conservation and Management of Marine Turtles and their Habitats of the Indian Ocean and South-East Asia* created under the Bonn Convention. The Memorandum of Understanding covers the park's marine turtles and includes a conservation and management plan which focuses on reducing pressures, conserving critical habitat, exchanging scientific data, increasing public awareness and participation, promoting regional cooperation, and seeking resources for implementation. National and State level strategies for the conservation of marine turtles have also been produced (see *Reptiles and Amphibians* in Section 17).

The osprey (*Pandion haliaetus*), brown goshawk (*Accipiter fasciatus fasciatus*) and mongolian dotterel *(Charadrius mongolus*), also listed under the Bonn Convention, have been recorded in Cape Range National Park.

Japan–Australia Migratory Bird Agreement (JAMBA), China–Australia Migratory Bird Agreement (CAMBA) and Republic of Korea – Australia Migratory Bird Agreement (ROKAMBA)

Australia's treaties with Japan and China came into force in the 1980s to protect migratory birds in these countries. The treaties provide for cooperation between the governments involved in order to protect shared species and their habitats. Nearly 80 bird species are listed in these agreements. Australia has also entered into the Republic of Korea- Australia Migratory Bird Agreement (ROKAMBA) in 2007 for the protection of migratory birds.

The EPBC Act provides statutory protection for migratory birds listed under these agreements. This Commonwealth legislation stipulates that all actions likely to impact on such species are subject to environmental assessment and approval, and assists Australia in meeting its international obligations for the protection and management of migratory birds listed under JAMBA, CAMBA and ROKAMBA. Under the current Wildlife Conservation Act, migratory birds listed under JAMBA, CAMBA or ROKAMBA are not necessarily declared as specially protected fauna.

There are around 30 bird species covered under JAMBA, CAMBA and/or ROKAMBA that have been recorded in the Cape Range National Park (see *Birds* in Section 17).

8. MANAGEMENT ARRANGEMENTS WITH ABORIGINAL PEOPLE

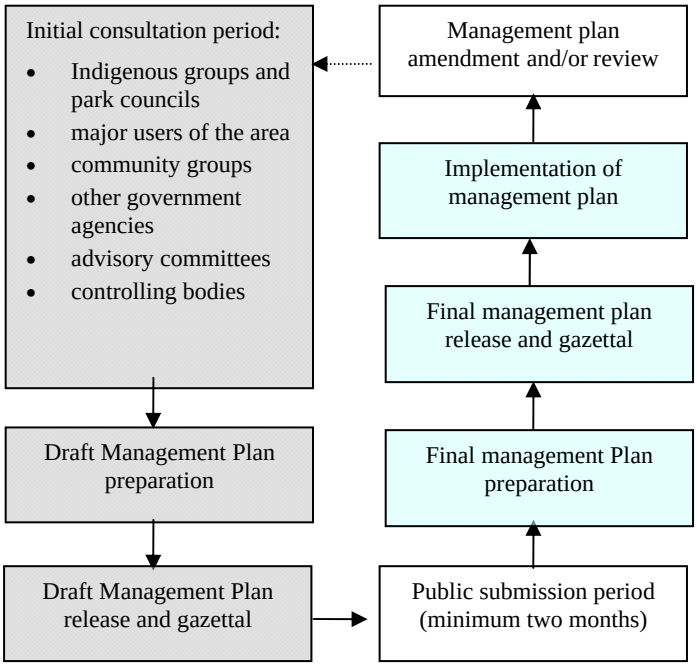
The Yamatji Land and Sea Council is the native title representative Aboriginal body for an area encompassing the park. The role of native title representative Aboriginal bodies is to assist Aboriginal groups or individuals to make applications for native title, help resolve disagreements between groups making applications, and assist groups and individuals by representing them in native title negotiations and proceedings. There is a combined native title claim by the Gnulli Native Title Claimants over an area extending from the North-west Cape eastwards to approximately Mt Augustus and southwards towards the Malgana border of the Shark Bay area. The Gnulli Native Title Claim is on behalf of three language groups with interests in the claim area (i.e. the Thalanyji, Baijungu and Ingadda). The Conservation Commission and the Department acknowledge the aspirations of Aboriginal people to obtain native title over their traditional lands and waters under the provisions of the Native Title Act. Both agencies acknowledge that native title rights and interests may be found to exist, except where they have been legally extinguished under Australian law. This management plan will not however have any bearing in relation to Native Title Tribunal processes.

There is a strong interest by Aboriginal people to be involved in the management of the conservation estate in Western Australia. Working together with Aboriginal people to care for the land will assist heritage and biodiversity conservation, strengthen the connection of Aboriginal people to their traditional or custodial lands, and enrich cross-cultural awareness.

Several Demonstration Park Councils (DPCs) have been established throughout Western Australia. DPCs are partnerships between Aboriginal people and the Department for the joint management of specified areas of the conservation reserve system. The Conservation Commission will facilitate implementation of these partnerships, and work closely with DPCs to fulfil joint responsibilities. A DPC comprising representatives from the Gnulli Native Title Claimants and the Department was established in early 2004 (known as the Coral Coast Park Council, with membership at the time including Anne Preest, John Dale, Mervyn McIntosh, Ron Baron, Stewart and Gwen McIntosh, Syd Dale and Terrance Dale). To assist with efficient and integrated management, the Coral Coast Park Council is also utilised to facilitate Aboriginal involvement in the management of Ningaloo Marine Park, and may be used for input regarding Jurabi and Bundegi Coastal Parks as well.

9. MANAGEMENT PLANNING PROCESS

The process of producing a management plan is as follows:



Management plans are prepared by the Department in consultation with and on behalf of the Conservation Commission. The Conservation Commission issues draft management plans for public comment and provides final plans for approval by the Minister for Environment.

10. PERFORMANCE ASSESSMENT

The Conservation Commission will measure the success of this plan by using key performance indicators (KPIs) and other mechanisms as appropriate. It is not efficient to measure all aspects of management given resource and technical impediments—consequently indicators will target key components or values of the plan. Each key performance indicator comprises evaluation of a measure and target, reporting requirements and a management response to any shortfall.

KPIs are an integral component of adaptive management. Adaptive management is a process whereby monitoring and other research is utilised to evaluate whether the management being implemented is adequately meeting the management objectives, and, whereby management can be adapted as necessary in the light of new knowledge or conditions. This is a reiterative process in which there are ongoing adjustments in management as needed to take account of and respond to changing conditions.

The Department is responsible for providing information to the Conservation Commission to allow it to evaluate the success of the Department's management in meeting targets specified in the KPIs. The frequency of these reports will depend upon the requirements of each KPI. Where a report identifies a target shortfall, a response to the Conservation Commission is required. The response will identify factors that have led to the target shortfall,

and propose alternative management actions where appropriate. The Conservation Commission will consider the Department's response on the target shortfall and evaluate the need for action in the context of its function under section 19(1) (g) (iii) of the CALM Act. The Conservation Commission will make the results of management plan assessments available to the public.

The application of a KPI is identified for relevant sections throughout the plan.

11. EXISTING TENURE

A national park covering part of the existing Cape Range National Park was first gazetted as a 13,424 ha reserve in 1964 (Reserve 27288, Location 52). In 1971, the status of the reserve was raised to a Class A reserve with a purpose of national park and it was named Cape Range National Park. In 1974 Yardie Creek pastoral lease land from Tantabiddi Well to 6 km south of the Yardie Creek watercourse (Location 106) was included within the park increasing the total reserved area to its current size – approximately 47,655 ha. Survey undertaken in 2001 to more accurately determine the reserve area revealed this to be less than the originally gazetted 50,581.0111 ha. The park (Reserve 27288) is now vested in the Conservation Commission. Under the Land Administration Act, national parks have a high level of security of purpose and tenure – excisions greater than 1 ha (except for roads) and any change of reserve purpose need approval of Parliament.

To the west the park is bounded by the Ningaloo Marine Park which extends to High Water Mark in areas adjacent to the national park. To the south, the park is bordered by the Learmonth Air Weapons Range. To the north and north-east it is bounded by unallocated Crown land, and by Exmouth Gulf pastoral station to the east.

The tenure of the area is shown in Map 1. Proposals for additions to the conservation reserve system are addressed in Section 12 (*Biogeography*). The addition of areas to a national park occurs under the Land Administration Act and requires the consent of the Minister for Environment.

PART C. MANAGING THE NATURAL ENVIRONMENT

The major foci for nature conservation management for the period of this plan are to:

- further contribute to the establishment and management of a comprehensive, adequate and representative (CAR) reserve system through progression of proposed additions to the conservation reserve system described in this plan;
- maintain the integrity of subterranean habitats;
- provide for well managed wildlife tourism (e.g. rock wallaby and marine turtle interactions) that will enhance conservation of the target species;
- control feral animals, in particular goats and foxes, to protect key species;
- increase knowledge of the effects of buffel grass and its control, and subsequently treat and rehabilitate affected areas; and
- improve knowledge regarding the biodiversity attributes of the park and proposed additions to the conservation reserve system.

The last two points in particular need to be considered in light of the state-wide biodiversity audit undertaken by The Department in 2002 (May and McKenzie 2002, Kendrick and Mau 2002), which provided a basis for assessing conservation priorities across the State and identified knowledge gaps. Relevant major knowledge gaps and research priorities identified in the audit or throughout the preparation of this plan are highlighted where relevant throughout this section (see also Section 42 *Research and Monitoring*).

12. BIOGEOGRAPHY

The Interim Biogeographic Regionalisation for Australia (IBRA) provides a planning framework for selecting a CAR reserve system of protected areas to conserve and protect Australia's biodiversity (Thackway and Cresswell 1995). The IBRA divides Western Australia into 26 biogeographic regions, based on lithology, geology, landform, and vegetation. The park and proposed conservation reserve system additions are within the Cape Range subregion of the Carnarvon IBRA bioregion. This bioregion comprises two subregions, the other being the Wooramel subregion.

The benchmark reservation level for a CAR reserve system is generally acknowledged as 15% of each bioregion (CALM 2003). The area of reserved conservation land in the Carnarvon bioregion is 30 2536 ha, or 3.59%. This is still well under the recommended level of reservation for a CAR reserve system and reinforces the need for (a) additions to the conservation reserve system and (b) complementary off reserve conservation measures.

In addition to using scientifically-based CAR criteria, areas that serve as buffers to marine or terrestrial reserves, protect threatened species or otherwise assist with conservation management are also commonly included in parks and reserves. Natural areas with spectacular landforms and scenery subject to high public use may also be included.

Proposals for Additions to the Conservation Reserve System

Conservation reserves on or adjacent to the Cape Range Peninsula comprise Ningaloo Marine Park, Cape Range National Park, and the Jurabi and Bundegi coastal parks. However, numerous planning and policy documents have recommended various additions to this. Primarily, proposals to extend Cape Range National Park have originated from recommendations of the EPA in 1975, including recommendations for extensions to the north, south and east[1].

In 1981 Cabinet reconsidered the EPA recommendations (in part) reducing the EPA proposed area in recognition of conflicting mineral interests, although directed that the area to the north be managed in sympathy with the national park (CALM 1987). The Cabinet decision was subsequently reflected in the *Cape Range National Park Management Plan 1987* (CALM 1987). The proposals in the 1987 management plan (see Map 1) also reflected that the area on the southern boundary of the current national park had been acquired by the Commonwealth for

[1] EPA recommendations for extensions to the west have already occurred.

an air weapons range.

Exmouth Gulf Station

The Department has collaborated with government agencies responsible for mineral and water resources, the Shire of Exmouth, the (previous) Department of Environment, the Western Australian Museum, and the lessees of Exmouth Gulf station regarding its proposals for addition to the conservation reserve system. As a result it has been determined that mineral, petroleum, water and other resource interests would not preclude the additions, provided that:

- a CALM Act (section 5(1)(h)) reserve for 'Conservation and Limestone Resource Management' is created (see Map 1 and Section 32 *Mineral and Petroleum Development and Exploration*);
- support is given for future proclamation under the Petroleum Act if required; and
- management of the area is consistent with water resource protection objectives (see Section 15 *Water Management*).

However, none of the additions proposed in the 1987 management plan have been implemented as the boundaries (where they applied to Exmouth Gulf Station) were reconsidered as part of negotiations in the 2015 pastoral lease exclusion process[2]. These negotiations have identified the boundaries of an area to be excluded from Exmouth Gulf Station for addition to the conservation reserve system in 2015 (see Map 1) or earlier if a purchase offer is actioned by the lessees. Acknowledging the conditions listed in the above dot points and the pastoral lease exclusion agreement, the Department will now be in a position to progress the addition of the pastoral lease exclusion area of Exmouth Gulf Station to the conservation reserve system in 2015. However, the Exmouth Gulf Station pastoral lease exclusion area does not encompass the entire proposed 'Conservation and Limestone Resource Management' reserve, as indicated on Map 1. The addition of the remaining area of the proposed 'Conservation and Limestone Resource Management' to the conservation reserve system, if required for the purposes of limestone resource management, would be subject to further negotiation with the pastoral lessees and other key stakeholders. Given the values of the conservation estate additions from Exmouth Gulf Station and the continuity of these with the park, the area (with the exception of the proposed Conservation and Limestone Resource Management reserve) is recommended to be reserved for the purpose of 'national park'. However any reserve creation is a matter for Government consideration and determination on a case by case basis.

Areas Subject to Further Planning by WAPC

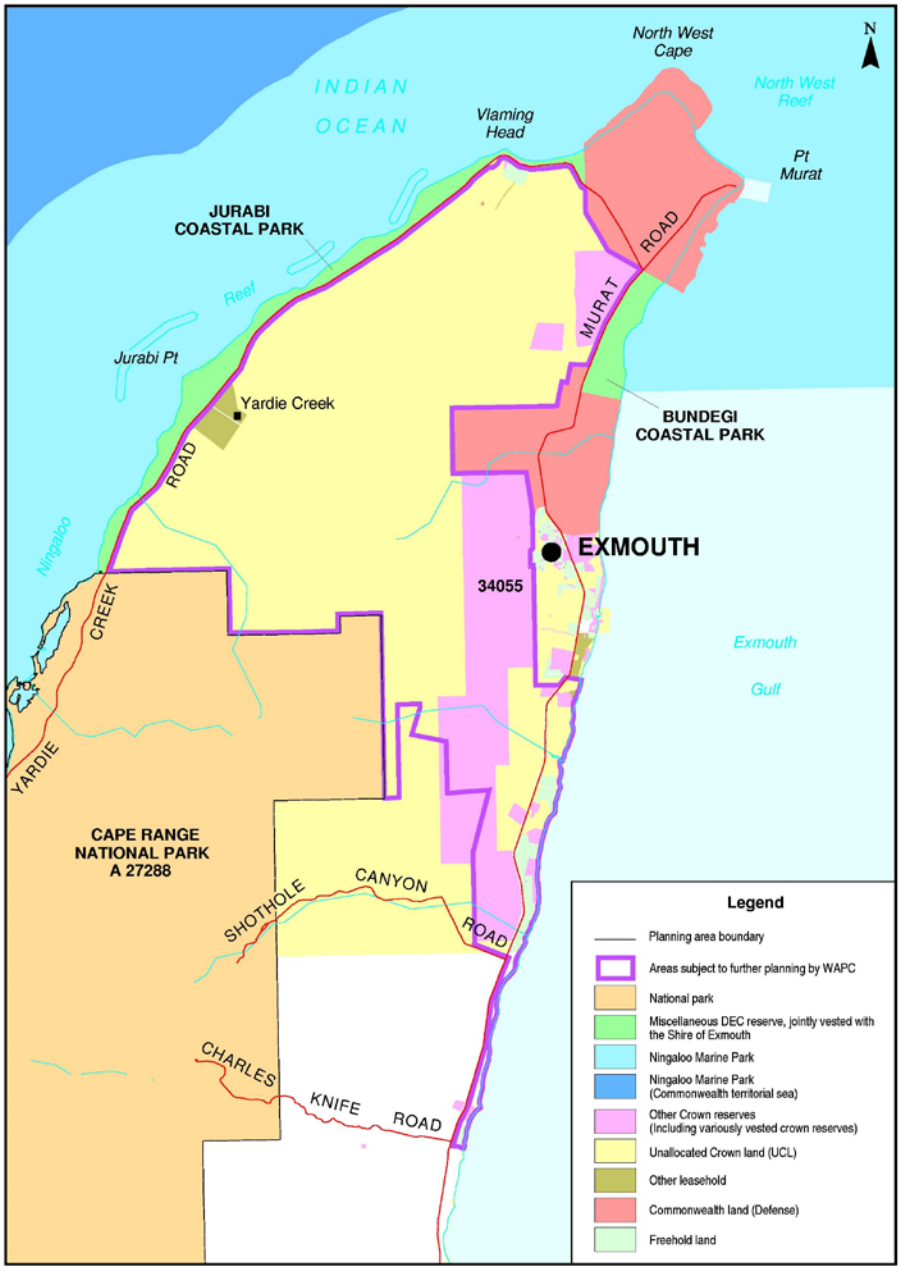
Since gazettal of the *Cape Range National Park Management Plan 1987*, a series of State planning and policy documents have made other recommendations regarding possible extensions to conservation reserves of the North West Cape (see Appendix 8 (A) for further details). The strategic regional land-use plan currently applying to the area, the *Ningaloo Coast Regional Strategy Carnarvon to Exmouth* (WAPC 2004) (Ningaloo Coast Regional Strategy), identified the areas subject to previous recommendations regarding the conservation reserve system as "Proposed Conservation and Recreation Areas" and "Conservation and Multi-use Areas" (see Map 5). These include areas of unallocated Crown land for which the Department has responsibilities (under section 33(2) of the CALM Act) for fire prevention and the control of plants and animals declared under the *Agriculture and Related Resources Protection Act 1976.*

In addition to the implementation of the Ningaloo Coast Regional Strategy, the WAPC recognises the need for more detailed planning for some areas of the Cape Range Peninsula – see the Area Subject to Further Planning by the WAPC indicated in Figure 1. This planning study would include a consultation process and address a range of land use interests including but not limited to conservation. WAPC land use planning recommendations would be forwarded to Government for final decision.

The planning study should recognise that the "Proposed Conservation and Recreation Areas" and the most northerly "Conservation and Multi-use Area" identified in the Ningaloo Coast Regional Strategy, includes areas subject to previous negotiation and Cabinet and Ministerial agreements and as described above[3].

[2] The process whereby Government undertook negotiations regarding the exclusion of areas from pastoral leases, that would contribute towards the establishment of a CAR reserve system and provide for future sustainable tourism and recreation use, both terrestrial and marine (Parliament of Western Australia 1995, Western Australian Government 1997).
[3] The previous agreements did not consider land within the Learmonth Air Weapons Range to the south of the national park.

Figure 1 Area Subject to Further Planning by the WAPC



The Department will be undertaking (or otherwise facilitating) flora and fauna surveys and other biological investigations within the "Proposed Conservation and Recreation Areas" if required to assist with advising the WAPC regarding the protection of significant conservation values (including advice regarding additions to the conservation reserve system where considered necessary). Known conservation values within these areas include some habitats and species not represented, or not well represented in the conservation reserve system – these include Pleistocene desert dunes, reptiles, mammals, stygofauna and flora and are highlighted in more detail throughout this document where relevant (e.g. Section 16 *Native Plants and Plant Communities* and Section 17 *Native Animals and Habitats*). The area also encompasses the northern end of the range and associated terrace features; values which need to be considered for inclusion into the national park (see Section 14 *Geology and Geomorphology*, Section 24 *Indigenous Cultural Heritage*).

Coastal Pastoral Lease Exclusion Areas

The "Proposed Conservation and Recreation Areas" identified in the Ningaloo Coast Regional Strategy also include coastal areas to be excluded from pastoral leases and proposed to be "vested generally with the Conservation Commission" (WAPC 2004). In the event of these areas being vested with the Conservation

Commission or otherwise to be managed by the Department (e.g. as unallocated Crown land), the Department will undertake further management planning as necessary. Management of these areas will be consistent with the objectives and underlying principles of this management plan.

Learmonth Air Weapons Range

The Learmonth Air Weapons Range at the southern end of the park has been identified for addition to the conservation reserve system should the Commonwealth's need for the area cease (WAPC 2004). The Department and the Department of Defence regularly liaise to facilitate coordinated and integrated management. This includes, for example, ongoing liaison regarding a management plan of the Bundera Coastal Protection Area[4], and coordinated management of issues such as weeds, feral animals and fire.

Purpose and Management of Additions to the Conservation Reserve System

In the event of land from the areas described above being transferred to the management control of the Department, they will, with the exception of the coastal pastoral lease exclusion areas, be managed under and in accordance with this management plan. In the event of land from the coastal pastoral lease exclusion areas being transferred to the management control of the Department, a separate management document will be prepared due to the complexity of management arrangements for this area. This separate management document will be consistent with the objectives and underlying principles of this management plan.

Proposed reserves adjacent to the national park should also be national park, but previous Ministerial commitments regarding the proposed Conservation and Limestone Resource Management reserve under section 5(1)(h) of the CALM Act are acknowledged. The tenure and purpose of coastal pastoral lease exclusion areas will be determined in the event that these areas are added to the conservation reserve system.

12 – Biogeography

Key Points

- Reservation of the Carnarvon IBRA bioregion is well under the recommended level of reservation for a CAR reserve system (generally acknowledged as 15 %).
- Additional reservation and off-reserve conservation measures will be important to achieve adequate conservation of the Carnarvon IBRA bioregion.
- Additions are proposed to the conservation reserve system, some of them long-standing proposals from the 1970s.

The objective is to contribute to the establishment of a comprehensive, adequate and representative reserve system and support complementary off-reserve conservation measures.

This will be achieved by:

1. pursuing implementation of the proposed additions from Exmouth Gulf Station to the conservation reserve system in conjunction with the relevant landholders and Government agencies.
2. providing advice and other input into relevant WAPC planning processes as required to protect significant conservation values (including making recommendations for addition to the conservation reserve system as considered necessary).
3. undertaking (or facilitating the undertaking) of conservation related research to inform relevant WAPC planning processes as required.
4. ensuring that any additions to the conservation reserve system are reserved with the appropriate tenure, class and purpose.
5. liaising with the Department of Planning and other relevant stakeholders (e.g. the Shire of Exmouth, Department of Mines and Petroleum) regarding management of areas proposed for addition to the conservation reserve system as necessary and appropriate.
6. encouraging and facilitating off-reserve conservation.

13. CLIMATE CHANGE

The climate of the area is arid-tropical and characterised by low rainfall, high evaporation rate, relatively high temperatures and seasonal tropical cyclones (Commonwealth of Australia 2002). Rainfall in the area is

[4] This coastal area of the air weapons range has been identified as important in the conservation of threatened stygofauna communities.

associated with occasional, but intense tropical cyclone activity and regular cold fronts during winter (WAPC 2004).

Observed and Projected Climate Change

Observed climate changes include an increase in global average temperatures of 0.6 ± 0.2 ° C since 1900 (CSIRO 2001a). Australia's continental average temperature has risen by about 0.7° C from 1910-1999, with most of this increase occurring after 1950 (CSIRO 2001a). During the last 90 years, Western Australia's daily average temperatures have risen and there have been consistent regional trends in rainfall changes, with the trend in the northern regions being to wetter conditions (Western Australian Greenhouse Taskforce 2004).

Climate modelling and analysis by CSIRO suggests that there will be continued warming and changes in rainfall patterns in Australia including:

- an increase in the average annual temperature of 0.4 - 2° C over most of Australia by 2030 (relative to 1990), with slightly more warming in north-western Australia;
- an increase in the average annual temperature of between 1.0 – 6.0 ° C over most of Australia by 2070, with spatial variations similar to those for 2030, and the highest potential increases projected for the northwest of Western Australia; and
- a likely decrease in rainfall in the south-west – with rainfall projections for other parts of Western Australia less certain

(CSIRO 2001b, Western Australian Greenhouse Taskforce 2004).

There are also indications that weather events may generally be more extreme, with increases in floods, droughts and lightning, and that tropical cyclones may have greater peak wind intensity and more intense rainfall (Western Australian Greenhouse Taskforce 2004).

Impacts of Climate Change

The projected climate changes discussed above will have significant social, economic and ecological impacts on vulnerable systems. The Intergovernmental Panel on Climate Change (IPCC) considers natural systems especially vulnerable to climate change because of limited adaptive capacity, and suggests that whilst some species may increase in abundance or range, climate change will increase existing risks of extinction of some more vulnerable species and increase loss of biodiversity (IPCC 2001, cited in Western Australian Greenhouse Taskforce 2004). Climate change presents an additional pressure for native species and ecosystems as well as increasing existing pressures such as habitat fragmentation/modification, competition from introduced species and altered fire regimes.

The *National Biodiversity and Climate Change Action Plan 2004-2007* (Department of Environment and Heritage 2004a) identifies potential impacts of climate change on Australian species and ecosystems as including:

- reductions in the geographic range of species;
- changes to the timing of species' lifecycles;
- changes in population dynamics and survival;
- changes in location of species' habitats;
- increases in the risk of extinction for species that are already vulnerable;
- increased opportunity for range expansion of invasive species;
- changes in the structure and composition of ecosystems and communities;
- changes in coastal and estuarine habitat due to rising sea levels; and
- changes in plant growth and ecosystem function arising from increased carbon dioxide concentration in the atmosphere.

The Intergovernmental Panel on Climate Change (2001) provides a more detailed and comprehensive consideration of the potential impacts of climate change.

Species and communities that are already located at the limit of their climatic ranges are likely to be more vulnerable than those located well within their climatic range. Other species and communities that may be more vulnerable to climate change include those with:

- very limited or restricted climatic ranges;

- limited dispersal ability;
- very specialised habitat requirements; and
- small populations and/or low genetic diversity

(Department of Environment and Heritage 2004a).

Cape Range National Park supports a number of species and communities that are endemic or at or near the limits of their range (see Sections 16 and 17) and which are likely to be particularly vulnerable to climate change for these and other reasons. The potential impacts of projected changes on such species and communities are uncertain. Potential impacts on the park's important anchialine system and the ecosystems it supports are also not well understood. Any park specific research undertaken to improve understanding of potential climate change impacts on biodiversity, should focus on these and other species and communities of special conservation significance as a priority.

Responses to Climate Change

Given the significant potential adverse effects of climate change, the issue has been the subject of intense international and national focus. Responses to climate change involve a number of global, national, State and local level initiatives including for example, the United Nations Framework Convention on Climate Change, the Kyoto Protocol, and the National Greenhouse Strategy. On a national level, 'loss of climatic habitat caused by anthropogenic emissions of greenhouse gases' has also been identified as a key threatening process under the EPBC Act. At the State level, a new climate change adaptation and mitigation strategy is being developed to aid in the fulfilment of the State's responsibilities regarding national and international agreements regarding climate change. The Department has also commenced the undertaking of: a biodiversity response modelling to investigate the potential vulnerability of Western Australia's plants and animals to climate change; and developing a climate-biodiversity strategy.

At individual reserve level, the implementation of strategies in this plan aimed at protecting groundwater quality and quantity, reserve creation, pest animal and weed control, fire management, and re-introduction programs, will help to decrease vulnerability of species and ecosystems to climate change.

Strategies in the plan aimed at rehabilitating vegetation and reducing overgrazing will increase the amount of carbon that is sequestered in the land – promoting an increase in vegetation cover helps to reduce contributions to atmospheric concentrations of carbon dioxide.

Management responses to climate change as applied in the park need to be considered in the context of broader (e.g. state-wide) climate-biodiversity research outcomes and management approaches.

13 – Climate Change

Key Points

- Increases in global average temperatures are already apparent and climate projections for Australia indicate continued significant increases in the average annual temperature and more extreme weather events.
- Climate change will have significant impacts on vulnerable species and ecosystems, and adaptation strategies are required to improve understanding and increase the resilience of natural systems to these changes.
- Much of climate change management is focussed on addressing existing knowledge deficits and uncertainties.
- Reserve creation, introduced pest and weed control, fire management and re-introduction programs could help decrease the vulnerability of the park's species and ecosystems to climate change.
- Increasing the extent of vegetation cover assists in reducing contributions to atmospheric concentrations of carbon dioxide.

The objective is to better understand and take into account the effects of climate change on the key values.

This will be achieved by:

1. investigating the potential vulnerability of the park's species and communities to climate change (in particular species and communities of special conservation significance or likely to be highly vulnerable to climate change) to facilitate and complement delivery of the Department's broader

climate-biodiversity research priorities.
2. adapting management approaches as necessary in response to new knowledge about the impacts of climate change and changes in state-wide climate-biodiversity management approaches.
3. protecting adequate and appropriate space within the reserve system to provide buffers, corridors and climate refugia (e.g. implementing proposed additions to the conservation reserve system as indicated in Section 12 of this plan).
4. limiting non-climate stresses for species and communities (particularly those that are vulnerable to climate change).
5. implementing strategies within this plan aimed at rehabilitation of vegetation and reducing overgrazing by introduced and native herbivores.
6. implementing strategies within this plan aimed at minimising risks to visitor safety from severe weather events (e.g. implementing emergency response plans in the event of cyclones, tsunami and storm surges).

14. GEOLOGY AND GEOMORPHOLOGY

Geology

The park lies within the Carnarvon Basin geological province. More specifically, it is situated within the Exmouth sub-basin of the Northern Carnarvon Basin geological province.

The sequence of rock layers forming much of Cape Range is known as the Cape Range Group and comprises marine, predominantly carbonate rocks ranging in age from Late Oligocene to Miocene (Hocking 1990, Russell 2004). Formations within this group include (in order of decreasing depth and age) the Mandu, Tulki and Trealla Limestones. Two other rock units recognised within the group are essentially confined to the western and northern side of the range – namely the Pilgramunna Formation and the overlying Vlaming Sandstone (Hocking 1990, Russell 2004). The former interfingers with Trealla Limestone (Hocking 1990). Hocking (1990) provides a more comprehensive discussion of the geology of the area including the Cape Range Group sequence.

Geomorphology

The geomorphology of the Cape Range peninsula is described in detail by various authors (e.g. Wyrwoll *et al.* 1993, Hocking 1990, Hamilton-Smith *et al.* 1998, Russell 2004). Some of the key features described by these authors are presented below:

The Ningaloo Reef – Cape Range Karst System

The Cape Range peninsula and associated fringing reef constitutes an extensive karst system of national and international significance (Hamilton-Smith *et al.* 1998). The geological evolution of the karst system over a sequence of different climatic phases (e.g. wet climatic phase through to current warm arid conditions) has been an important driver of biological evolution as demonstrated through the significant speciation and adaptation evident in the subterranean fauna of the area (Russell 2004).

Karst features are most strongly developed in the Tulki and Trealla Limestone (Water and Rivers Commission 1999). The Mandu Limestone is relatively impermeable and has limited the depth extent of karstification (Russell 2004).

Caves are some of the more conspicuous karst features within the park. Allen (1993) and Hamilton-Smith *et al.* (1998) described an extensive cave system within the Cape Range karst. Local cavers have recorded over 800 karst features (D Brooks cited in Western Australian Speleological Group submission to the draft management plan for Cape Range National Park, 2006), at least 580 of which are caves (D. Brooks, cited in Hamilton-Smith *et al.* 1998). On the coastal plain, the cave system is partially filled with water, and plays an important role in the conservation of subterranean fauna (see Section 17). Within the Cape Range proper, permanent water can be reached in very few caves—four such caves have been identified to date (Humphreys 2000a). The cave system is also significant for other faunal conservation and recreational values (see Section 17 and *Caving* in Section 28).

Hamilton-Smith *et al.* (1998) provides a description of the karst and some of the key considerations in its

management. Values and features highlighted include:

- a karst hydrogeological system which supports a unique biota of high biodiversity conservation significance;
- positioning on the margin of an Afro-trailing edge type of tectonic plate—this position is unique internationally;
- evolution in relatively young limestone—most other karsts in Australia are formed in much older limestone;
- the only Australian example of terrestrial karst that is bordered by coral reefs which are still forming;
- a system which provides insights into weathering processes and karst development in arid areas; and
- a karst system which is still active, particularly on the flanks of the range and beneath the coastal plain, and which demonstrates simultaneous erosional and depositional karstic processes.

Important karst management considerations identified by Hamilton-Smith *et al.* (1998) include recognition that:

- karst systems provide important and diverse habitat value and adverse impacts on the system may have flow-on implications for the biota that depend on this;
- the karst hydrogeological system is part of a complex integrated system extending over (and potentially influenced by activities on) the entire peninsula, and as such requires integrated, catchment-wide management approaches;
- environmental impact assessment for karstic environments requires specialised expertise; and
- understanding about the Cape Range karst system and karst dependent ecological systems is increasing, but significant knowledge gaps remain. In view of this, a precautionary approach is required in circumstances where assessment of the effects of development proposals on these karst systems is impeded by knowledge deficits that cannot be readily corrected.

Further background and generic guidelines for cave and karst management are provided by the World Conservation Union (Watson *et al.* 1997).

There are a number of land uses (e.g. mining, infrastructure development and recreation) that have the potential to adversely affect conservation values associated with karst if they are not subject to appropriate controls and precautions. The implications of these land uses for conservation values are discussed throughout this plan as relevant.

In recognition of the need for integrated management, and the wealth of knowledge that exists outside the Department in relation to karst management, the Department receives advice from the North West Cape Karst Management Advisory Committee. Members represent the Western Australian Speleological Group (Exmouth), the Department (Pilbara Region, Exmouth District, WA Threatened Species and Communities Unit), Shire of Exmouth, Western Australian Museum and the Department of Defence. Consultation with this committee and/or other karst management experts as necessary is an important facet of park management, and is required for all activities with the potential to significantly impact on karst and associated values.

Dissected Range

The Cape Range is a result of uplift associated with tectonic compression. Located throughout the Northern Carnarvon Basin is a series of large faults thought to have originally formed during the break up of the supercontinent of which Australia was previously part (i.e. Gondwana). Subsequent tectonic compression during the Late Cainozoic caused reverse movements on these older faults leading to the development of substantial rock folding in the Gascoyne, Exmouth and Barrow Sub-basins (Russell 2004). Cape Range is the largest of a series of north-northeast trending upfolds of rock (i.e. anticlines) resulting from this compression. The Cape Range Anticline extends approximately 100 km along the length of the peninsula with a structural relief of 450 m (Geological Survey of Western Australia 1975, cited in Russell 2004).

Since uplift, weathering and erosion have carved deep gorges that dissect the Cape Range. These rocky gorges provide refuge for a wide variety of species including the black-flanked rock wallaby *(Petrogale lateralis lateralis)* and the Douglas toadlet (*Pseudophryne douglasi)*, both of which occupy scattered relictual ranges within the northwest (Kendrick 1993) (see *Native Animals and Habitats* in Section 17).

A significant proportion of the Cape Range is encompassed within the national park. However there are differences in the flora and fauna species supported throughout the range, and this plan includes proposals to incorporate a more representative cross section of the range into the conservation reserve system to increase the range of species and habitat represented (see Map 1 and *Proposals for Additions to the Conservation Reserve System* in Section 12).

Coastal Terraces

On the western side of Cape Range are a series of scarps and terraces that run the length of the anticline and are reflective of uplift. Although the ages of formation of the terraces are not well known it is generally assumed that terrace age increases with elevation (Russell 2004). Uncertainties uncovered by research regarding the terraces indicate a tectonic and geomorphic history somewhat more complex than is currently understood (Russell 2004).

The terraces and sediments that overlie them provide important information regarding past climatic variations, sea-level fluctuations, continental drift, and the timing of and erosional response to uplift events. The terraces are emergent reef complexes, and the fossils they harbour provide an indication of past marine and coastal flora and fauna assemblages. Some of the terraces show warping, but not the lowest (known as the Tantabiddi Terrace), indicating geologically recent but now ceased deformation (Wyrwoll *et al.* 1993, Russell 2004).

The addition to the park of areas from unallocated Crown land to the north of the existing national park (see *Proposals for Additions to the Conservation System* in Section 12) would allow most of the Cape Range Terraces to be protected within the conservation reserve system.

Coastal Dunes and Beach Ridges

Along the west coast of the peninsula is a narrow linear strip of white dunes and ridges of relatively recent age. These are known to be significant for southern reptile species at their northern limits (Kendrick 1993) (see Section 17*)*.

Many of the park's existing coastal recreation sites are in areas of historical use (i.e. prior to the creation of the national park) and are not necessarily located in the most suitable or appropriately set back areas. Coastal landforms can have low stability, and hence are susceptible to disturbance through natural or human disturbance. Recreational use of these areas needs to be well defined and managed to avoid degradation. Existing recreation sites within areas susceptible to degradation will be subject to rehabilitation and other maintenance/management measures as necessary to address these issues. All new recreation site developments implemented under this management plan, particularly any larger developments with significant infrastructure, will be cognisant of appropriate coastal set back distances and land capability.

The park's coastal dunes and beach ridges are also impacted by natural events and processes. Coastal areas are naturally dynamic and subject to natural coastal processes such as (seasonal accretion and erosion cycles and dune movement). Cyclones, storm surges and tsunami may also dramatically influence coastal geomorphology.

Desert Dunes

Pleistocene desert dunes and associated sand plains located on unallocated Crown land at the extreme northern part of the Cape Range peninsula are believed to be remnants of desert dunes that formed during a period of more extreme climate conditions (Wyrwoll *et al.* 1993). These red dune fields are distinct from those found near the southern part of Exmouth Gulf, which comprise paler sediments with a relatively more developed soil profile. The red dunes show little soil development and have low stability (Wyrwoll *et al.* 1993). The dunes support isolated populations of arid (northern and central) and semi-arid zone reptile species, are associated with subterranean fauna, and provide valuable palaeoclimatic information. It is recommended that a representative area of these dunes be added to the national park (see Section 12). A much smaller area of red dunes located at the top of the range in the southern half of the park, are intersected by the Sandy Bay track. These dunes have a south-west orientation as opposed to the north-east orientation of the red dunes to the north of the park. The conservation value and significance of this small dune field is not known.

Alluvial Fans

Extensive alluvial fans arise from many of the gorges that have developed within the Cape Range. These alluvial fans provide insights into the evolution of the landscape, and have important implications for improving our understanding of the evolution of the karst, and the structure and function of the karst aquifer (Hamilton-Smith *et al.* 1998).

Paleochannels (buried ancient riverbeds) evident in cross sections of the alluvial fans have the potential to provide insights into past climatic events such as large rainfall discharges (Wyrwoll *et al.* 1993).

Palaeontological Values

Fossil deposits in the park, such as those discovered in caves or during excavation of archaeological sites, have served to identify Cape Range as an area of considerable palaeontological importance. For example, fossils of mammals found in the range are important for increasing the understanding of mammal extinction in Australia. Damage or unauthorised removal of fossils from protected areas is prohibited under the CALM Regulations. All palaeontological research undertaken within the park must be authorised (see Section 37).

Geoheritage

The Cape Range region showcases an array of geological features that have significant scientific and educational values and can therefore be described as being of geoheritage importance.

Geological features that are considered to be unique within Western Australia and/or have significant geoheritage or geoscientific values may be designated as a State Geoheritage Site[5]. Sites are registered in the Register of Western Australian Sites of Geological Significance that is maintained by the Geological Survey of Western Australia.

A number of features/sites within the Cape Range region (including the national park) have been thus designated. More specifically, these include the following locations (see also Map 3a):

- Shothole Canyon – has excellent rock exposures of the major units of the Cape Range Group, the Trealla, Tulki and Mandu Limestones;
- Charles Knife Road – provides excellent views of the canyons of Cape Range and Exmouth Gulf which show the shape of the anticline, gross colour variations in the limestone units and overall morphology of the range and fringing coastal plain;
- wave-cut terraces southwest of Vlaming Head – provide significant examples of a series of terraces that have formed as a consequence of tectonic uplift of Cape Range;
- a Pleistocene fossil coral reef exposed near sea level at the mouth of Mowbowra Creek – this is overlain by a limestone cobble and boulder conglomerate similar to, but older than, those that infill the present-day creek beds.

A geoheritage site within Cape Range National Park was also listed on the Register of the National Estate in 1978 (Department of Environment and Heritage 2004b) (see Map 3b). The site:

- displays the geology of the Cape Range Group and younger strata which are important for the study of the Exmouth sub-basin of the Carnarvon Basin;
- includes raised marine terraces which show warping;
- is of particular value for geological research; and
- is notable for its geological landscape, including gorges and natural rock arches, windows and bridges

(Department of Environment and Heritage 2004b)

Although unlikely to be affected by low-key recreational use, it is important that potential effects on geoheritage values are considered in recreation use and site developments. For State Geoheritage Sites, the Director of Geological Survey of Western Australia should be consulted prior to undertaking any significant site development with the potential to adversely impact on geoheritage values. It is also important that the visitor interpretation and education values of geoheritage sites and other features of geological interest in the park are recognised as providing significant opportunity for promoting geoconservation within the park and beyond.

Rock sampling and collection at State Geoheritage Sites should only be undertaken for the purpose of geoscientific research and with the written permission of the Director Geological Survey of Western Australia. Within Cape Range National Park, such permission would only be given with the concurrence of the Director General of the Department.

[5] Assessment of the significance of geological sites and features is carried out by the Geological Survey of Western Australia based on criteria developed by the Heritage Committee of the Geological Society of Australia, and by the Australian Heritage Commission. Criteria include geological type, geological age, use, representative or outstanding nature, rarity and current condition.

14 – Geology and Geomorphology

Key Points

- The Cape Range peninsula has geological and geomorphological values of State and wider significance, both intrinsic, and for the support of subterranean and other fauna.
- The park is part of a complex and poorly understood karst system, the management of which requires specialist advice and input.
- The addition of areas from unallocated Crown land to the north of the existing national park would allow most of the Cape Range Terraces to be protected within the conservation reserve system.
- The geological and geomorphological values of the park and the fossils it harbours can provide important insights into past events and are of interest to a number of scientific disciplines.
- Sites of geoheritage value within Cape Range National Park have been recognised at both State and Commonwealth levels.

The objective is to maintain the geomorphological diversity and processes of the park and conserve sites of known geoheritage.

This will be achieved by:

1. ensuring geoconservation values are taken into consideration as part of broader assessments of conservation values within proposed or possible additions to the conservation reserve system.
2. seeking advice from the North West Cape Karst Management Advisory Committee or other karst management experts as necessary.
3. locating and designing recreation and other infrastructure so as to prevent or mitigate significant impacts on geoheritage and other geological values and consulting the Director of Geological Survey of Western Australia as necessary regarding sites on the Register of Western Australian Sites of Geological Significance.
4. enforcing the CALM Regulations regarding fossil protection as required.
5. providing opportunities for increased visitor awareness and appreciation of the park's geoconservation values.

Key Performance Indicator (see also Appendix 1)

Performance Measure	Target	Reporting Requirements
14.1. Conservation and scientific value of the park's geoheritage.	14.1 No significant reduction of value over the life of the plan subject to natural processes.	Every 5 years.

15. WATER CATCHMENT PROTECTION

Hydrology

Surface Hydrology

The main surface hydrology feature of the park is Yardie Creek, which dissects the central and southern section of Cape Range and is the only permanent surface watercourse in the park. Streams and creeks drain across the ridgelines of the Cape Range during rainfall, and may form ephemeral pools after heavy rainfall events. Other than during heavy cyclonic rainfall, most of the average annual rainfall of 260 mm rapidly infiltrates through the ground and into the karst (Allen 1993).

Yardie Creek is an estuarine wetland subject to tidal movements even when the mouth is closed to the ocean, which is often the case for years at a time. It is also thought that the creek may be in hydrological continuity with subterranean waterways (also subject to tidal influences—see below), although the nature of any connection is not known (Humphreys 2000b). The creek system and the semi-permanent pools are important for maintaining a number of wetland species and communities. For example, Yardie Creek is significant as a refuge for a number of taxa that reach their northern limits in Cape Range (see Section 16 and 17). Maintenance of the water quality of Yardie Creek and the semi-permanent pools is important for the conservation of these species; hence strategies addressing potentially polluting events or activities are detailed where relevant throughout the plan.

Although there is no evidence to suggest that the water quality of Yardie Creek is a problem, fish kills have

occurred within the creek on very rare occasions when the mouth of the river has been closed. It is believed that these are natural events resulting from oxygen depletion associated with extraordinary water temperatures and algal death/decomposition rates, or rapid alterations in salinity. Should such events re-occur over the life of this plan, information may need to be provided to allay public concerns.

Groundwater Hydrology

Allen (1993) and the then Water and Rivers Commission (1999, 2000) have drawn on limited watertable data and other available information to summarise the groundwater hydrological features of the Cape Range peninsula. They indicate a system that is still only understood in reasonably general terms.

Two aquifers have been identified—the confined Birdrong Sandstone Aquifer and an unconfined aquifer. The former contains saline water and reaches depths of approximately 1 000 m. The unconfined aquifer comprises a lens of freshwater overlying saline water, the freshwater layer being much thinner near the coast than it is further inland (Water and Rivers Commission 1999). Tidal fluctuations have been noted in this aquifer up to 1.3 km inland on the western side of the peninsula, indicating significant karstic development in the coastal plain allowing direct connection of the aquifer and the sea (Hamilton-Smith *et al.* 1998). Because of this subsurface connection to the sea and the resultant mixing of freshwater and seawater, the system is described as anchialine (Humphreys 2000b). The unconfined aquifer occurs within the Mandu, Tulki and Trealla limestones, collectively known as the Cape Range Group (Water and Rivers Commission 1999).

Significant recharge of the unconfined aquifer is dependent upon intense or long periods of rainfall, which infrequently but most commonly occurs during cyclonic activity (Allen 1993). Groundwater discharge occurs in a number of ways, but most significantly by abstraction for human usage. Other discharge mechanisms include:

- sub-sea springs (Allen 1993, Hamilton-Smith *et al.* 1998). It is thought that karst springs may account for some of the openings evident in the fringing reefs on the west coast (Hamilton-Smith *et al.* 1998);
- evapotranspiration from vegetation of the coastal plain (Forth 1973); and
- pools along the lower reaches of Yardie Creek, and Qualing Pool on the east coast of the peninsula (Allen 1993).

Allen (1993) also refers to rare ephemeral springs and a large perennial freshwater spring in a tributary of Shothole Canyon.

Maintenance of water quality, natural hydrological regimes and the anchialine spectrum within the system is particularly important for the conservation of stygofauna and any other groundwater dependent or reliant species (see Section 17). Potential threats to the integrity of aquifer ecosystems include:

- ecologically unsustainable water abstraction (and associated salt-water intrusion);
- pollution (e.g. by sediment, nutrients, herbicides, insecticides, industrial wastes, bacteria);
- alterations to natural water drainage patterns (e.g. associated with recreation or other infrastructure development, limestone mining);
- exotic aquatic organisms (aquarium fish and invertebrates in particular); and
- disturbance of interrelationships between surface and aquifer environments (e.g. clearing of vegetation and erosion of overlying soils and landforms).

There are a number of specific factors that need to be considered when addressing the threat of pollution in karst environments. For example, pollutant delivery potential via both surface and sub-surface drainage needs to be considered. This is because directions of drainage in underground karst are typically dictated by geological structures, and therefore sub-surface drainage may contrast with what is suggested by surface topography (Watson *et al.* 1997, Hamilton-Smith *et al.* 1998). Further, pollution control must also consider the increased risk of contamination near open conduits to the aquifer (e.g. caves, bores and pools) due to the rapid rate with which water can be transported through these.

Consideration of the potential to alter drainage patterns is also particularly relevant to karst environments. Concentration or channelling effects can result in water movement through the soil and into caverns beneath, leading to subsidence and sometimes collapse (Hamilton-Smith *et al.* 1998). Human-induced changes such as these interfere with hydrogeological regimes and habitat values.

The final threat listed above arises because the integrity of aquifer systems depends on maintenance of its connections and inter-relationships with surface environments. For example, surface vegetation and soils play an important role in regulating water infiltration, carbon dioxide production, and atmospheric conditions in the

sub-surface environment (Hamilton-Smith *et al.* 1998).

Strategies to address the abovementioned threats are detailed throughout the plan as relevant.

Water Management

Activities both within and adjacent to the park have the potential to significantly alter hydrological regimes and reduce the quality of ground and surface water if they are not appropriately controlled and managed. An integrated approach is required across the catchment, regardless of tenure, to protect hydrological systems and the biota that depend on them. Effective communication between various stakeholders with key roles or interests in the management of activities occurring in the catchment is essential. Meetings of the North West Cape Karst Management Advisory Committee may provide a useful forum for promoting integrated catchment management. This committee includes members that represent the Western Australian Speleological Group (Exmouth), the Department (Pilbara Region, Exmouth District, WA Threatened Species and Communities Unit), Shire of Exmouth, Western Australian Museum, the Department of Water and the Department of Defence.

Under section 33(1)(dc) of the CALM Act, a function of the Department is to promote the conservation of water for land to which the Act applies, both in terms of quality and quantity. In addition, the Department of Water has responsibilities for water resource utilisation and conservation in areas proclaimed under the *Rights in Water and Irrigation Act 1914* and the *Country Areas Water Supply Act 1947*. In the Cape Range region, the previous agencies with carriage of this legislation have:

- established a water reserve and developed the *Exmouth Water Reserve Water Source Protection Plan* (Water and Rivers Commission 2000), to protect the public water supply source from contamination; and
- developed the *Groundwater Allocation Plan – Exmouth Groundwater Subarea* (Water and Rivers Commission 1999), which identifies environment as the primary beneficial use for groundwater in the subarea[6].

The water reserve intersects the park (see Map 4) and is managed as a Priority 1 Source Protection Area. Whilst conservation reserves are considered a use compatible with Priority 1 areas, the Department of Water may request limits regarding recreation site (or other) development in such areas. It is however recognised that the current extent of development poses a low and manageable contamination risk (Water and Rivers Commission 2000). Similarly, proposals within this management plan are unlikely to conflict with water reserve objectives. However, in recognition of the *Exmouth Water Reserve Water Source Protection Plan*, the Department of Water will be consulted on any significant site developments proposed for within the Public Drinking Water Source Area (PDWSA) over the life of the plan.

The park falls within the Exmouth Groundwater Subarea proclaimed under the *Rights in Water and Irrigation Act 1914*. The *Exmouth Groundwater Subarea Groundwater Allocation Plan* has been developed to establish policies and principles for the sustainable allocation of groundwater resources in the subarea. The groundwater allocation plan recognises that the fresh water lens of the unconfined aquifer is susceptible to over-pumping and needs to be carefully managed. The plan includes:

- allocation limits for groundwater abstraction;
- licensing for all wells in the unconfined aquifer;
- metering of high use wells; and
- provisions to reduce the likelihood of vertical or horizontal saltwater intrusion. These include, for example, provisions for reducing or ceasing pumping in response to increasing salinities or significant inland movement of the saltwater/freshwater interface. The plan also states that the screening of wells in the upper sections of the freshwater lens, and low pump rates, will be encouraged.

The Exmouth Subarea is further divided into five, with management prescriptions and water allocations varying within each: Cape Range National Park overlies parts of three of these (Exmouth West, Exmouth South and Exmouth Central) (Map 4 at rear). The majority of the existing national park falls in the Exmouth West Subarea. This management plan does provide for some groundwater abstraction from within the park, provided it is taken and used sustainably. Groundwater abstraction from within the national park is dealt with in Section 38.

The groundwater allocation plan adopts a precautionary approach to allocation management given the lack of

[6] In order, priority beneficial use for groundwater in the area are: environment; public water supply; and private and community use.

comprehensive scientific knowledge regarding specific Ecological Water Requirements (EWR) for the subarea. Natural seasonal and other cyclic variability within the hydrogeological system and the limits of acceptable change are also not specifically known. Until more specific information is available, the plan provisionally sets the Environmental Water Provisions (EWP) at the generalised condition of no degradation to water levels and quality. Meanwhile, the groundwater allocation plan prescribes additional research and monitoring to establish baseline data and assist with identification of specific EWR for subterranean fauna of the aquifer. This plan endorses the premise of the groundwater allocation plan, that there will be no degradation to water levels and quality, which should be maintained to protect subterranean fauna, and it is considered that doing so should simultaneously provide for groundwater dependent flora species and communities. It is however acknowledged that there is a need to identify more specific EWR for groundwater dependent species and communities.

15 – Water Catchment Protection

Key Points

- Other than during heavy rainfall events, most of the average annual rainfall rapidly infiltrates through the ground and into the karst.
- The Yardie Creek wetland system is significant as a refuge for a number of taxa that reach their northern limits in Cape Range.
- Maintenance of the anchialine spectrum within the unconfined aquifer is important for the conservation of stygofauna.
- Alterations to naturally occurring water regimes, water quality, drainage patterns and surface-subsurface interactions are potential threats to the habitat values of the park.
- Catchment boundaries extend beyond the park boundaries, requiring integrated catchment-wide approaches for water management.
- A Priority 1 PDWSA intersects the park. However, conservation reserves are generally considered a land use compatible with such areas.
- Current limitations in scientific knowledge preclude the identification of specific EWR for the park.

The objective is to maintain the hydrological regimes (quality and quantity), with a particular focus on the ecological water requirements of groundwater dependent species and communities.

This will be achieved by:

1. liaising with relevant agencies (e.g. Department of Water) regarding the management and monitoring of groundwater levels, surface water flows and water quality and providing advice and direction as necessary to ensure park values are protected.
2. liaising with stakeholders with key roles or interests in the management of activities occurring in the catchment (e.g. with the North West Cape Karst Management Advisory Committee), to promote integrated catchment management which recognises the ecological water requirements of species and communities within the park.
3. assessing the potential effects of operations or developments within the park on aquifer integrity (including water quality/quantity and karst structure) and identifying and implementing strategies to prevent or mitigate adverse impacts.
4. making referrals to EPA as necessary regarding activities outside the park that may impact on park hydrological values.
5. utilising technology to prevent aquifer contamination and minimise groundwater use in the park as appropriate (e.g. appropriate waste management, low water usage and water recycling technology).
6. assessing potential pollution risks near sinkholes or other open conduits to the aquifer, and taking action to remove or reduce risks.
7. managing factors that contribute to vegetation loss and erosion (e.g. unmanaged access, wildfire, grazing pressure from feral herbivores and euros).
8. rehabilitating eroded sites as required.
9. managing caving or other recreational activities to avoid aquifer pollution.
10. consulting with the Department of Water regarding any significant proposals for visitor or other management infrastructure and facilities within the PDWSA of the park.
11. undertaking and/or encouraging others to undertake research into groundwater hydrology and EWR for the park, and taking action as necessary in response to new knowledge to ensure park values are protected.
12. providing opportunities for the community to increase their awareness of the ecological significance of the park's hydrological support systems.

Key Performance Indicator (see also Appendix 1)		
Performance Measure	**Target**	**Reporting Requirements**
15.1. Alterations in karst hydrology (including groundwater quality, quantity, anchialine stratigraphy and hydrological regimes).	15.2. No significant adverse change (e.g. beyond natural seasonal or other cyclic variation) over the life of the plan at selected sites.	Every 5 years.

16. NATIVE PLANTS AND PLANT COMMUNITIES

Native Plants

The richness, nature and distribution of the flora of the Cape Range peninsula are strongly reflective of the area's geographical, geomorphological and climatic influences. Almost surrounded by sea and receiving both summer and winter rainfall, the peninsula is able to support temperate and tropical as well as arid species. Topographical and climatic variations associated with the Cape Range anticline are also significant influences on the floral diversity and distribution.

The Cape Range peninsula is situated within the Carnarvon Botanical District of the Eremaean Botanical Province, which is the largest botanical province in Western Australia. Although Keighery and Gibson (1993) considered flora habitat diversity to be low, the flora is particularly rich for an arid limestone environment, with 630 taxa recorded. This represented just over 46% of the 1348 taxa known for the Carnarvon Botanical District at that time and included 12 endemic taxa, six taxa largely confined to the peninsula and 30 weed species. Although there are tropical and temperate species at the margins of their ranges, the composition of the flora is most reflective of the area's aridity (e.g. the relatively high number of annuals) (Keighery and Gibson 1993).

Threatened (and Priority) Flora

All native flora in Western Australia is protected under the Wildlife Conservation Act. Protected flora that is likely to become extinct or is rare or otherwise in need of special protection can be declared to be 'rare flora' under section 23F of the Wildlife Conservation Act (these species are commonly referred to as 'threatened') and is currently managed in accordance with the Department's Policy Statement No. 9 – *Conservation of threatened flora in the wild*. In addition, species that do not meet criteria for listing as threatened because of insufficient information, species that have been recently removed from the threatened list, or that are near threatened and require monitoring, are placed on the Department's Priority Flora list. Species on this list are grouped into Priority categories 1 through to 5 (see glossary for definitions of these). Priority species do not have the special legislative protection provided to rare flora, but a priority flora list is maintained as a mechanism to highlight flora of special conservation interest and encourage appropriate management activities. Although no declared rare species have been recorded within the park, Priority 2, 3 and 4 species are known to be present. Priority species currently recorded for the Park includes 6 Priority 2 species: *Harnieria kempeana, Verticordia serotina, Abutilon sp. Cape Range* (AS George 1312), *Acanthocarpus rupestris, Eremophila occidens* and *Daviesia pleurophylla*; 6 Priority 3 species: *Stackhousia umbellata, Corchorus interstans, Acacia alexandri, Grevillea calcicola, Acacia startii*; and 1 Priority 4 species: *Brachychiton obtusilobus*.

The Commonwealth EPBC Act provides a listing of nationally threatened species and ecological communities. Western Australian listings under this Act are currently incomplete. There is no provision under existing State legislation to recognise and protect threatened ecological communities (only individual taxa are afforded special protection), although this is proposed to change when the proposed Biodiversity Conservation Act is enacted (see *Legislation* in Section 7). Some protection is also provided under other State legislation, such as the Environmental Protection Act.

Tropical Species

Those species with tropical affinities are restricted to the cooler, damper, and relatively fire-free western gorges of the range, and include all locally occurring members of the families Acanthaceae, Moraceae, most of the Ascelpiadaceae and species such as *Livistona alfredii*[7], *Achyranthes aspera* and *Olearia dampieri*. Many are only found along the gorges and valleys of the western side of the Cape Range. These areas are well protected

[7] *Livistona alfredii* occurs outside the existing park but within the area of Exmouth Gulf Station proposed for addition to the conservation reserve system.

as the valleys are slightly wetter and fire free and the climate is ameliorated by the sea breeze.

Range End Flora

The Cape Range peninsula is noted for the occurrence of flora species at (or near) the limit of their distribution. These include, for example:

- several mangrove species at the southern limit of their range (Busby and Bridgewater 1986). One of these species, *Rhizophora stylosa*, is apparently declining locally (Kendrick and Morse 1990), probably due to the long-term shallowing of the tidal lagoon. *Rhizophora* is generally an outer-edge mangrove species, and probably copes best in slightly deeper water (P. Kendrick pers. comm.).
- species of tropical affinities approaching the ends of their ranges.
- 50 temperate species at the northern ends of their ranges, including species occurring on red dune fields at the top of the peninsula (21 species), in valleys or on limestone on the western side of the range, and on the western coastal sands (Keighery and Gibson 1993).
- *Banksia ashbyi* meets its northern limit on the Cape Range peninsula. *Banksia ashbyi* has both seeding and re-sprouting forms, but only re-sprouting forms are found on the peninsula. This species is found in Unallocated Crown land to the north of the park as well as in the park.

Endemic Flora

Keighery and Gibson (1993) refer to 12 endemic and 6 near endemic species for the Cape Range peninsula, although they indicate that there is a need for more expansive study of the biology and ranges of such taxa. However, it is known that several of these species occur outside of the park—additions to the conservation reserve system (see Section 12) would provide improved protection to some endemic and near endemic species. Further research is required to confirm the status and distribution of these species.

Disjunct Flora

A number of species disjunct from their main ranges are associated with Yardie Creek. Yardie Creek has limited emergent aquatics, predominantly the native bulrush (*Typha domingensis*) which is disjunct from its main range by hundreds of kilometres.

Plant Communities

Coastal vegetation on the Cape Range peninsula was first broadly described by Beard (1975) and later by Keighery and Gibson (1993), who identified five distinct community types on the peninsula. Those community types of relevance to the park include:

- tertiary limestones of the Cape Range dominated by *Acacia tetragonophylla, A. bivenosa, Grevillea variifolia* subsp *variifolia, G. calcicola, Melaleuca cardiophylla* or, on the terraces north of Yardie Creek, by *Ipomoea yardiensis*. The dominant hummock grasses are *Triodia wiseana* and *T. pungens*;
- younger limestones on the western coastal plain dominated by *Melaleuca cardiophylla* and/or *Hibbertia spicata* low heath over Triodia spp; and
- shrublands dominated by *Banksia ashbyii*, *Hibbetia spicata* and *Hakea stenophylla* on red Quaternary sands.

While the work of Keighery and Gibson provided a greater level of detail than that of Beard (1975), both these authors and Kendrick and Mau (2002) identified vegetation mapping and floristic survey as significant data gaps.

Management of Native Plants and Communities

Actual and potential flora management issues identified in this plan include:

- competition from environmental weed species, in particular buffel grass (see Section 19 *Environmental Weeds*);
- grazing by feral goats and euros (see Section 20 *Introduced and Other Problem Animals*);
- inappropriate fire regimes (see Section 21 *Fire*);
- climate change (see Section 13 *Climate Change*);
- maintenance of water quality and changing water levels due to abstraction from the unconfined aquifer system, and (see Section 15 *Water Catchment Protection*); and
- localised disturbance to restricted (less common) species.

To facilitate and improve management of the issues identified above, a more comprehensive understanding of the area's plant species and communities is required. Kendrick and Mau (2002) specify some of the more significant data gaps in relation to flora management on the Cape Range peninsula, namely:

- a lack of quantitative data on the impact of changes to fire regimes in hummock grasslands; and
- a lack of quantitative data on the impact of weed colonisation, especially buffel grass on coastal communities, particularly on the recruitment of perennial flora and consequent effects on other plants.

16 – Native Plants and Plant Communities

Key Points

- The Cape Range peninsula is floristically rich for an arid limestone environment and supports populations of flora from temperate, arid and tropical provinces.
- Whilst there is no declared rare flora recorded for the park, several priority species have been identified.
- The peninsula supports several species that are at the margins of their ranges, as well as disjunct populations and species not (or not well) represented elsewhere.
- A more comprehensive understanding of the area's native plants and communities and the impacts of fire, weeds and unsustainable grazing pressure are required to improve flora management effectiveness.

The objective is to conserve the diversity of native plants/plant communities, and to maintain viable populations of threatened or otherwise significant flora.

This will be achieved by:

1. developing a comprehensive spatial inventory of plant species and communities (particularly for priority species or other species of special conservation significance).
2. ensuring special flora conservation values (e.g. range-end species on red dune fields) are taken into consideration as part of broader assessments of conservation values within areas for possible addition to the conservation reserve system.
3. identifying and protecting native plants and plant communities that may require special protection from inappropriate fire regimes, environmental weeds, and unsustainable grazing pressure from feral herbivores and euros.
4. ensuring recovery plans for any threatened species or communities identified in the park over the life of the plan complement the strategies in this management plan, and seeking to give effect to strategies within recovery plans as appropriate.
5. using fire to maintain and enhance flora biodiversity as required exercising special care where buffel grass dominates.
6. identifying flora species at particular risk of climate change (e.g. endemic species) and implementing conservation management strategies where practicable (e.g. germplasm storage).
7. preventing or minimising impacts on native flora and communities from visitor use. This may involve:
   - guiding or restricting visitor access as necessary; assessing ecological effects of proposed recreation and other infrastructure developments to inform siting and design decisions; and
   - providing and promoting opportunities for visitors to increase their knowledge and appreciation of the area's flora values.

Key Performance Indicators (see also Appendix 1)

Performance Measure	Target	Reporting Requirements
16.1. Diversity and condition of native plant communities.	16.1. No significant decrease in known level of diversity and condition over the life of the plan.	Every 5 years.
16.2. Cover and condition of threatened, priority or otherwise significant flora species or communities (e.g. disjunct, range end, locally restricted).	16.2. No decrease in cover and condition over the life of the plan.	Every 5 years or as per recovery plans if applicable.

17. NATIVE ANIMALS AND HABITATS

The biogeographic patterns of the extant terrestrial vertebrate fauna are significantly influenced by the landform units present on the peninsula and are generally typical of much of arid or semi-arid Australia (Kendrick 1993).

Cape Range peninsula is not an intense centre of endemism for vertebrate fauna. There is a high level of endemism within the underground invertebrate fauna (Humphreys 2000a). The Cape Range karst is thought to be one of the most biologically diverse in the world (Humphreys 1993, Humphreys 2000a).

The peninsula's rich and diverse fauna has been attributed the range of habitats available (e.g. mangrove, sandy ridges, subterranean wetlands, alluvial plains, rocky ranges and caves), as well as the presence of species at the limits of their geographical range or occurring as geographically isolated populations (Kendrick 1993). Habitat conservation within the park is consequently integral to maintaining faunal diversity. This involves preventing significant habitat loss or degradation, and a range of strategies aimed at addressing causes of this (e.g. environmental weeds, inappropriate fire regimes, altered water regimes and introduced species) are detailed throughout this plan as relevant. Habitat retention for 'specially protected', endemic and habitat specialist fauna is particularly important, although this is often complicated by the limited ecological and life history data available.

Prevention of significant direct human disturbance of fauna is also integral to maintaining the park's faunal diversity. The plan includes a range of strategies to ensure that recreation activities in the park are appropriately managed to prevent this, not the least being to ensure that visitors have access to information to increase their awareness and understanding of the potential impacts of disturbing fauna and how to avoid these.

Based on the currently available information, it appears that there are a number of faunal species on the Peninsula that are not currently represented (or well represented) within the existing national park. For example, many northern or inland reptile species of the Cape Range peninsula are restricted to red dune fields north of the park (see *Reptiles and Amphibians* in this section*)*. These dune fields also overlie particular subterranean faunal habitat *(*see *Subterranean Fauna* in this section) and provide habitat for mammal species likely to be uncommon in the park*.* Conservation of these species would be best achieved by addition of a representative area of these dune fields to the conservation reserve system.

Threatened and Other Specially Protected Fauna

At a State level, the Wildlife Conservation Act (section 14 (2) (ba)) provides for the Minister to declare species of native fauna as 'rare or likely to become extinct' (commonly referred to as threatened) or 'other specially protected fauna'. The Department's Policy Statement No. 33 – *Conservation of endangered and specially protected fauna in the wild* provides management direction for fauna thus declared.

There are 12 species of fauna[8] declared under section 14 (2) (ba) currently recorded for Cape Range National Park (see Appendix 2), most of which are subterranean fauna with limited geographical ranges and which have life history attributes that render them susceptible to disturbance, and therefore in need of special protection. There has however been a relatively low level of research conducted to date, and it is probable, particularly with respect to subterranean fauna, that new species will be discovered (Humphreys 2000a). Of the threatened and other specially protected fauna of the park, 10 of these are threatened species and a further one (the peregrine falcon) is listed under an international agreement[9].

Species that do not meet criteria for listing as threatened because of insufficient information, species that have been recently removed from the threatened list, or that are near threatened and require monitoring are placed on the Department's Priority Fauna list. Species on this list are grouped into Priority categories 1 through to 5 (see *Glossary* for definitions of these). Priority fauna species currently recorded for Cape Range National Park includes one Priority 1 species (*Uperoleia marmorata),* three Priority 2 species (*Ramphotyphlops splendidus, Diplodactylus* sp.Cape Range, and *Noticola flabella),* two Priority 3 species (*Lerista allochira, Sminthopsis longicaudata)* and six Priority 4 species (*Mesembriomys macrurus, Ardeotis australis, Numenius madagascariensis, Stygiocaris stylifera, Draculoides vinei,* and *Hydromys chrysogaster).*

Mammals

Fauna survey of the park has been limited and patchy. Kendrick (1993) used Western Australian Museum and Department records to list extant mammal fauna known from the Cape Range peninsula, including 21 native mammals, of which 11 are bats. An additional eight have been introduced by Europeans (Kendrick 1993) (see

[8] As well as 3 sub-fossil species. Six species are listed under the EPBC Act as well as under State legislation.
[9] Populations of the peregrine falcon are now generally higher in Australia than elsewhere in the world, however it is considered endangered on a global scale and is also protected under the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).

Section 20 *Introduced and Other Problem Animals*). A recent survey of the dune field habitat within unallocated Crown land to the north of the park (see *Proposals for Additions to the Conservation Reserve System* in Section 12) concluded that over half of the mammal species recorded in association with this habitat were likely to be uncommon within the existing national park (Metcalf and Bamford 2005).

Cape Range is rich in fossil and sub-fossil mammalian fauna, which is highly valuable in ascertaining the composition and distribution of mammalian fauna prior to European settlement (Department of Environment and Heritage 2004c). For example, the central rock rat (*Zyzomys pedunculatus*), which is not known to have a living population on the Cape Range peninsula (CALM 1997), is more abundant in the cave sub-fossil deposits in Cape Range than anywhere else in its original distribution (Baynes and Jones 1993).

Caves in the area contain fossil mammalian faunas that are different from the modern fauna, and can provide an insight into the reasons for mammalian extinction. Studies of the mammal material from cave deposits of Cape Range have shown that at least half of the original mammal fauna of the peninsula has become locally extinct since European colonisation of Australia (Baynes and Jones 1993). This was probably due to their vulnerability to habitat alteration resulting from the introduction of the rabbit and pastoral species, and further exacerbated by the presence of introduced predators (Morton 1990).

Mammal species particularly susceptible to fox predation fall within a critical weight range (CWR) of 35 grams to 5.5 kilograms (Burbidge and McKenzie 1989). The Department (CALM 1997) reported no CWR mammals remained in Cape Range, with the exception of the echidna (*Tachyglossus aculeatus*), which had not followed the same pattern of decline as other CWR species. Among those CWR species now absent from Cape Range are nine dasyurids, three bandicoots, three macropods, and 13 rodents (Appendix 3).

The Department seeks to control and reverse the impacts of introduced predators through the Western Shield program (see Section 20 *Introduced and Other Problem Animals*). It is possible that up to 12 species could be reintroduced to the park following sufficient predator and goat control (Appendix 3), including seven species favouring sand plain habitats. In addition to predator and goat control, the impact of habitat alteration by the highly invasive buffel grass or other invasive weeds must be considered (see Section 19 *Environmental Weeds*).

Although many ground-dwelling mammals of the peninsula are now locally extinct, those that remain are common elsewhere in the arid and semi-arid north west of Western Australia, with the exception of the black-flanked rock wallaby (Kendrick 1993). This species was once widespread in WA but is now restricted to isolated populations scattered throughout the State including on two islands – Barrow Island and Salisbury Island. The black-flanked rock wallaby is a threatened species declared to be 'specially protected' under the Western Australian Wildlife Conservation Act, and is also listed as threatened under the Commonwealth EPBC Act. The Department is in the process of preparing a species recovery plan.

The status of populations of black-flanked rock wallabies on the Cape Range peninsula is not thoroughly known, although ongoing research will more accurately establish their distribution and status. Surveys were most recently undertaken in conjunction with volunteers from the Cape Conservation Group in 2005. Several transects were established to provide a foundation for future monitoring and research. The survey, which was not limited to the national park, indicated current or recent use by rock wallabies of six previously known sites, as well as evidence of the species in six new locations. All of the previously known locations, and four of the new, are within the national park or proposed additions to the park from Exmouth Gulf Station. It appears that the western gorges of the range are particularly significant for black-flanked rock wallabies, however because of the rugged, inaccessible nature of the range, it was not comprehensively surveyed, and the eastern side in particular requires more extensive survey effort.

It was noted during the 2005 surveys that habitat previously used by rock wallabies or that appears suitable is not utilised, and it likely that competition with goats for food and shelter could be a factor (D. Pearson pers. comm.). Targeted goat control in areas of potential rock wallaby habitat may help promote re-colonisation/colonisation of these areas. Similarly, an increased focus on fox and cat control in existing or potential habitat areas is important. Aerial baiting for foxes is undertaken at least four times a year, but further research is required to help evaluate the effectiveness of the baiting regimes as currently applied. Manually trapping for cats and foxes around rock-wallaby colonies may be of assistance in enhancing other introduced predator control efforts; however this can be practically difficult. The development of cooperative management arrangements with adjacent land managers is important to effectively deal with the threat that goats, foxes and cats present to black-flanked rock wallabies.

The rock wallabies are most active at dawn and dusk therefore the establishment of campsites in key habitat

areas should be avoided to reduce potential disturbance by campers. Similarly, other recreational activities such as abseiling and rock-climbing can cause disturbance (e.g. through the 'climbing calls' that climbers use for safety and communication), and therefore provision for these activities should also avoid key rock wallaby habitat areas. Walk-trails should be sensitively aligned to avoid direct intersection with areas of key rock wallaby habitat.

The population of rock wallabies at Yardie Creek is a feature of boat tours along the gorge and a popular wildlife viewing attraction in the park. Ongoing visitor impact management measures (such as regulation of the number of boat trips per day, restricted boat tour licences, prohibition of visitor access to some areas, and education/interpretation) are important to address potential problems and provide for sustainable wildlife tourism. Provisions of the CALM Act and associated regulations will be used if/as necessary in the light of new knowledge to prevent significant disturbance of rock wallaby populations within the park.

Some fire management considerations for the conservation of black-flanked rock wallabies are discussed in Section 21 *Fire*.

Bats

Kendrick (1993) summarised information on the bat fauna of the Cape Range, noting that 5 species had been recorded. Gould's wattled bat (*Chalinolobus gouldii*) is widely distributed throughout the continent. The little red flying-fox (*Pteropus scapulatus*) is found throughout northern and eastern Australia. The inland cave bat (*Vespadelus findlaysoni*) inhabits arid and semi arid areas. The common sheath tailed bat (*Taphozous geogeanus*) and the white striped mastiff bat (*Tadarida australis*) have northern and southern ranges respectively. Collections are however inadequate and more species may be present. Other species that may occur in the area include the yellow-bellied sheath-tail bat (*Saccolaimus flaviventris*), lesser long-eared bat (*Nyctophilus geoffroyi*), little broad-nosed bat (*Scotorepens greyii*), northern free-tail bat (*Chaerephon jobensis*) and Beccari's free-tail bat (*Mormopterus beccarii*) (Churchill 1998). There have also been unconfirmed reports of the threatened orange horseshoe-bat (*Rhinonicteris aurantius*) in Cape Range. Mangrove ecosystems around the coast of the peninsula provide a foraging area for many bat species (Kendrick 1993).

The common sheathtail-bat (*Taphozous geogeanus*) is a cave dwelling species (Churchill 1998) and favours the limestone country within the Cape Range. The inland cave bat (*Vespadelus findlaysoni*) typically roosts near cave entrances (Churchill 1998) The presence of cave roosting species will be one of the values to be considered when assessing the suitability of caves for caving use (see *Caving* in Section 28).

Birds

Kendrick (1993) provided an overview of the avifauna of the Cape Range peninsula, noting that approximately 200 species had been recorded. He classified these into three broad biogeographical patterns:

- species ubiquitous throughout and beyond the area;
- species endemic or locally restricted to the area; and
- species which reach the limits of their natural distribution on the peninsula (i.e. southern species which reach the northern extent of their range on the peninsula or northern species which reach the southern extent of their range on the peninsula).

Levels of endemism for avifauna for Cape Range peninsula are generally low. However, species that are locally restricted to the peninsula include populations of the spinifex pigeon (*Petrophassa plumifera*) and grey shrike-thrush (*Colluricincla harmonica rufiventris*), with the latter considered to exhibit sub-specific endemism within the Cape Range peninsula (Kendrick 1993). These species are morphologically different from Pilbara populations and, in the case of the grey shrike-thrush, southern interior populations. It is likely that the separation of populations is related to the distinct landforms and vegetation of the Cape Range peninsula (Kendrick 1993).

Southern species that reach their northern limits on the peninsula include the striated field wren (*Calamanthus fuliginosus*) and grey-breasted white-eye (*Zosterops lateralis gouldi*) (Kendrick 1993). Those species whose southernmost (western coastal) limits fall on Cape Range peninsula include beach stone curlew (*Burhinus neglectus*), bar-shouldered dove (*Geopelia humeralis*), rufous-crowned emuwren (*Stipiturus ruficeps*), grey-headed honeyeater (*Lichenostomus keartlandi*), painted firetail (*Emblema picta*), little woodswallow (*Artamus minor*) and spotted bowerbird (*Chlamydera maculata*).

Yardie Creek and Mangrove Bay are particularly important bird habitat areas for both resident and migratory bird species. The Mangrove Bay area is known to support a high diversity of bird species including eight species at their southern limit in Western Australia (May *et al.* 1993). The park is utilised by several JAMBA, CAMBA and ROKAMBA species (see *Obligations and Agreements* in Section 7 *Legislative Framework* and Appendix 4).

Bird breeding areas of note include the canyon walls of the Cape Range, in particular those within the Yardie Creek system. Biota (CALM 2002) reported that spring was the breeding period for key species in Yardie Creek, primarily the eastern reef heron (*Ardea sacra*) and little corella (*Cacatua sanguinea*). Other species recorded as nesting within the gorge include the Australian kestrel (*Falco cenchroides*), black-faced cuckoo shrike (*Coracina novaehollandiae*), little woodswallow (*Artamus minor*) and welcome swallow (*Hirundo neoxena*). The southern canyon wall is favoured for nesting. To prevent disturbance of breeding activity (as well as to protect rock wallabies) access to the southern wall is prohibited, and visitor access elsewhere in the gorge is specifically defined. Further, seasonal closures or restrictions as provided for under the CALM Act or CALM Regulations can be utilised as necessary to protect breeding birds.

Reptiles and Amphibians

Previous studies of the herpetofauna along with West Australian Museum collections record over 90 species of terrestrial reptiles and amphibians from the Cape Range peninsula (P. Kendrick pers. comm.), with no known extinctions. As with birds, the herpetofauna of the peninsula is composed of species that are (i) ubiquitous, (ii) endemic or locally restricted, and (iii) at the limits of their natural distributions. Many of these species have a very wide distribution range (Kendrick 1993). A skink (*Lerista allochira*) and a blind snake (*Ramphotyphlops spendidus*) known from the park have been listed as Priority 3 and Priority 2 respectively.

Kendrick (1993) described the amphibian fauna of the peninsula as small and predominantly comprising species with northern or central desert distributions. Species with ranges centred on the central deserts or semi-arid interior include Main's frog (*Cyclorana maini*) and the shoemaker frog (*Neobatrachus sutor*), while the desert tree frog (*Litoria rubella*) is present across monsoonal, arid and southern semi-arid Australia. The coastal country between the Cape Range peninsula and Carnarvon is frequented by the tawny frog (*Neobatrachus fulvus*). Douglas' toadlet (*Pseudophryne douglasi*) occupies a scattered and relictual range across the southern and western Pilbara, and Ashburton. This poorly known species has been recorded in Shothole Canyon—the nearest known conspecific population is over 200 km south-east at Barlee Range Nature Reserve. Unlike other frog species in the area that are more tolerant of arid conditions, it appears Douglas' toadlet breeds in winter following winter rains (Kendrick 1993), and as a consequence may be vulnerable to climatic changes.

Seven reptile species are endemic, or nearly so, to Cape Range peninsula. Of these, three species—*Aprasia fusca, Ctenotus rufescens* and *C. iapetus*—occur predominantly on the peninsula, although they are found in the dune and sand plain country of Bullara Station and the former Giralia Station to the east (Kendrick 1993). *Strophurus rankini* occurs in the coastal dunes of the west coast of the Cape Range peninsula and extends a short distance to the south (Kendrick 1993, B. Maryan pers. comm.). *Aprasia rostrata* was formerly thought to be restricted to the Montebello Islands until it was recently recorded on the North West Cape, its first record since the 1950s (P. Kendrick pers. comm.). *Lerista allochira* and an as yet undescribed species of *Delma* are the only true endemic vertebrates of the Cape Range peninsula (Kendrick 1993, B. Maryan pers. comm.). Both are restricted to the dissected limestone country of the Cape Range.

Cape Range peninsula is the northern geographical limit of seven southern species: *Diplodactylus ornatus*, *Tympanocryptis parviceps*, *Ctenotus fallens*, *Lerista lineopunculata*, *L. praepedita*, *Morethia lineoocellata* and *Simoselaps littoralis*. These species, endemic to southern WA, are restricted to sandy coastal habitats and generally found along the western coastal dunes and the coastal corridor (Kendrick 1993).

Five species (*Ctenotus grandis titan*, *Eremiascincus fasciolatus*, *Lerista bipes*, *Ctenophorus isolepis isolepis* and *Diporiphora winneckei*) are primarily of the central and northern coastal sandy deserts, two species (*Diplodactylus conspicillatus* and *Varanus brevicauda*) are present throughout the Pilbara and the sandy deserts of the interior, and *Lophognathus gilberti* has a mainly northern distribution which extends south along the north western coast from the monsoonal environments of the Kimberley and Northern Territory (Kendrick 1993, B. Maryan pers. comm.).

Five of the reptilian species that occur on the peninsula are separated from other conspecific populations that lie to the east and north. Two of these species (*Strophurus elderi* and *D. mitchelli*) are found in the Pilbara region, although the range of *S. elderi* extends over much of the southern and central interior of the continent (Kendrick 1993, B. Maryan pers. comm.). *Diplodactylus ciliaris aberrans* (from the Cape Range peninsula) is found in

isolated populations in the Pilbara, Kimberley and central deserts. *Ctenophorus clayi* (from Exmouth Gulf) is distinctly isolated from the larger part of this species' range in southern central Australia. The fifth isolated population of the Cape Range peninsula is that of an undescribed species of *Acanthophis* (Kendrick 1993).

Of the reptiles restricted to the Cape Range peninsula, all but one species (*Lerista allochira*) are found on the sandy habitat of the white coastal dunes or the red dune fields north of the park (Kendrick 1993).

Many northern or inland reptiles are found on the Cape Range peninsula on the red dune fields north of the park and consequently may not be represented, or only poorly represented, in the park. A survey of the dune field, specifically targeting reptiles and small mammals, was conducted in late 2004. The study found the faunal assemblage of the dune field to include species at the limit of their range and species that have isolated populations on the Cape Range Peninsula. The dune field habitat is not well represented in the park and species closely associated with the habitat (including but not limited to approximately a third of the reptile species recorded during the survey) are likely to be uncommon within the existing conservation reserve (Metcalf and Bamford 2005). The Conservation Commission and the Department will seek to add a representative area of dune field habitat to the conservation reserve system (see *Proposals for Additions to the Conservation Reserve System* in Section 12).

Three reptile species recorded in the park are 'specially protected' under the Wildlife Conservation Act and are also listed as threatened under the EPBC Act—the green turtle (*Chelonia mydas*), hawksbill turtle (*Eretmochelys imbricata*) and loggerhead turtle (*Caretta caretta*). These species utilise beaches on the Cape Range Peninsula for nesting.

In response to worldwide declines in populations of marine turtles, the Commonwealth Government has produced a recovery plan for marine turtles in Australia to address detrimental impacts on Australian populations (Environment Australia 2003). Provisions included within this management plan for Cape Range National Park are consistent with and where appropriate give effect to actions identified in the Commonwealth recovery plan for marine turtles. These include for example, strategies aimed at managing factors that can impact on successful marine turtle nesting, and at increasing public awareness of turtle conservation management issues. At State level, a more specific wildlife management program for marine turtles is also being developed to guide management of these and other threats.

Potential disturbances to turtle populations in the park mainly arise from indirect disturbance to nesting habitat (e.g. through tourism and recreation related developments or activities), direct disturbance of females during nesting, or predation of eggs and hatchlings by foxes. Vehicular and pedestrian traffic on turtle nesting beaches can be problematic as ruts and furrows left behind can present significant impediments to hatchling movement back to the ocean. Light pollution near turtle nesting beaches can have a similar effect by attracting hatchlings away from the water and increasing the risk of mortality. Predation of turtle eggs by foxes can account for 70 % mortality on some mainland beaches (R Mau, pers. comm.). Disturbances can be minimised by ensuring:

- appropriate siting, design and management of recreation and tourism sites;
- continuing to control foxes with particular attention to key turtle nesting beaches;
- visitor education programs and monitoring for visitor impacts on turtle nesting; and
- appropriate management of visitor access and wildlife interactions.

Strategies to these ends are detailed throughout this plan as relevant. The *Management Plan for the Ningaloo Marine Park and the Murion Islands Marine Management Area 2005-2015* includes strategies for turtle monitoring programs and research regarding the location and relative significance of turtle aggregation sites and rookeries (Marine Parks and Reserves Authority/Department of Conservation and Land Management 2005). A community-based turtle monitoring program is also in place in the region. The program involves training volunteers to collect and record data about turtle nesting activities and provides invaluable information important to the conservation of this fauna.

Invertebrates

Although there is very little information regarding the regional significance of the terrestrial invertebrate fauna inhabiting the peninsula area (Environmental Protection Authority 1999, Hamilton-Smith *et al*. 1998), some information does exist regarding non-marine molluscan fauna and subterranean fauna.

The non-marine molluscan fauna of the Cape Range peninsula consists exclusively of gastropods (Slack-Smith 1993). This fauna had apparently become isolated from their ancestral populations by the progressive

development of aridity, and display a high proportion of endemic taxa (10 species are endemic to the peninsula, and seven species endemic to the Cape Range), as well as four species at the southern limits of their range (Slack-Smith 1993). Three widespread species, at the limit of their range at Cape Range, have been found exclusively in caves—a habitat not usually adopted by these species, but which provides a cooler, more humid environment and allows them to persist in an area that might otherwise be unsuitable (Slack-Smith 1993).

Cape Range Subterranean Habitats

The subterranean waterways within the Cape Range peninsula have been identified in the *Directory of Important Wetlands in Australia* as a good example of a subterranean karst wetland system and the only one (with the exception of Barrow Island) in arid north-western Australia (Department of Environment and Heritage 2004d). The wetland system fulfilled five of the six criteria for identifying nationally important wetlands (Department of Environment and Heritage 2004d) and may also meet the requirements for listing under the Convention on Wetlands (the Ramsar Convention).

Subterranean karst wetlands are uncommon in arid regions and in the Carnarvon bioregion. Barrow Island, which is in the same bioregion and has similar karst subterranean wetlands, is subject to petroleum and gas resource use. Much of the significance of the park's subterranean wetland system is associated with the endemic, relictual or otherwise notable subterranean fauna it supports (see *Subterranean fauna* below). This fauna, which includes threatened species listed under the Wildlife Conservation Act and EPBC Act, is dependent on the presence and maintenance of the karst hydrogeological system and processes for all stages of the life cycle. Much of the park's subterranean fauna has not been found anywhere else and is entirely dependent on the karst wetlands. Conservation of the park's stygofauna and the habitat values which support it therefore important for maintaining biodiversity locally, within the bioregion and more broadly. Management considerations relevant to maintaining the integrity of this system are discussed in Sections 14 and 15. Subterranean fauna can also be significantly affected by:

- interference with the anchialine zone of the unconfined aquifer;
- transformation of subterranean caverns to surface habitat by removal of substrate (e.g. by mining or infrastructure development);
- mobilisation of fine materials leading to clogged pore spaces;
- addition of energy (via nutrients) to typically low energy systems; and
- introduction of exotic species (e.g. fish, snails, parasites).

In terms of 1 above, much of the known stygofauna of the area occurs in the anchialine zone—the zone where freshwater and seawater meet and diffuse into each other (Hamilton-Smith *et al.* 1998). Anchialine systems are highly stratified in terms of salinity, and this stratification is commonly associated with major changes in other physico-chemical parameters (e.g. oxygen potential) (Humphreys 2000b). Whilst the distribution of some of the stygofauna species seems to be restricted to specific physico-chemical conditions, others have more wide-ranging distribution and are found in waters with varying characteristics (Humphreys 2000b). Given the inherent complexities of anchialine habitats, changes in naturally occurring regimes and balances may pose a threat to subterranean fauna (Hamilton-Smith *et al.* 1998, Humphreys 2000b).

The combined impacts of buffel grass, high macropod densities and introduced herbivores (e.g. goats[10]) are particularly significant in terms of 4 above. Strategies have been included in the relevant sections of this management plan to reduce these impacts.

Ramsar

Consideration will be given to nominating the park's subterranean wetlands for inclusion on the list of Wetlands of International Importance (i.e. listing as a Ramsar site) over the life of this plan.

Under the *Environment Protection and Biodiversity Conservation Act Regulations 2000* (EPBC Act Regulations), management plans for declared Ramsar wetlands should provide for continuing monitoring and reporting on the state of the wetland's ecological character. Broad Key Performance Indicators have been included in Sections 14 and 15 so that changes in the hydrogeology system upon which the subterranean fauna depends will be monitored. Current knowledge deficits regarding the ecological water requirements of groundwater dependent subterranean fauna makes the development of more specific indicators difficult at this stage. A detailed monitoring program, including more specific indicators/parameters, will be developed as part

[10] The accumulation of large quantities of goat and other animal faeces within the vicinity of open conduits to the aquifer may result in significant increase in local nutrient inputs to the system.

of the implementation of this management plan to facilitate assessment against these broad indicators. Management will then be adapted in light of the results of monitoring and research into the ecological water requirements, where this is necessary to ensure the ecological character of the subterranean karst wetland system is maintained.

The EPBC Act Regulations refer to the provisions for community consultation on decisions and actions that may have a significant impact on the wetland. In the event of the subterranean wetlands of the park being listed as a Ramsar site, community consultation should include or be via the North West Cape Karst Management Advisory Committee, the Coral Coast Park Council, and the Coral Coast Parks Advisory Committee. The North West Cape Karst Management Advisory Committee will also play a key role in facilitating the integrated catchment management necessary to protect karst wetland values.

Subterranean Fauna

The subterranean fauna of the Cape Range peninsula comprises both terrestrial and aquatic components and includes species considered rare or likely to become extinct. In the context of this management plan, troglofauna is used to refer to terrestrial species and stygofauna is used for aquatic, collectively these will be referred to as subterranean fauna. The subterranean fauna predominantly comprises invertebrate species.

There are three threatened and three priority subterranean fauna species known within the park. The threatened species include two spiders—the western Cape Range Bamazomus (*Bamazomus vespertinus*) and the western Cape Range Draculoides (*Draculoides julianneae*)—and a millipede (*Stygiochiropus sympatricus*). The Cape Range blind cockroach (*Nocticola flabella*), the spear-beaked cave shrimp (*Stygiocaris stylifera*) and the Cape Range schizomid spider (*Draculoides vinei*) are all listed as priority species. A number of specially protected subterranean fauna species and communities are found outside the park—at Cameron's Cave in Exmouth, and the Bundera Sinkhole in the Department of Defence land to the south of the park. Both areas are covered by threatened ecological community interim recovery plans.

The terrestrial cave-dwelling fauna of the peninsula is dominated by a wide array of arachnids and myriapods (centipedes and millipedes), with over 30 species exhibiting a marked degree of adaptation to subterranean life (Humphreys 2000a) and hence particularly dependent on subterranean habitats. Some species occur elsewhere above ground, but on the peninsula are restricted to caves. Others show either partial modification for subterranean existence or are unmodified and represent surface fauna that opportunistically occurs in caves (Harvey *et al.* 1993). Study of stygofauna has been facilitated by access via open conduits into the aquifer (e.g. sink holes, caves and bores). Fauna identified to date include two species of teleost fish—the blind gudgeon (*Milyeringa veritas*) and blind cave eel (*Ophisternon candidum*), two shrimps, a thermosbaenacean, an ostracod, a cirolanid, at least two melitid isopods and a recently described member of the class Remipedia (*Lasionectes exleyi*) (Yager and Humphreys 1996, cited in Hamilton-Smith *et al.* 1998). However, the distribution of the stygofauna through the karst system is unknown, and it is considered that many more species await discovery (Hamilton-Smith *et al.* 1998, Humphreys 2000a).

Despite relatively limited investigation (compared to that done in karst provinces in other areas), the diversity of subterranean fauna of the Cape Range peninsula is identified amongst the world's most notable (Hamilton-Smith *et al.* 1998, Humphreys 1993, Humphreys 2000a). It was previously thought that arid zones did not exhibit diverse subterranean fauna, and yet it has recently been revealed that the diversity identified on the peninsula is comparable to and in some instances exceeds that of overseas locations renowned for such diversity (Humphreys 2000a). In an Australian context (i.e. compared to other karst systems in the Nullarbor Plain, Chillagoe in Queensland, and Tasmania), the richness of the troglobitic arachnid and myriapod fauna is significant in that it comprises approximately half of the known troglobitic species recorded in the country (Harvey *et al.* 1993).

The peninsula's subterranean fauna also features several endemic or near endemic species. These include genera of stygofauna that are endemic to the region (e.g. *Milyeringa* and *Stygiocaris)*, and troglobites endemic to the Cape Range formation (i.e. all the species and many genera) (Humphreys 2000a). Further, two subterranean fish species found on the peninsula are the only vertebrate animals known from Australia that are restricted to subterranean environments (Poore and Humphreys 1992).

The subterranean fauna of the Cape Range peninsula is also noted for its age and zoogeographic origin, aspects of which are of interest to a number of scientific disciplines. Findings from studies of Cape Range subterranean fauna include:

- that its stygofauna taxa are unrelated to those that occur in other karst regions of Australia (Humphreys 1994). Some Cape Range taxa have biogeographic affinities with the North Atlantic and are thought to be

ancient relicts of taxa which evolved from the Tethys sea, having shared a common origin dating back over 180 million years ago (Humphreys 1994).
- considerable genetic diversity within the subterranean fauna of the Cape Range peninsula. Genetic provinces are considered to be reflective of past isolating events such as the uplift of the Cape Range anticline, and separation of aquatic habitats (e.g. through the lowering of perched watertables under arid conditions) (Humphreys 1993; Humphreys 2000a).
- troglobite species that appear to have biogeograhic affinities with tropical and temperate areas of Australia as well as further afield (at least one species has links to ancient Gondwanan fauna presently found in north-western Australia, India and southern Africa) (Humphreys 1993; Harvey *et al.* 1993).

Apart from ensuring that karst hydrogeological systems that support the subterranean fauna are maintained, conservation of subterranean fauna must also take into account:

1. that much of the known subterranean fauna of the peninsula is distributed outside the existing boundaries of Cape Range National Park. Representation within the conservation reserve system will be improved through proposed additions identified in Section 12 (Hamilton-Smith *et al*. 1998). Areas of Pleistocene red dunes to the north of the park overlie areas in which both troglofauna and stygofauna has been found (Humphreys 2000b), and the addition of a representative sample from these dunefields to the park needs to be considered;
2. that stygofauna have some life history attributes that make them particularly susceptible to disturbances (see below); and
3. there is a lack of specific information regarding the Ecological Water Requirements (EWR) for the subterranean fauna (see Section 15).

With regards to 2 above, Humphreys (2003) described the typical life history attributes of stygofauna as:

- long-lived;
- few young;
- small populations;
- slow population response; and
- no resting stages.

In addition, subterranean fauna (and troglofauna in particular) usually has a very limited geographical range. There may for example be a lack of connectivity between caverns, creating isolated habitat and limiting dispersal of fauna (e.g. physical disjunction between coastal plain and range). Distribution of this fauna may also be limited by physico-chemical characteristics (e.g. variations in salinity and dissolved oxygen) where species are adapted to very specific physical characteristics.

17 – Native Animals and Habitats

Key Points
- Fauna survey of the park has been limited and patchy.
- To a large extent the diversity of fauna in the park is attributable to the range of habitats available (e.g. mangrove, sandy ridges, subterranean wetlands, alluvial plains, rocky ranges and caves) and hence conservation of habitat diversity and quality needs to be a key management focus. Habitat loss or degradation is associated with factors such as environmental weeds, inappropriate fire regimes, introduced/problem animals, inappropriate recreation developments or activities, and alterations in groundwater levels and quality.
- Predation by and competition with introduced animals poses a significant threat to native animals.
- Areas proposed for addition to the conservation reserve system contain faunal species not currently represented (or only poorly represented) within the existing park.
- The fauna of the park includes species either at the limit of their geographic range or occurring as geographically isolated populations.
- Black-flanked rock wallabies and nesting turtles and birds are an important and popular focus for wildlife viewing activities. They are, however, vulnerable to associated potential impacts and hence must be protected against these.
- Subterranean waterways within the Cape Range peninsula provide important habitat for subterranean fauna and have been identified as nationally significant, and may also be of international significance.
- The Cape Range peninsula supports an extremely diverse subterranean fauna of high biodiversity and scientific significance including endemic, relictual and locally disjunct species.
- Much of the subterranean fauna is vulnerable to extinction as a result of its highly specialised habitat

or lifecycle requirements and geographic isolation.

The objective is to conserve the diversity of native fauna and habitat types, and to maintain viable populations of threatened or otherwise significant fauna.

This will be achieved by:

1. managing factors that can lead to loss or degradation of faunal habitat (e.g. environmental weeds, inappropriate fire regimes, introduced/problem animals, inappropriate recreation or tourism developments/activities, and alterations in groundwater levels and quality).
2. continuing to control introduced and problem animals, with a priority on reducing threats to threatened or otherwise specially protected species, and considering reintroducing locally extinct species when their habitat requirements can be met.
3. giving consideration to nomination of Cape Range subterranean wetlands on the List of Wetlands of International Importance.
4. developing cooperative management arrangements with adjacent land managers as appropriate to maximise effectiveness of control of introduced fauna such as goats, foxes and cats.
5. ensuring that special fauna conservation values (e.g. reptile and subterranean fauna values associated with the red dune fields area) are considered in negotiations regarding the 'Area Subject to Further Planning by WAPC' (see Section 12).
6. subject to further negotiations, restricting or prohibiting public access at specific locations and times as necessary to prevent disturbance to fauna or habitat.
7. undertaking or supporting and encouraging further research in the park to increase knowledge of vertebrate and invertebrate fauna, particularly subterranean fauna and threatened or otherwise specially protected species.
8. providing opportunities for visitors to increase their knowledge and appreciation of the native fauna of the park.
9. ensuring that the potential disturbance to turtle nesting habitat and nesting activity is taken into consideration in recreation site developments implemented under this plan and taking action as necessary to avoid or manage such disturbances.
10. managing human-wildlife interactions (e.g. rock wallabies, turtles and birds) so as to maximise associated conservation and visitor enjoyment benefits whilst preventing significant adverse impacts (e.g. using E Class, zoning or classifying land as indicated in Land Classification, providing visitors with information on ways to avoid/minimise disturbance).
11. ensuring visitors have access to information about the ecological significance of, and appropriate activities and behaviours near, turtle nesting sites.
12. ensuring recovery plans for threatened species or communities of relevance to the park complement the strategies in this management plan, and seeking to give effect to strategies within recovery plans as appropriate.
13. identifying fauna species at particular risk from climate change and implementing conservation management strategies where practicable (e.g. maintaining captive populations).

Key Performance Indicators (see also Appendix 1)

Performance Measure	Target	Reporting Requirements
17.1. Diversity of native fauna species and habitat.	17.1. No loss of known species of habitat diversity over the life of the plan.	Every 5 years
17.2. Population numbers and range of specially protected fauna species, threatened ecological communities or otherwise significant fauna.	17.2. Remain stable or increase over the life of the plan subject to natural variations.	Every 5 years or as per recovery plans if applicable.
17.3. Visitation related impacts on turtles, nesting birds sensitive to disturbance and rock wallabies.	17.3. No significant adverse impacts over the life of the plan.	Every 3 years or as per recovery plans if applicable.
17.4. Changes in the known level of predation on nesting turtles within the park.	17.4. Decrease over the life of the plan.	Every 3 years or as per recovery plans if applicable.

18. THREATENED ECOLOGICAL COMMUNITIES

Threatened Ecological Communities (TECs) are ecological communities approved by the Minister for the Environment as threatened and listed on the Department's non-statutory TECs Database. There are currently no known TECs within the park, although threatened subterranean fauna communities have been identified elsewhere on the peninsula (e.g. Cape Range Remipede Community of the Bundera Sinkhole and Cameron's Cave Troglobite Community) and it is possible that other TECs will be identified within the park over the life of the plan.

19. ENVIRONMENTAL WEEDS

Environmental weeds are species that establish themselves in natural ecosystems, proceed to modify natural processes and eventually lead to the decline of the communities they invade (CALM 1999). Environmental weeds displace native plants, particularly on disturbed sites, by competing with them (e.g. for space, light, nutrients and water). They can also have a significant impact on other conservation values by altering animal habitats, harbouring pests and diseases and altering fire regimes.

The establishment of many weed species on the Cape Range peninsula has been hampered by its arid nature and lack of sandy riverine areas, major towns, intensive agriculture or alluvial flats (Keighery and Gibson 1993). However, around thirty weed species have been recorded, some of which are capable of seriously impacting conservation values within the park. Comprehensive mapping of weed species in the park has not yet been undertaken. Mapping would facilitate assessment of weed distribution, vegetation condition, prioritisation of weed control measures and the effectiveness of weed control.

Weed species of particular concern on the peninsula include buffel grass, kapok (*Aerva javanica*), stinking passion flower (*Passiflora foetida*) and great broom (*Bromus diandrus*).

Buffel grass is ubiquitous on the western coastal plain and because of the extent of its distribution and difficulties with its control is the most serious weed in the park to date. It has largely replaced native *Triodia* grasslands on the coastal plain as a result of disturbance, such as heavy grazing pressure (by stock in the past and by goats and euros presently), and by its positive response to fire (Keighery and Gibson 1993).

Buffel grass is a hardy, drought-resistant perennial bunchgrass native to Africa, the Middle East and Asia (Dixon *et al.* 2001). It is believed that buffel grass was introduced into Australia between 1870 and 1880 with the packsaddles of Afghan camel drivers (The Nature Conservancy 2004). Since then it has been used by the pastoral industry for erosion control and as a pasture supplement throughout the Pilbara and Kimberley regions of WA (Dixon *et al.* 2001).

Buffel grass can reproduce either vegetatively through rhizome or stolon production, or sexually by seed. The seeds are easily dispersed by wind, flood, fire and by attaching the barbed bristles of the seed coat (burs) to animal fur or human clothing (The Nature Conservancy 2004, Tu 2002). It significantly alters environmental conditions when invading new habitats as it reduces soil fertility, increases soil erosion, which increases surface water runoff and creates unstable watersheds with degraded water quality (Fabel 2000). Leachates from the leaves and roots of buffel grass have also been shown to have a phytotoxic effect on other species (Fulbright and Fulbright 1990).

Buffel grass creates the ideal fuel source for wildfire—it burns readily when cured, rapidly regenerates after fire and may increase the frequency of wildfires in communities that are not adapted to fire (Tu 2002). Regular wildfire events maintain buffel grass populations while suppressing or replacing native species, resulting in a change in the structure of the vegetation community and a reduction in species diversity (Dixon *et al.* 2001). The success of buffel grass as an invasive weed not only impacts on the vegetation communities but also on the fauna that use them for habitat and refuge (Dixon *et al.* 2001).

Environmental Weed Management

An integrated approach to environmental weed management was developed in the *Environmental Weed Strategy for Western Australia* (CALM 1999). As part of this strategy, environmental weeds are rated in terms of their environmental impact on biodiversity. The criteria used to determine the rating for each weed are:

- Invasiveness – ability to invade bushland in good to excellent condition or ability to invade waterways.

- Distribution – current or potential distribution including consideration of known history of wide spread elsewhere in the world.
- Environmental Impacts – ability to change the structure, composition and function of ecosystems and in particular an ability to form a monoculture in a vegetation community.

Under the strategy, the highest rating weed species on the peninsula are buffel grass, kapok, stinking passion flower and great broom.

The *Environmental Weed Strategy for Western Australia* and local knowledge guide the approach and priority setting for the control of environmental weeds within the conservation reserve system. Priorities for action are to first control any weed that impacts on threatened or priority flora, fauna or ecological communities, or that occurs in areas of high conservation value, and then address high, moderate and low rated environmental weeds in decreasing priority as resources allow.

Options for environmental weed management include prevention, eradication, control, containment or monitoring. The preferred option is to prevent the introduction of environmental weeds through appropriate management, as eradication is rarely feasible. Methods of control include managing introductions and disturbance, the use of herbicides, biological control, manual control and potentially, control through the application of fire. Effective control programs encourage the growth of native species through rehabilitation and the suppression of weeds with the overall aim of boosting the area's resilience to further weed invasion. The role of rehabilitation where weeds have been removed is critical in order to prevent reinvasion of new weeds.

The local community can play an invaluable role in the early detection, monitoring and control of environmental weeds, and hence strategies to increase community awareness of and support for weed management are identified where relevant throughout this plan.

Control of Buffel Grass

Control of buffel grass is complex. The long, dense root mass makes manual removal of the grass difficult, it withstands cutting and grazing (in some instances cutting only encourages growth), and it recovers quickly from fire.

There does not appear to be any single control method that may be employed for the successful management of buffel grass at a landscape scale such as within Cape Range National Park. An integrated management approach including removing or reducing buffel grass biomass (by manual removal, burning, or slashing), use of herbicide (glyphosphate or haxazinone) to control seedlings and re-sprouts and active restoration to create dense native vegetation is required (Tu 2002). Currently, the most effective method for control of buffel grass at sites that have a well developed seed bank is to spray plants with herbicide, then burn the dry matter and surface seed bed and follow-up spray any regrowth (Puckey and Albrecht 2004). The use of herbicides in the park will only be undertaken where significant contamination of subterranean habitats (or other native plant and animal communities) can be effectively prevented or mitigated. This may mean, for example, that spraying around sinkholes will need to be avoided.

Improved understanding of buffel grass and its interaction with factors such as grazing (i.e. from feral herbivores and euros) and fire is required to facilitate control of this weed. Further research into the implications of its toxic effects on rehabilitation is also necessary.

19 – Environmental Weeds

Key Points

- Around 30 species of weeds have been identified for the Cape Range peninsula.
- It is preferable to prevent the introduction of environmental weeds through appropriate management, as eradication is rarely feasible.
- The local community can play an invaluable role in early detection, monitoring and control of environmental weeds.
- Buffel grass is ubiquitous on the western coastal plain and because of the extent of its distribution and difficulties with its control is the most serious weed in the park.
- There does not appear to be any single control method that may be employed for the successful management of buffel grass in large areas. Rather an integrated management approach using mechanical and chemical means of control is required, and should be adapted in the light of increased knowledge about this weed.

The objective is to reduce the impact of weeds (and high priority weeds in particular) on the key values.

This will be achieved by:

1. undertaking (and maintaining) baseline weed mapping as part of the preparation and implementation of a prioritised weed control plan cognisant of the *Environmental Weed Strategy for Western Australia* and local knowledge.
2. ensuring that weed species that pose a threat to significant flora, fauna and communities are given high priority for control.
3. implementing prioritised weed control based on ratings in the *Environmental Weed Strategy for Western Australia* and local knowledge.
4. minimising disturbance of soil while carrying out management activities, particularly in areas in or adjacent to sources of weeds.
5. targeting recent disturbance areas for weed control to prevent weeds from permanently establishing themselves.
6. applying entry hygiene controls as required (including for the Sandy Bay Track) and ensuring any materials imported into the park for use in management operations do not introduce a weed risk.
7. developing and utilising tools and systems to assist the local community and visitors to identify and report new high-threat weed species.
8. investigating methods of buffel grass control and broad-scale rehabilitation techniques and adapting weed control management if/as appropriate in response to findings.
9. undertaking research to investigate the inter-relationship of fire and priority weed species to inform fire management (e.g. use fire control plots).
10. conducting research into the relationship between fire, buffel grass and native species.
11. liaising with neighbouring landholders to facilitate effective, coordinated weed management.

Key Performance Indicator (see also Appendix 1)

Performance Measure	Target	Reporting Requirements
19.1. The cover of environmental weed species rated as high priority.	19.1. Decrease over the life of the plan.	Every 5 years.

20. INTRODUCED AND OTHER PROBLEM ANIMALS

Problem animals can be either native species that impact on conservation values or adjacent land uses, or exotic animals that have become established as wild or naturalised populations. Problem animals have potential for serious impact on natural systems through effects such as predation, habitat alteration or destruction, competition for food and territory and introduction of disease.

Exotic species in the park are listed in Table 1. Priorities for action are protection of threatened wildlife, translocation areas and other important habitat. The Department recognises the need for regionally coordinated approaches to the management of problem animals that involves liaison with other government and private landholders. Management of problem animals in the park should be cognisant of and consistent with regional approaches. The Department also has responsibilities for control of declared animals on the lands it manages under the *Biosecurity and AgricultureManagement Act 2007*.

TABLE 1 Exotic Animals Recorded in the Park

Common Name	Species
fox*#	*Vulpes vulpes*
feral cat #	*Felis catus*
goat #	*Capra hircus*
wild dogs*	*Canis lupus dingo* and hybrids
rabbit* #	*Oryctolagus cuniculus*
house mouse	*Mus musculus*
black rat	*Rattus rattus*

*Declared animals under the Biosecurity and Agriculture Management Act.

These animals are recognised as nation-wide problems and are the subject of threat abatement plans developed through the Commonwealth Government's lead environmental protection agency.

Foxes and Cats

Foxes (*Vulpes vulpes*) are common in the national park and predation of turtle eggs by foxes can account for 70 % mortality on some mainland beaches (R Mau pers. comm.). The fox is also a major threat to medium-sized ground dwelling mammals and ground-nesting birds (Burbidge and McKenzie 1989). The feral cat is thought to have been responsible for the extinction of small to medium sized ground dwelling mammals in the arid areas of the State (Burbidge and McKenzie 1989).

Predation by foxes and cats are listed as key threatening processes under the EPBC Act. Five-year threat abatement plans have been prepared for both threatening processes to provide national coordination, with the emphasis on local control programs to ensure recovery of endangered species. The Department implemented the Western Shield program in 1996 in order to control predators such as the fox and feral cat. The program involves aerial baiting of selected lands managed by the Department using 1080 poison (sodium fluoroacetate) baits to (a) enable native wildlife population to recover and (b) allow the reintroduction of native animals to former habitats once foxes and cats have been controlled. Sodium fluoroacetate occurs naturally in Western Australia in native *Gastrolobium* plants, which has enabled native animals to develop a natural tolerance to the poison.

Foxes were common throughout the national park and adjacent areas but are now controlled by 1080 baiting across the park, affording protection to rock wallaby colonies, sea turtle nesting beaches and other fauna or habitat. An ongoing focus on fox and cat control particularly in existing or potential habitat areas is essential. Aerial baiting for foxes is undertaken at least four times a year, but further research is required to help evaluate the effectiveness of the baiting regimes as currently applied. Manually trapping for cats and foxes in significant habitat areas may be of assistance in enhancing other introduced predator control efforts; however this can be practically difficult. To maximise baiting effort, the Department seeks to work cooperatively with station owners and the Department of Defence to bait strategic areas adjacent to the national park.

Feral cats (*Felis catus*) are found throughout the peninsula with higher concentrations associated with areas close to human habitation and use. Control of feral cats has not yet been undertaken in the park. The use of 1080 meat baits for cat control is currently being researched with a view to the potential for broader application in the future. Liaison with the Shire is required to promote responsible cat ownership within the local community.

Goats

Large populations of feral goats (*Capra hircus*) are common and widespread on the peninsula (CALM 1997). Competition and land degradation by feral goats is listed as a Key Threatening Process under the EPBC Act and a threat abatement plan has been prepared by the Commonwealth Government to provide national coordination, with the emphasis on local control programs to ensure recovery of endangered species. The threat abatement plan identifies feral goats as a threat to the threatened black-flanked rock wallaby. Targeting goat control in areas used by rock wallabies will assist to reduce this threat. Goat control in area previously used by rock wallabies may help promote re-colonisation.

Goats, along with foxes, are currently the most significant feral animals within the park. Goats are responsible for a variety of impacts on native flora and fauna, including competing with native fauna for food, water and shelter, and threatening the survival of native flora through their feeding habits (Biodiversity Group Environment Australia 1999). The impact of hooves and overgrazing destabilises soils and greatly increases erosion. There is also some concern about the impact that goats (along with euros—see below) may have in increasing nutrient and sediment loads into the aquifer system by grazing around and utilising water from sinkholes, and from camping within cave entrances, where large volumes of goat faeces accumulate, almost certainly causing significant increase in local nutrient loads into the karst.

Goat control in conservation reserves adjacent to pastoral leases is complicated by the rise of a *de facto* managed goat industry based on sale of unmanaged (feral) goats. Goat control efforts on conservation lands are significantly impeded where land management objectives on adjacent lands are to maintain or promote their numbers, and where there is a concomitant lack of effective control measures to prevent them wandering in from adjacent pastoral properties. In 2002, recognition was given to the growing goat industry in that goats were reclassified from ‘prohibited’ stock to ‘authorised’ stock under the Land Administration Regulations 1998. As a result of this reclassification the Pastoral Lands Board has developed best practice management guidelines for the industry, which include guidelines pertaining to identification (e.g. ear marking) and boundary fencing to prevent escape of goats onto adjacent lands. However, there is currently little statutory requirement for pastoralists to manage their stock in accordance with the guidelines, and prevent movement of their stock onto

adjacent lands, although the Department will seek to work in collaboration with individual pastoralists and the Pastoral Lands Board of Western Australia to encourage strategies to this end.

Goat control within the park currently comprises ad hoc shooting by the Department and authorised organised groups of shooters who undertake an annual intensive shoot around Yardie Creek. Shooting is particularly effective in late summer when water sources are scarce and goats congregate at known water points. Outside of these circumstances inaccessible terrain throughout the park presents difficulties, and the utilisation of aerial shooting may need to be considered during the life of the plan, although, this option will not always be feasible because of the Department's legal obligations regarding treatment of straying stock and the difficulties inherent in identifying, from the air, whether goats are marked. Allowing mustering for commercial sale (e.g. through cooperative arrangements with adjoining pastoral landholders) to assist with goat control is also a possibility, although this is difficult due to the rugged terrain and is subject to market forces.

Barriers (e.g. fencing) can provide localised protection around sinkholes and help reduce the risk of aquifer contamination from goats.

Rabbits

Rabbits (*Oryctolagus cuniculus*) are present on the peninsula but their distribution and impact on its conservation values is not well known. Competition and land degradation by feral rabbits is listed as a Key Threatening Process under the EPBC Act and a threat abatement plan has been prepared by the Commonwealth Government to provide national coordination, with the emphasis on local control programs to ensure recovery of endangered species. It appears that rabbit populations are largely limited to small isolated pockets, although it is likely that numbers fluctuate considerably in response to climate conditions, increasing for example after significant rainfalls, and declining during periods of drought. Ongoing fox and wild dog control may have the unintended effect of allowing rabbit populations to increase.

It is unclear to what extent rabbits contribute to the overall impact of introduced animals on the park's conservation values, however this has been assumed to be relatively low, and priority is given to the control of goats and foxes. Nevertheless, a targeted monitoring and control program with a focus on protection of threatened or other species of special conservation may be warranted.

Various strategies are employed to control rabbit populations, including the widespread introduction of biological control agents such as myxoma and rabbit calicivirus. These disease agents have an important role in controlling rabbit numbers, but will not, in isolation, necessarily provide adequate levels of control. 1080 baiting may be of assistance. This and other options for rabbit control in the park require further investigation.

Black Rat

The occurrence of the black rat (*Rattus rattus*) on the Cape Range peninsula is of concern as it may out-compete and displace larger native rodents such as the central rock-rat (*Zyzomys pedunculatus*). Although there is not currently substantial information on competition between black rats and native rodents, it is known that the black rat displaced the southern bush rat (*R. fuscipes*) and a species of *Pseudomys* on Woody Island near Esperance. The black rat has also been implicated in the displacement of the pale field rat (*R. tunneyi*) in coastal areas of the Midwest and Pilbara (CALM 1997).

Wild Dogs

Wild dogs are defined as all wild-living dogs, including dingoes (*Canis lupus dingo*) and hybrids (Department of Agriculture and Food, and Agriculture Protection Board of WA 2005). It is unlikely that dingoes still persist within the park, and wild dogs occasionally observed in the park are likely to be hybrids originated from the settlements of Exmouth and Learmonth (Kendrick 1993), although stations or visitors cannot be ruled out. Wild dogs, through predation of feral goats and possibly cats and foxes, may be providing a form of ecosystem service. Wild dog control is currently guided by the *Western Australian Wild Dog Management Strategy* (Department of Agriculture and Food, and Agriculture Protection Board of WA 2005), and baiting is periodically undertaken in areas where the park adjoins pastoral leases according to a program agreed with the Department of Agriculture and Food. The aim of the Wild Dog Management Strategy is not to necessarily eliminate wild dogs, but to control their impacts.

Fish and Aquatic Invertebrates

Introductions of exotic aquatic organisms (e.g. aquarium fish and invertebrates) into the subterranean wetlands of the Cape Range Peninsula present a significant threat to subterranean fauna through predation and competition for resources and food. A primary focus in addressing this threat is preventing introductions through increased awareness of the threats and ways to reduce them.

Other Problem Animals

Euros

The Department does not normally monitor euro (*Macropos robustus*) numbers in the national park, although it does conduct periodic surveys on the pastoral leases immediately to the south.

The park is thought to be supporting an unnaturally high population of euros due to reduced predation pressures from previously present dingoes and the increased grazing capacity of the land due to invasion by buffel grass. This probably contributes to significant environmental degradation caused by overgrazing (P. Kendrick pers. comm.). The Department conducted a survey of euro numbers on the peninsula in 2001 and again late 2004. The survey results suggested that euro numbers had increased substantially (Mawson unpubl. 2005), with densities highest around the caravan park north of the park where green pick is available from the sewerage leach drains. Such high densities adjacent to the park are likely to impact on park values (P.Mawson pers. comm.) and warrant further investigation as part of broader research into the relative contributions of euros to total grazing pressure on the coastal plain vegetation.

Within the park, grazing pressure from goats and euros is particularly evident around natural water points where loss of vegetation has been extensive, and is likely to result in increased nutrient and sediment loads into the anchialine system. The associated impacts of this potential increase in nutrients and sediments on the subterranean fauna are unknown. Further, the interaction and relative contributions of euros and feral herbivores to total grazing pressure, the spread of buffel grass and aquifer contamination is also unclear. Any attempts at rehabilitation will be difficult unless total grazing pressure can be reduced.

Approaches to reduce the impact of euros may include protection of sinkholes by barriers, and to reduce the area of buffel grass within the park.

20 – Introduced and Other Problem Animals

Key Points

- There are a number of introduced animals in the park that can out-compete, prey on, or alter the habitat for native animals. Foxes and goats are the major species of concern within the park.
- The number of euros present within the park is thought to be elevated and causing environmental degradation.
- Priorities for action in controlling problem animals are protection of threatened wildlife, translocation areas and other important habitat.

The objective is to reduce the impact of introduced and problem animals on the key values.

This will be achieved by:

1. reducing the number of feral goats in the park as much as possible (e.g. through enlisting organised groups to assist with the control efforts, implementing periodic knock down of population numbers through aerial shooting programs, allowing for the commercial mustering of goats within the park).
2. continuing to implement the Western Shield program to (a) reduce the threat of feral predators such as foxes and cats and (b) enable the reintroduction of species that have become extinct on the peninsula.
3. investigating options for rabbit monitoring and control within the park.
4. targeting control of introduced animals to protect threatened or other species of special conservation as a priority.
5. developing cooperative management arrangements with adjacent landholders to promote appropriate stock control measures and/or facilitate more effective, coordinated management of introduced species.
6. liaising with the local Shire regarding programs to promote responsible cat ownership.
7. using fencing and other goat proof exclusion measures as appropriate, particularly in susceptible areas

or sites and around sinkholes on the coastal plain.
8. undertaking and/or supporting research programs into the control and impacts of feral animals.
9. investigating the relative contribution of euros to total grazing pressure on the coastal plain vegetation and implementing population control measures (e.g. exclusion, culling) if/as considered necessary in consultation with the Conservation Commission.
10. disseminating information to minimise the threat of introduced aquatic organisms on the values of the park.
11. taking action as necessary and feasible to eliminate or control populations of introduced aquatic organisms presenting a significant threat to native species.

Key Performance Indicators (see also Appendix 1)

Performance Measure	Target	Reporting Requirements
20.1. Area of the park significantly impacted by goats.	20.1. Decrease over the life of the plan.	Every 5 years.
KPI 6 also applies		

21. FIRE

The Department's management of fire is regulated by legislation (e.g. the Bush Fires Act, CALM Act)[11] and guided by the Department's Policy Statement No. 19 – *Fire Management*. Fire planning in spinifex grasslands is also guided by 16 management principles based on existing knowledge of fire behaviour and effects (see Appendix 5).

Fire History

Aboriginal Use of Fire

For millennia fire has been a natural phenomenon in the Australian arid zone through lightning strikes. Aboriginal people also used fire regularly and purposefully across the landscape for a variety of reasons (Nicholson 1981, Burrows and Christensen 1991, Haynes 1991, Pyne 1991, Latz 1994, Burrows *et al*. 2000). The ecological effects and patterns resulting from traditional burning practices of Aboriginal people were not documented for the North-west Cape and details are therefore unknown. However, based on anecdotal evidence and studies in hummock grasslands (Spinifex) vegetation in the Western Desert, it is likely that burning by Aboriginal people maintained a patchwork of different post-fire successional communities, and that the cessation of traditional burning following European settlement has resulted in substantial changes to the landscape, particularly to the range and structure of vegetation types (Burrows *et al*. 1991). Limited experimental information on the ecological impacts of traditional burning is available (Tropical Savanas CRC 1997).

Fire Management Following European Settlement

The effect of European settlement on the burning regimes previously imposed on the Cape Range peninsula is unknown. In other parts of northern Australia dominated by hummock grasslands, fire was used by pastoralists to encourage the re-growth of grasses for stock, to assist in mustering and to protect their pastoral leases against the devastation of large wildfires (Pyne 1991, Bushfires Council of the Northern Territory 1997). While it is likely that traditional burning techniques were incorporated into pastoral burning, the pattern of fire associated with traditional routes for travelling through the country is likely to have changed. Such changes will have impacted biodiversity values in arid areas. The advent of pastoralism, together with the departure of Aboriginal people from their homelands and the subsequent changes to fire regimes in arid areas, impacted upon the biodiversity values in these areas (Burrows *et al*. 1991).

The more recent fire history of the park is not well documented, however the park's fire history dating back to around the mid 1970s could be obtained through the interrogation of satellite data. Major fires burnt through much of the Cape Range in 1979. Fires occurred in the south-east corner in 1997 and throughout the park in 1999. Most of the area burnt was restricted to the top of the range, with little of the coastal plain being burnt. Fires ignited by lightning on the top of the range do not easily spread to the coastal plain due to the steepness of the slopes and the prevailing sea breezes, although these conditions can drive fires out of the park and onto the coastal plains and range slopes to the east. Control of fires on top of the range is complicated by access difficulties.

[11] Further details of the Department's statutory responsibilities in this area are provided in Policy Statement 19: *Fire Management Policy.*

Fire Ecology

The ecological effects of fire will depend on a complex interaction of an array of factors including the:

- attributes and life cycle needs of the biotic elements making up the ecosystem (e.g. regeneration strategies, time between germination and flowering, recolonisation/dispersal capacities);
- weather, climate and climate change;
- concurrent ecological stressors (e.g. grazing pressure, weed invasion, predation pressures); and
- the fire regimes that the ecosystems are exposed to (e.g. frequency, interval, season and intensity of fire).

There has been no research on how these factors interact in the Cape Range area. Strategies to improve knowledge about the interrelationship of fire and the species and ecological communities of the park are therefore a key focus for fire management.

Fire and Flora

Species and communities vary widely in their response to fire, some having attributes that enable them to accommodate and/or utilise the occurrence of fire (e.g. fire is needed to stimulate regeneration in some species), whereas others possess traits that suggest they are relatively sensitive to fire. Commonly, the latter will be confined to less flammable parts of the landscape where fire is not as frequent (e.g. wetlands, drainage lines, low fuel areas). The cooler, damper western gorges of the Cape Range contain species with tropical affinities (Keighery and Gibson 1993); their fire responses are not well understood, but they are likely to be fire sensitive. Communities of the western limestone ridges contain many localised species for which a fire response is not adequately understood. This is also the case for the case for the endemic species *Grevillea calcicola* and the near endemic *Acacia bivenosa* (Keighery and Gibson 1993). Species and communities of the park's coastal dunes and ridges, whilst not necessarily fire-sensitive, require special consideration regarding the effects that fire can have on increasing destabilisation and erosion processes (through removal of vegetation cover).

Attributes and life cycles of species provide clues to understanding their fire response. For flora, predicting fire response is easier when there is information regarding vital attributes and life cycle factors such as:

- life-span;
- time between germination and flowering;
- regeneration strategies (e.g. whether by seeding, re-sprouting or both);
- triggers required for seed release, germination or flowering;
- season of ephemeral species;
- distribution (e.g. whether in restricted, isolated, wet/moist areas);
- seed or bud protection measures; and
- post-fire dispersal capacity.

Knowledge of the park's floristic communities is limited. Further research regarding the key fire response species[12] is required over the life of this plan. This information will assist in identifying the optimal interval, season, intensity and scale of fire to allow them to persist.

Hummock grasslands (*Triodia* species) are a dominant community type within the park. These normally only carry a fire after a period of about 5-7 years, although this interval can be shorter under severe fire conditions, or following high growth periods (Burrows *et al*. 1991). Rainfall is the primary influence on growth rates in hummock grasslands and so extensive wildfires are usually preceded by several seasons of above average rainfall[13]. Studies in other spinifex-dominated communities (Burrows *et al.* 1991, Burbidge 1985 and Griffin *et al*. 1983) have shown frequent small fires result in a mosaic of spinifex at differing stages of succession, which is important for providing a range of habitat types and for breaking up the run of large, intense wildfires.

Studies undertaken elsewhere in the Pilbara (Casson and Fox 1987) suggest that two of the dominant hummock grasses within the planning area, *Triodia wiseana* and *T. pungens* may be able to re-sprout from root bases, and therefore may initially exhibit quicker post fire regeneration than spinifex which regenerates only by seed. However, in the study by Casson and Fox (1987), it was observed that a sprouting response in *T. wiseana* was limited to sites where the heat of the fire or its effect had been moderated to some extent. They therefore described *T. wiseana* as a facultative seeder-sprouter, and in this respect similar to *T. pungens*. *T. wiseana* was

[12] 'Key fire response' species and communities are those that are either sensitive to fire or otherwise require special consideration in the development of planned fire regimes (e.g. keystone, threatened, priority, endemic and disjunct species).
[13] Climate data from Learmonth suggests that above average rainfall has not occurred since 2000.

also noted to have a close knit growth form that appears to provide a more insulating protective effect than the more open growth form of *T. basedowii*; another species which has been recorded from the park and which regenerates from seed. It appears that *T. basedowii* may need to be treated as a more fire sensitive species relative to *T. wiseana*.

Research is required to improve understanding of the interactions of fire (amongst other disturbances) with significant weed species in the park. The hummock grasslands of the coastal plain contain large infestations of buffel grass that has a very positive response to fire. Regular fire events can favour it, resulting in displacement of native flora and degradation of fauna habitat (Dixon *et al.* 2001). Highly flammable weeds such as buffel grass may also adversely alter the frequency and intensity of fire.

Fire and Fauna

The rate of post-fire recovery of animal species depends largely on post-fire recovery of the flora communities within its habitat (Muller 2001, Abbot and Burrows 2003), and the geographical scale of the fire. Research in other ecosystems indicates that the immediate impact of fire on fauna, and their recovery rate, is directly proportional to the scale, intensity, and patchiness of fire and the interval between fires (Friend 1995, Burrows and Friend 1998, Friend 1999, Burbidge 2003, Friend and Wayne 2003).

The interaction of fire with ecological pressures will also influence post fire recovery of fauna. For example, extensive loss of vegetation cover through fire may result in increased exposure to predation and increased competition for reduced food and shelter. This is a consideration for the park's black-flanked rock wallabies, which are vulnerable both to predation from foxes and cats, and competition for resources with goats and rabbits. Fire induced invasion of buffel grass could also present an issue for this species if it were to significantly replace some of its key food sources. The size, distribution and protection of unburnt patches will be important considerations in fire management planning for the conservation of the black-flanked rock wallaby. It is also important to consider the minimum fire interval required to allow its food source and habitat species to complete their life cycles.

Predicting the impacts of fire on fauna is aided by understanding of factors such as:

- the distribution and the location of key habitat areas;
- specialised habitat requirements (including for example requirements for mature or relatively long unburnt vegetation);
- life history attributes including fecundity;
- dispersal capacities (i.e. ability to relocate to unburnt areas); and
- the interaction of fire with concurrent pressures (e.g. from predators, introduced fauna, climate change).

As for flora, the fire response of fauna varies. Further research is required to improve knowledge of the key fire response species and communities.

In general, fire regimes that result in a reduced risk of large damaging wildfires and that promote floristic and structural diversity (thereby providing a range of habitats), will help to maintain faunal diversity. Landscapes exposed to repeatedly uniform fire regimes can result in habitat homogenisation that may be detrimental to faunal diversity (Burrows *et al.* 1991). Alternatively, variance in the frequency, interval, season, intensity and scale of fire can promote biodiversity.

Fire and Karst Ecosystems

The effects of fire on arid karst landscapes and associated ecosystems are not well documented or understood. Holland (1994) found that fire in karst landscapes could breakdown the limestone surface and destroy minor solution features (known as karren). These effects were associated with hot fires in areas of high fuel load. He also observed that the degree to which vegetation fires will cause erosion of the limestone depends upon the purity of the limestone, its inclination and its degree of karstification. Other probable effects of fire in karst include:

- alteration in the 'usual' surface-subsurface interactions (e.g. alteration of water and nutrient flows between surface and subsurface); and
- increased sediment loads (e.g. limestone fragments, ash and debris) into the karst cavities and pore spaces, and the groundwater.

The ecological significance of such effects is unclear. Fire is a natural process and would have been a long-

standing influence in the evolution of biotic assemblages found in the Cape Range area. The vegetation overlying the karst includes 'fire-tolerant' species and communities. There is however little accurate knowledge about the area's former fire regimes.

It is expected that the ecological significance of the karst effects listed above would increase in proportion to the intensity and scale of fire. Holland (1994) considered that longer intervals between fires would, given the propensity to higher fuel loads and therefore hotter fires, increase the potential for breakdown of the limestone surface in the event of a fire. Therefore, it is likely that fire management which promotes variable fire regimes, and which reduces the risks of large and intense wildfires associated with 'high fuel loads', may ameliorate impacts of fire on the karst and associated ecosystems. The question of which specific fire regimes will best provide for conservation of karst and karst related ecosystems of the park, is unknown.

Research should investigate the attributes and fire response of species commonly occurring near the entrances of caves, or with roots penetrating into caves (e.g. Ficus sp.). Vegetation around major cave entrances can influence inflows to the cave, of air, soil and nutrients for example, and therefore loss of this vegetation may have flow on effects by altering environmental conditions and disrupting cave ecosystems.

Fire Management

With its hot arid climate and highly flammable vegetation, the risk of ignition and spread of fire within the park is high, particularly in the hot summer months. Changes in ground moisture, temperature and vegetation associated with climate change would exacerbate this risk, leading to more vigorous fire behaviour in the traditionally cooler months (Howden *et al.* 2003). Planned management responses to the issue of fire are therefore essential.

Planned (prescribed burning) was not undertaken in the park under the preceding 1987 management plan due to:

- the rugged inaccessible nature of the range;
- the dominance of buffel grass on the coastal plain, and its positive response to fire to the detriment of native species;
- the limited threat to life and property arising from fires in the range; and
- the existence of a track network on the coastal plain that was sufficient to break this area of the park into manageable units.

Since the development of the previous management plan the Department has elsewhere employed a number of measures to reduce the wildfire threat where access is difficult, including establishing wind driven fuel reduced buffers and using open edged burning. Because of the potential for buffel grass to expand under certain fire regimes, there is a need for caution when using planned fire. On the other hand, current knowledge suggests that the use of prescribed fire under specific conditions may be efficacious in the management of this weed (see *Fire Management for Biodiversity Conservation* below for further explanation).

Increased visitation to the park presents increased fire-related risks, including both human ignition sources and visitor safety. Similarly, expansion of the town of Exmouth and associated infrastructure requires a more proactive approach to reducing the risks from wildfires emanating within the park.

Fire Management for Biodiversity Conservation

Knowledge of fire ecology has increased significantly through research and experience, but this inherently complex area has an ongoing need for research. Nevertheless, a lack of full scientific certainty is not a valid reason to jeopardise the conservation of biodiversity by not taking any action to prevent a regime of large and intense wildfires. Proactive fire management in an adaptive management framework and on-going research is important. This must draw on the best available knowledge, and be adapted where necessary in the light of timely monitoring and review of fire management projects (e.g. research based planned burn trials).

This plan provides for the use of proactive measures, including planned burns, for the conservation of the park's biodiversity and to protect other values. On the basis of current understanding, it is thought that this would be best achieved by fire management that delivers a range of fire regimes and results in a mosaic of diverse[14] post-fire vegetation stages (i.e. 'seral stages'). How a vegetation mosaic can be best achieved in practice requires further exploration, and will need to answer questions such as:

[14] Spatially and temporally

- what the relative proportions of seral stages (e.g. early, intermediate or late) should be and how these should be distributed across the landscape?;
- what constitutes an appropriate mosaic (e.g. patch grain size to enable species to effectively disperse and recolonise from burning or newly burnt patches)?;
- how to deliver patchiness at various scales (e.g. landscape, vegetation/geomorphological unit)?;
- how 'edge effects' in patches can be accounted for?;
- what are the interactions between fire and weeds such as buffel grass?; and
- what are the particular fire management regimes required for key fire response species including threatened species such as the black-flanked rock wallaby and *Livistona* palms?

Fire management will be implemented in an adaptive management, or *quasi* experimental framework so that fire ecology hypotheses can be constructed and tested based on best available knowledge, and the outcomes monitored and new knowledge gained to inform future management actions. For practical reasons including but not limited to resource constraints, fire management priorities with respect to conserving the park's biodiversity values, will focus on measures to protect key fire response species, and research to improve understanding about their fire response.

Over the life of this plan the fire and biodiversity conservation foci will be to:

- create a mosaic of vegetation of different seral stages, providing habitat diversity, based on current knowledge of the vital attributes and life cycle requirements of key fire response species and communities;
- identify and develop a database of vital attributes of key fire response species; and
- advance understanding of the interaction between fire regimes and environmental weeds invasion, especially buffel grass.

The interaction of fire with weed species such as buffel grass remains a complicating factor for fire management in the park. Fire may enhance weed invasion, which in turn can lead to more frequent or intense fires or prevent the regeneration of native species (Hobbs 2003). Nonetheless, the use of planned fire may be a useful component of an integrated suite of measures to manage this weed. Prescribed fire may for example be used to reduce the likelihood of fire events that would favour the spread of buffel grass, by managing 'fuel' accumulation in vegetation surrounding large areas of infestation. Prescribed fire could also be used in conjunction with herbicide treatments to impede germination and gradually reduce soil seed stores. Initially, the use of prescribed fire in areas dominated by buffel grass should focus on experimental burning to improve understanding of the fire response of this species and its implications for fire management. Similar approaches could be used to clarify the fire-response of other weed species that are thought to significantly affect the incidence of fire and/or ecosystem responses to it. A series of fire management guidelines being developed by the Department will include buffel grass management issues.

In addition to the goal of providing a diverse vegetation/habitat mosaic for the conservation of biodiversity, the Department will undertake fire management for the protection of human life and valuable infrastructure from fire. These goals will not necessarily be mutually exclusive, but there will undoubtedly be circumstances in which they may conflict. The approach currently adopted by the Department is to plan for ecologically based fire regimes, and then modify the plans as necessary where the threat to other values are unacceptable (Burrows 2003).

Fire Management for Wildfire Risk Mitigation

A proactive approach to protecting biodiversity and property or infrastructure assets from the threat of wildfire was not a significant feature of the previous management plan. However, due to increased visitation, improved access and the development of community assets that are vulnerable to fire, this approach is no longer tenable. Over the life of this management plan the Department intends to undertake a range of measures to mitigate wildfire risks to human safety and valuable property/infrastructure (as well as to the natural and cultural values of the park as discussed above).

Long intervals between fires over extensive areas results in relatively dense, mature vegetation conducive to the spread of high intensity wildfires. These can be very difficult and dangerous to suppress under moderate to extreme fire weather conditions. Given that the impacts of a single fire event and the rate of recovery are directly proportional to the intensity and size of the fire (Burrows and Abbot 2003), the susceptibility of the park to large intense wildfires presents a significant risk to fire vulnerable assets in and adjacent to the park and also to maintaining the park's biodiversity values. Biodiversity values may also be threatened by a lack of diversity in fire regimes and the habitat simplification that can occur as a result (Burrows *et al.* 1991).

Wildfire emanating from the park has potential to impact on infrastructure associated with the town of Exmouth, such as the Water Corporation borefield on unallocated Crown land adjacent to the park, and on adjacent pastoral leases (e.g. stock, feed and station infrastructure). Fire burning within the park also presents risks to visitor safety and can impact on infrastructure within the park such as the:

- Milyering Visitor Centre and other major recreation facilities;
- Ranger's residence and workshop;
- Bureau of Meteorology weather watch radar facility; and
- Telstra communication tower.

The fire protection foci for the park will be to reduce the risk of damage to life, property, infrastructure and biodiversity values by large, intense wildfires.

Cooperation between the Department and adjacent land holders is necessary to effectively manage wildfire risks. The park boundaries are not defined by developed access and, unchecked, fire is able to spread across tenure boundaries. Consequently, pastoral land holders, local government and managers of the adjacent Learmonth Air Weapons Range need to cooperate in developing mutually supportive fuel management strategies that accommodate their land and risk management objectives.

Together with good fire detection and suppression systems, maintaining an acceptable fuel loading and fire management access adjacent to fire vulnerable infrastructure, is a cornerstone to reducing the threat posed by wildfire to life, property and infrastructure. Reduction of fuel quantity reduces fire intensity and improves the likelihood of controlling unplanned fire. As the probability of control increases, the probability of loss of human life and property decreases.

More broadly, strategic fuel reduction to manage the build up of fuel loads, and to maintain a diversity of fuel age classes across a landscape, can assist in limiting the spread and intensity of wildfires. In some circumstances fuel modification can be achieved by mechanical or manual means, however for practical and biodiversity conservation reasons, this is best achieved through the application of planned fire.

The Department maintains Incident Preparedness and Response Plans to respond to wildfire emergencies as well as other incidents requiring emergency response. The capacity to suppress wildfires in the park is constrained by difficult access and limited water supply, so a key focus of fire management will be to reduce the likelihood of large damaging wildfires occurring. Fire response needs to be cooperative with the local government authority. In addition to local Government, other agencies and groups that play a role in fire emergency response include FESA, Department of Defence and local pastoral land managers.

The low possibility of unexploded ordnance in the park poses a risk to health and safety in undertaking fire management and wildfire suppression activities. The Department has developed guidelines for fire management in UXO zones (Fire Operational Guideline 86).

Liaison and Community Involvement

In recognition of increasing community interest in fire management, the Department makes its indicative burn programmes publicly available for comment. In addition, it is recognised that neighbouring land holders have a particular interest in management of issues such as fire. Liaison with neighbours, as well as other agencies and groups that have fire management responsibilities, is important to ensure effective and coordinated management across jurisdictional boundaries and fire management interests. As far as it is practical and appropriate, fire management in the planning area and adjoining lands should be integrated and/or complementary.

Fire Management Plans

Detailed fire management planning over the life of this plan will consider the best available knowledge to identify fire regimes that are optimal for conserving biodiversity and protecting the fire vulnerable values of the park and adjacent land. This information will underpin the development of a rolling 3-year indicative burn plan and associated annual burn plan.

This management plan identifies a range of fire management research needs, and recommends that the application of planned fire at least initially, should be carried out with a view to advancing knowledge. It is therefore proposed to develop a fire research plan to further detail fire research objectives and strategies for the park. Fire research undertaken within the planning area needs to not only consider area-specific needs, but should also be mindful of and complementary to the Department's broader fire research management projects

and priorities wherever possible.

21 – Fire

Key Points

- It is thought that burning by Aboriginal people maintained a patchwork of different post-fire vegetation communities, and that cessation of these practices has resulted in a reduction in the range and structure of vegetation types.
- There is a need to improve understanding about the park's key fire response species or communities. Fire management can then be adapted in the light of research findings as necessary.
- The majority of plant species in the park possess characteristics that allow them to survive regular fire, although some species in the western gorges and valleys of the range, and on the western limestone ridges, are likely to be fire sensitive.
- Buffel grass responds vigorously to fire, however the cautious use of prescribed fire may be a useful component of an integrated suite of weed control measures.
- Large, intense wildfires present a threat to the protection of biodiversity, human life and property. The presence of a temporally and spatially diverse mosaic of vegetation age classes can limit the spread and intensity of wildfires and assist in the conservation of biodiversity.
- Fire management for the park will require consideration of karst and associated values, as well as the interaction of fire with ecological pressures such as predation, over-grazing and weed invasion.
- Effective management of wildfire risks can only be achieved through cooperation of adjacent land managers.
- It is possible that there are unexploded ordinance in the park.

The objective is to manage fire to conserve the biodiversity of the park and to protect life and valuable community assets.

This will be achieved by:

1. preparing and implementing rolling 3-year prescribed burn plans that are based on consideration of:
   - the vital attributes of indigenous flora;
   - fire regime requirements of indigenous fauna;
   - enhancement and maintenance of biodiversity at a localised scale;
   - mitigating the risk of wildfire impacts on fire vulnerable values of the park and surrounding lands (life and property);
   - developing knowledge concerning the interactions of fire and the biota of the park; and
   - the potential for any fire to exacerbate existing ecological stressors such as weed invasion, predation by feral predators and climate change.
2. ensuring fire management, including planned fire regimes, are adjusted in response to new knowledge (e.g. findings of monitoring or research).
3. obtaining detailed information about the park's fire history (e.g. by undertaking interrogation of satellite data).
4. developing a database of the vital attributes of key fire response species.
5. conducting research into the interactions of fire, buffel grass and native species, including experimenting with planned fire to investigate its potential for assisting in the control of this weed (see also any Departmental fire management guidelines for buffel grass finalised over the life of this management plan).
6. maintaining sufficient management access on the coastal plain to assist in containing wildfires.
7. maintaining appropriate incident response plans (e.g. the currently named "Incident Preparedness and Response Plan") that considers the park's constraints of access and water supply.
8. working with neighbouring land holders and other agencies and groups that have fire management responsibilities, to provide integrated and coordinated fire management across jurisdictional boundaries and fire management interests.
9. following the relevant actions for UXO zones as identified in the Department's Fire Operational Guideline 86, unless otherwise indicated by the Regional Manager.
10. developing a fire research plan for the park which also considers and is complementary to the Department's broader fire management research objectives.

Key Performance Indicator (see also Appendix 1)		
Performance Measure	**Target**	**Reporting Requirements**
21.1. Knowledge of the vital attributes of key fire response species.	21.1. Increase in knowledge of the vital attributes of threatened, priority and other key fire response species (see *Glossary*) over the life of this plan.	Every 5 Years.
21.2. Knowledge of the interactions between fire and buffel grass.	21.2. Increase from the extent of knowledge described in this plan (e.g. as reflected in findings or recommendations of research papers and experiment reports).	Every 5 Years.
21.3. Diversity and distribution of seral stages providing habitat diversity.	21.3. A range of seral stages is established for major native vegetation types over the life of the plan.	Every 5 Years.
21.4. Human life and community assets.	21.4. No losses attributable to the Department's fire management.	Annually.

22. ECOSYSTEM REHABILITATION

In the context of protected area management, the term 'rehabilitation' refers to the establishment of a stable, self-regulating ecosystem following disturbance, consistent with the purpose for which the area is managed.

The Department's Policy Statement No. 10 *Rehabilitation of Disturbed Land* guides the rehabilitation of lands managed by the Department, based on the following principles:

- in the first instance, land should be managed to avoid disturbance as far as possible – rehabilitation should be the last option in a series of management decisions designed to protect environmental values; and
- rehabilitation should aim to restore original values and help to enhance all potential uses provided the priority uses are not adversely affected.

Application of the first management principle listed above is particularly relevant to the Cape Range area where low annual rainfall results in slow plant growth making rehabilitation very protracted, difficult and costly. Once loss of vegetation has occurred, the process of erosion is significantly accelerated and can be very difficult to reverse. Preventing or minimising disturbance is therefore essential, and strategies are incorporated into this plan for the management of infrastructure construction, recreational use, grazing by feral herbivores and fire.

Areas particularly susceptible to erosion include:

- disturbed areas surrounding campsites;
- banks of watercourses;
- sand dunes and dune blowouts;
- roads, tracks, paths located on steep slopes and shallow soils;
- points of concentrated public use;
- overgrazed areas (i.e. by native and introduced herbivores) surrounding natural water points;
- fire-scarred areas;
- areas that have been overgrazed by stock (outside of the park to the south); and
- extraction/borrow pits.

The rehabilitation required will vary with the cause and degree of the disturbance. In some circumstances it may be possible for disturbed areas to rehabilitate naturally. When identifying rehabilitation priorities within the park, consideration should be given to:

- the existing and potential impacts of disturbance sites on conservation, cultural heritage and visual landscape values;
- the type and extent of the disturbance;
- the likelihood of natural regeneration;
- the availability of resources; and
- the potential for volunteer participation.

Based on current disturbance and priorities, rehabilitation in the park over the life of plan will focus on four main areas:

- braiding and erosion of the Ningaloo-Yardie Creek Road (i.e. road south of Yardie Creek);
- reclamation of disused gravel pits;
- dune erosion (through human activities);
- as an important component of any weed control program; and
- barren areas surrounding natural water points due to overgrazing (through historic pastoral uses, feral herbivores and euros).

Local native species of the park should be used for rehabilitation purposes—this allows the greatest degree of success, enables continuity of new vegetation with the existing environment, and helps to minimise the introduction of exotic (non-local) plants. Sources of mulching and brushing material should be native or local species free of weed seeds, plant disease and pollutants.

22 – Rehabilitation

Key Points

- Rehabilitation is an important land management activity that needs to be tailored according to specific circumstances.
- The low annual rainfall on the Cape Range peninsula results in slow plant growth and can leave landforms highly susceptible to degradation and erosion. Rehabilitation can be difficult, hence avoiding unnecessary disturbance is very important.
- Local native species should be used for rehabilitation purposes.

The objective is to rehabilitate disturbed ecosystems to a stable condition that resembles as far as possible the natural ecosystem structure, function and/or processes.

This will be achieved by:

1. managing the park to avoid disturbance as far as possible.
2. designing, constructing and siting facilities to minimise the area requiring rehabilitation and prevent ongoing degradation.
3. rehabilitating, closing or relocating redundant roads, tracks and other disturbed areas as per rehabilitation priorities, and protecting these areas from grazing by introduced herbivores or euros where necessary.
4. facilitating natural rehabilitation of disturbed areas where possible.
5. ensuring local flora and weed, disease and pollutant free material are used in rehabilitation schemes.
6. considering soil conservation, revegetation and introduced plant and animal control programs in an integrated way across the wider landscape involving adjacent landowners and managers as necessary.
7. encouraging the involvement of community groups and individuals in rehabilitation programs.
8. educating visitors to minimise activities that cause erosion.
9. considering and implementing as necessary options for reducing the impact of euros and goats on areas of high conservation value (e.g. sink holes and caves).

PART D. MANAGING OUR CULTURAL HERITAGE

23. INDIGENOUS CULTURAL HERITAGE

Tindale (1974) describes the Cape Range area as being the tribal territory of the Jinigudira (variously spelt, e.g. Yinigudira) and the Baijunju (also variously spelt, e.g. Baijungu). The Coral Coast Park Council considers that the area is also the tribal territory of the Thalanyji. The Jinigudira were a coast-frequenting people inhabiting the North West Cape, and are said to have ventured out to sea on rafts of sticks, whereas the Baiyungu inhabited areas further south and the Thalanyji inhabited areas to the east (Tindale 1974). After European settlement many local Aboriginals were taken from their homelands and forced to work in the wild pearl shell and pastoral industries (Coral Coast Park Council pers. comm., Austen 1998).

The Indigenous cultural history and knowledge of the area has been poorly documented in literature, and that which does exist has in large part been written with a Eurocentric focus. This does not however mean that such knowledge does not exist amongst local Indigenous groups, and information may be withheld from broader distribution for a range of reasons, including for example because there is currently a Native Title determination pending (Coral Coast Park Council pers. comm.). The Jinigudira, Baiyungu and Thalanyji would have shared resources and also intermarried, extending relationships beyond the immediate North West Cape Area (Coral Coast Park Council pers. comm.). The North West Cape is an area of ongoing cultural significance to Aboriginal people and to the members of the Gnulli Native Title Claimants Group. 'Gnulli' means 'all of us' and the group, which includes representatives of several language groups (i.e. the Thalanyji, Baijungu and Ingadda) is recognised by the Aboriginal community as custodians of Aboriginal culture for the area (Coral Coast Park Council pers. comm., WAPC 2004).

Archaeological surveys undertaken within the area reveal that it provides unique opportunities for increasing our understanding of traditional Aboriginal life. Already, limited survey within the park has established a long history of use by Aboriginal populations, who primarily supported themselves by utilising marine shellfish and other coastal resources (Morse 1993)[15]. Research has however uncovered intermittency in Aboriginal use of certain sites in the area (Morse 1993). This is believed to be reflective of the population's response to changing environmental conditions; more specifically the arid conditions during the last glacial period and associated sea level changes (Morse 1993). The evidence suggests that the population followed the coastline as it retreated westwards (Morse 1993). It also indicates that terrestrial food sources (e.g. emu eggs and macropods) were also exploited opportunistically during less arid conditions, when the distance between the hinterland of the Cape Range and the coastline was close enough to allow this (Morse 1993).

Cone shell beads found within the park extend the age of human use of decorative ornaments in Australia to a time comparable to some of the earliest such evidence from Europe (Morse 1992). This finding demonstrates that behavioural patterns commonly linked with biologically modern human populations were occurring at the same time in both the northern and the southern hemispheres (Morse 1992).

The archaeological record of the Cape Range peninsula is of particular significance as it:

- provides the earliest confirmed evidence of Pleistocene marine resource use in Australia. Comparable sites elsewhere in Australia are believed to have been covered by rising sea levels;
- provides evidence for the earliest history of human decorative traditions in Australia;
- plays an important role in the conservation of Indigenous culture and in facilitating re-connection to country. The archaeological record has the potential to provide further insights into the lives of early Aboriginal Australians; and
- has the potential to increase understanding of biogeographical and other environmental changes over time.

Potential threats to the conservation of Indigenous heritage include accidental or deliberate damage to culturally significant sites, and the exclusion of Indigenous people from management of their cultural heritage. For the

[15] Archaeological research undertaken at Cape Range provides the earliest evidence of the use of coastal resources by Pleistocene Australians (Morse 1993).

most part, mitigation of these threats can be addressed by complying with relevant legislative provisions. In Western Australia, the Aboriginal Heritage Act protects places and objects customarily used by, or traditional to, the original inhabitants of Australia. A register of such places and objects is maintained under the Aboriginal Heritage Act, however, the Act also provides protection for these whether they have been entered on the register or not. There are numerous sites within the park on the register of Aboriginal sites (e.g. middens, artefact and burial sites), many of which are of archaeological significance. Approvals are required under the Aboriginal Heritage Act to proceed with any works that may affect Indigenous heritage values. As the register is not a comprehensive listing of all sites, precautionary assessments will be necessary prior to commencing any operations where there is potential to inadvertently damage sites.

Aboriginal heritage sites may also be listed under the *Australian Heritage Council (Consequential and Transitional Provisions) Act 2003* (Australian Heritage Council Act). Currently, places that have already been listed under the Australian Heritage Council Act are not automatically included in the State Aboriginal Site Register, and therefore lists of heritage places maintained under that Act should also be checked prior to undertaking any potentially damaging operations. In addition, under the Native Title Act, native title claimants and representative Aboriginal bodies must be advised prior to undertaking public works on the conservation estate.

In addition to complying with legislative requirements, management of Indigenous cultural heritage within the park is guided by the following principles:

- protection of places and objects of Indigenous heritage significance;
- restoration, as much as is possible, of the relationship between Indigenous people and their heritage places;
- recognition that Indigenous people are the primary source of information on the value of, and how to best conserve their heritage;
- provision for Indigenous people to have a primary and active role in heritage management;
- recognition that Indigenous people must control intellectual property and other information relating specifically to their heritage; and
- protection of culturally restricted information

(Australian Heritage Commission 2002).

Currently, there are very few Registered Aboriginal Sites within the park for which closure or restriction of visitor access is specified. Nonetheless, interpretation/education tools can be utilised to facilitate culturally considerate and appropriate behaviour. For example, visitors can be informed of the presence of numerous midden sites across the area in general, and that shell, stone and other materials may be of cultural significance and must not be removed.

Incorporation of sites of cultural significance into the system of protected areas can enhance heritage conservation, and opportunities to do so should be taken into consideration in negotiations regarding the 'Area Subject to Further Planning by WAPC' (see Section 12).

23 – Indigenous Cultural Heritage

Key Points

- Indigenous cultural history and knowledge of the area has been poorly documented, although persists amongst local Indigenous people.
- The park contains numerous sites of importance to Indigenous culture and archaeology.
- Aboriginal heritage sites must be managed in accordance with the Aboriginal Heritage Act.
- Incorporation of sites of cultural significance into the system of protected areas can enhance heritage conservation.

The objective is to conserve the Indigenous cultural heritage of the park so that current and future generations can benefit from it.

This will be achieved by:

1. ensuring that traditional custodians (e.g. through the Coral Coast Park Council or equivalent) have a primary and active role in managing their heritage, including the planning and implementation of Indigenous cultural heritage education and interpretation activities (see also Section 8. Management Arrangements with Aboriginal People).
2. ensuring that Aboriginal sites are protected in accordance with the wishes of the traditional custodians

of the area and the requirements of the Aboriginal Heritage Act and the Australian Heritage Council Act.
3. ensuring that traditional custodians or other appropriate Indigenous consultants are involved in any Indigenous heritage site identification surveys that are conducted.
4. establishing a catalogue of, and providing for communication of Indigenous stories about the park in consultation with traditional custodians (e.g. through the Coral Coast Park Council or equivalent).

Key Performance Indicators (see also Appendix 1)

Performance Measure	Target	Reporting Requirements
23.1. Number and condition of sites (i.e. places and objects) of cultural or archaeological significance.	23.1. No reduction or disturbance without formal approval.	Every 2 years.
23.2. Degree of satisfaction amongst traditional custodians (e.g. as represented by the Coral Coast Park Council) regarding level of Aboriginal involvement in park management.	23.2. Increases over the life of the plan.	Every 2 years.

24. NON-INDIGENOUS HERITAGE

Since European exploration and settlement, the park and broader region has been subject to varied uses including for example:

- pastoral;
- oil exploration;
- military purposes (e.g. US submarine base, Airforce Base, communications stations); and
- various maritime industries (e.g. whaling, pearl culture, prawn trawling, long-line fishing).

The Ningaloo Coast was included in the National Heritage List on 6 January 2010. However, there are currently no other sites within Cape Range National Park listed on Western Australia's Register of Heritage Places for historic heritage values. Nonetheless, there are various physical remnants of historic uses (e.g. fences, water points and wells from previous pastoral uses) throughout the park, the historic heritage significance of which has not been assessed. Establishment and maintenance of an inventory of sites/artefacts of potential historic significance would be beneficial to reduce any accidental loss, and facilitate any future assessments of cultural heritage values.

Should objects or places of historic cultural heritage significance be identified in the park over the term of the plan, management of these will be subject to the requirements of Western Australia's *Heritage of Western Australia Act 1990*. Under this legislation the Department is required to refer development proposals that may impact upon registered places to the Heritage Council of WA[16]. In addition, the Department also has obligations to act in accordance with the *Government Heritage Property – Disposal Process* with respect to registered places.

Places listed on national heritage registers are not automatically included in the State maintained register and in the pursuit of best practice in cultural heritage management national registers should also be checked prior to conducting potentially damaging operations.

Historic shipwrecks and associated relics over 75 years old are protected by the Commonwealth *Historic Shipwrecks Act 1976*. Some of these may lie on reefs offshore Cape Range National Park (Ross Anderson, pers. comm.). Any pre-1900 shipwreck material, including survivor's and salvager's camps found above the high-water mark is also protected by the *State Maritime Archaeology Act 1973*. Any finders of shipwreck material must report their find to the Director of the Western Australian Museum.

Management of non-indigenous cultural heritage should also give due regard to the principles and practices set

[16] See *Development Referral Guidelines* (Heritage Council WA) regarding what constitutes as "development" with respect to the Heritage of Western Australia Act 1990.

out in the Burra Charter (see *Obligations and Agreements* in Section 7). Providing for interpretation of cultural heritage is an important aspect of its management. Interpretive opportunities should be provided where appropriate to increase visitor awareness and appreciation of the cultural heritage of the park.

24 – Non-Indigenous Cultural Heritage

Key Points

- The park contains various physical remnants from previous historic use, however the historic cultural significance of these has not been comprehensively assessed.
- Establishment and maintenance of an inventory of sites or artefacts of potential historic significance would be beneficial to reduce the impact of any accidental loss and facilitate any future assessments of cultural heritage values.
- Providing for interpretation of cultural heritage is an important aspect of its management.

The objective is to conserve the cultural heritage values so that current and future generations can benefit from them.

This will be achieved by:

1. managing culturally significant sites in accordance with relevant legislation and the Burra Charter.
2. maintaining a database of heritage places and stories (or of sites/artefacts/stories of potential cultural significance).
3. documenting and implementing procedures to ensure that assessment and mitigation of impacts on places of heritage significance occur prior to commencement of potentially damaging works/operations.
4. providing for interpretation of historic cultural heritage to visitors.

KPI 23.1 applies (See Section 23)

PART E. MANAGING VISITOR USE

It is recognised that the public conservation estate managed by the Department has the capacity to provide for a significant portion of the public's growing demand for outdoor recreation and tourism, in particular 'nature-based' tourism, and in doing so contributes significantly to the social, psychological, physical and economic wellbeing of the community. In relation to the latter, an assessment of the economic value of recreation and tourism on the 'Gascoyne Coast' between Carnarvon and Exmouth determined that approximately $127 million annually in tourist expenditure could be attributed to nature-based activities and the natural environment (Carlsen and Wood 2004). As a consequence, the proposals in this management plan and the Department's subsequent management activities must consider the wellbeing of the regional economy.

The area managed by the Department covers more than 24 million ha of lands and waters protecting unique landscapes, geological formations, plants and animals, and cultural sites. Conserving these lands and waters for future generations, and managing them for use by the present one, is a complex process. Firstly, public expectations are as diverse as the environments the Department manages. Secondly, the desire to interact with these unique environments can lead to unsustainable impacts on the natural environment. Finally, the Department also considers the social and economic dependence of local communities in the way it manages the estate entrusted to it, and the opportunities that may arise from it. This management plan addresses these issues, at the same time providing for visitors to gain an appreciation and understanding of the area's values which should, in turn, foster an appreciation, understanding of and support for conservation both within the park and beyond.

The Department's Policy Statement 18 *Recreation, Tourism and Visitor Services* outlines the Department's principles, operational guidelines, procedures and administrative controls in relation to facilitating recreation and tourism on the public conservation estate. This management plan follows the policy guidelines within Policy Statement 18 where applicable.

The proposals for visitor use in this management plan are derived from the Cape Range Recreation Masterplan (draft) prepared in conjunction with this management plan. The masterplan development process considered a number of criteria to determine future visitor facilities development in the park, including:

- existing visitor use facilities and predicted patterns of use;
- marine park zoning;
- marine and terrestrial environmental and cultural values;
- existing recreation opportunities;
- visitor expectations; and
- visitor safety.

As a result of these deliberations, the major foci for recreation and tourism for the period of this management plan are to:

- manage recreational use of the coast to complement and assist with management of Ningaloo Marine Park and the Jurabi and Bundegi Coastal Parks;
- consolidate recreational and interpretive opportunities at existing day use sites in order to improve visitor amenity and environmental safeguards;
- develop greater visitor opportunities away from the coast; and
- increase the use of the Milyering Visitor Centre as a hub for visitor activities in the national park and adjacent marine park.

With regards to the point 1 above, the preparation of this management plan has been cognisant of management of the Ningaloo Marine Park and the Jurabi and Bundegi Coastal Parks. This has involved, for example, the development of visitor access and recreation site proposals for the national park that are consistent with and complement provisions within the existing management plans for these areas and marine park zoning. Further detailed subsidiary site level planning has yet to be undertaken in both marine and terrestrial areas (e.g. recreational use and mooring plans to be completed under the *Management Plan for Ningaloo Marine Park and Murion Islands Management Area 2005-2015*, and national park recreation site development plans).

In particular, point 4 above will include:

- creating a new camping area in the vicinity of the visitor centre, and the subsequent redevelopment and/or closure of some of the smaller camping areas to cater for day users;
- developing visitor facilities and activities that can be accessed/delivered from the visitor centre throughout the year (interpretive activities, provision of additional walking tracks);
- upgrading and improving the interpretation/education displays within the centre to cater for increasing visitation and changing needs; and
- considering the potential for commercial opportunities at the centre to cater for changed use patterns.

This plan allows for some increase in the capacity of camping and overall visitation to the park over the life of the plan and so provides opportunities for more people to enjoy it. However, escalation of visitation capacity must be approached with caution to ensure that increased use can be sustained without significantly compromising the park's natural and cultural values or the quality of the visitor's experience. To this end, the plan includes measures to:

- ensure staged implementation of recreation site developments that allows stepwise assessment of any associated impacts and their management (e.g. through KPIs);
- conserve the park's undeveloped 'remote' characteristics;
- ensure the delivery of a stronger conservation education message and provide information and interpretation opportunities that will foster increased awareness and appreciation of the park's values and management issues;
- develop more robust recreation sites that can withstand higher levels of recreation where appropriate;
- provide a wider range of recreational opportunities to assist with distributing visitor pressures;
- design and manage sites to separate potentially conflicting uses and reduce visitation pressures;
- introduce a booking system to assist with managing competition for limited facilities (e.g. for camping sites);
- use controls such as permit or registration systems and temporal and spatial access limits to protect values sensitive to visitor pressures; and
- support increased regulatory enforcement of restrictions where these are being deliberately disregarded.

In addition the Department can and does close sites to further visitors at peak times once numbers are at the limit that can be supported with the facilities present.

25. RECREATION AND TOURISM OPPORTUNITIES

Regional Context

Tourism is the fastest growing industry in the Gascoyne region, with the main attractions being Cape Range National Park and Ningaloo Marine Park, Kennedy Range National Park, Mt Augustus National Park, and the Shark Bay World Heritage Area (Gascoyne Development Commission 2006).

Of these icons, the Ningaloo Marine Park and adjacent land has been subject to the most marked increase in tourism use over the past decade. The pressures associated with these increases prompted the WAPC to prepare the Ningaloo Coast Regional Strategy, incorporating a regional strategy, structure plans for Carnarvon, Exmouth and Coral Bay, and the *Ningaloo Coast Statement of Planning Policy No. 6.3* (WAPC 2004).

The Ningaloo Coast Regional Strategy includes a coastal tourism framework to provide planning guidance for tourism, including identifying suitable locations (nodes) for a variety of tourism uses. One of the bases for allocating nodes to a particular use was the recognition that tourists to the Carnarvon – Ningaloo coast were seeking a remote and natural experience, and that this experience should be retained. At present, the provision of tourism infrastructure and services is focused in the towns of Exmouth and Carnarvon, and the tourism settlement of Coral Bay. Most of the coastline between these centres is held as pastoral lease, and includes Quobba, Gnaraloo, Warroora, Cardabia and Ningaloo stations. All of these pastoral leases, plus the Bundera Coastal Protection Area managed by the Department of Defence, offer various accommodation options but principally bush camping with minimal facilities (consistent with a remote and natural experience). Proposed nodes within the Ningaloo Coast Regional Strategy are detailed in Table 2, and on Map 5 (see also *Overnight Accommodation* in Section 28 *Recreational Use*).

TABLE 2 Coastal Tourism Framework (*Ningaloo Coast Regional Strategy – Carnarvon to Exmouth*)

Carnarvon – Exmouth						
Tourism Nodes (up to 500 bed equivalent)	Minor Tourism Nodes (up to 200 bed equivalent)	Ecolodge[1] Tourism Sites (up to 100 bed equivalent)	Homestead Tourism (up to 50 bed equivalent)	Coastal Camping Nodes	Dispersed Camping	Day Use
❖ Blowholes ❖ Quobba ❖ Gnaraloo ❖ Ningaloo Beach ❖ Yardie Creek Station Caravan Park ❖ Vlaming Head	❖ Red Bluff Camp ❖ Three Mile Camp ❖ Bruboodjoo ❖ Warroora Minor Tourism Node	❖ Gnaraloo Bay ❖ Elles Camp ❖ Winderabandi ❖ Cape Range National Park	❖ Warroora Homestead ❖ Giralia Homestead	❖ The Lagoon ❖ Horse Paddock ❖ Stevens Camp ❖ Maggies ❖ Fourteen Mile Camp ❖ Jane Bay Camp ❖ Lefroy Bay ❖ Doddy's Camp*	None identified. Detailed site planning required. All sites to be defined, monitored and managed	❖ Bay of Rest ❖ Learmonth Jetty ❖ Point Billie ❖ Lagoon/Dog Rock ❖ Mauds Landing ❖ Gnaraloo Boat Launch ❖ Seventeen Mile ❖ Cape Cuvier Lookout

[1] An ecolodge is defined in the Ningaloo Coast Regional Strategy as a category of accommodation that meets the philosophy and principles of ecotourism. It requires special care in design, construction and operation so as not to destroy the very resources or qualities tourists come to experience. An ecolodge should incorporate elements such as sustainable power generation, low energy passive design, minimal water use, ecologically sensitive waste disposal and recyclable processing of all waste with no pollutant product. An ecolodge can also consist of tented or canvas sleeping accommodation that is of a more permanent nature to that found in an ecocamp.

*Camping at Doddy's Camp subject to Department of Defence authorisation

Visitor Management Settings

As the use of natural areas increases, resource conditions change until the character of the place has been modified to a point where it no longer has the attributes that originally attracted people. As a consequence, the initial users are displaced by people who are more tolerant of the changed conditions, with the process continuing until a uniform high level of services and facilities is provided within the natural area. This is the idea of 'recreational succession'—where the very conditions of an area that attract recreational use are inevitably changed by that use (Prosser 1986).

The Recreation Opportunity Spectrum has been commonly applied as a standard planning tool in natural areas to address this issue (Clark and Stankey 1979). The Department proposes the use of 'visitor management settings' derived from the Recreation Opportunity Spectrum principles, to manage for recreational succession in natural areas such as national parks.

The system of visitor management settings is purely to guide the Department in determining what sort of recreation development may be appropriate. Coupled with the coastal planning framework articulated in the Ningaloo Coast Regional Strategy, visitor management settings will help prevent the natural areas within the national park being subjected to incremental development.

The Department's generic criteria for the settings (subject to final consultation) are presented in Appendix 6, and a map applying settings to the planning area is included as Map 6. It is important to note that the allocation of an area to a particular setting does not mean that the area will be developed to the full extent of the setting. For example, the 'highly modified' setting still allows opportunities for walk-in or kayak-in only campsites, and includes a range of sizes and social conditions. The intended extent of recreation site development over the life of this plan is indicated in Table 6 and Map 8.

The provision of visitor services, facilities and experiences in the park should also consider the range of opportunities that are or may become available within the wider area over the next 10-15 years, as identified in the Ningaloo Coast Regional Strategy.

Wilderness

The World Conservation Union defines wilderness as a "…large area of unmodified or slightly modified land, and/or sea, retaining its natural character and influence, without permanent or significant habitation, which is protected and managed so as to preserve its natural condition".

The Australian Heritage Council (previously Australian Heritage Commission) has compiled and maintains the National Wilderness Inventory (NWI), which is designed to identify wilderness quality across Australia. The NWI uses a quality index rating of 0 to 20, with 20 being the highest quality.

The following four criteria are used to estimate the quality of wilderness:

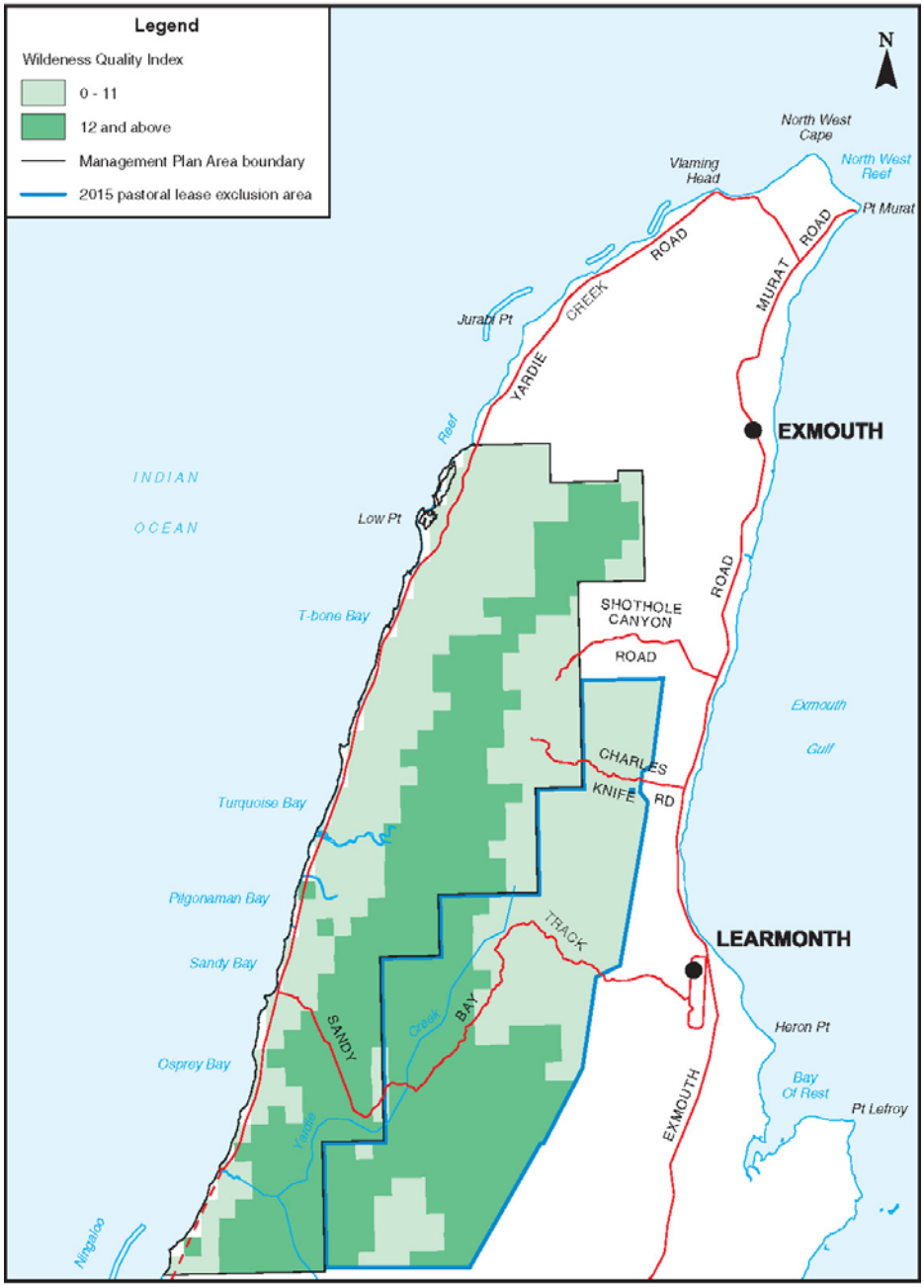
- remoteness from settlement – how remote a site is from permanent human occupation;
- remoteness from access – how remote a site is from established access routes;
- apparent naturalness – the degree to which a site is free from permanent structures associated with modern technological society; and
- biophysical naturalness – the degree to which a site is free from biophysical disturbances caused by the influence of modern technological society.

Wilderness areas are created under section 62(1) (a) of the CALM Act, although there are currently none gazetted. To support the legislation, the Department has developed a wilderness policy (Policy Statement 62 – *Identification and Management of Wilderness and Surrounding Areas*) that incorporates the NWI criteria and specifies a NWI wilderness quality index of at least 12 and a minimum size of 20 000 ha in arid, semi-arid and tropical areas.

The main points from the wilderness policy include:

- use of mechanised transport is not permitted within wilderness, except for emergency or essential management operations, or reasons of cultural importance.

Figure 2 Wilderness Quality



- education and/or recreation expeditions will be permitted within wilderness. Commercial recreation and tourism is not permitted within wilderness (CALM Act leases and licenses cannot be issued for wilderness classified under section 62 of the Act).
- constructed walk trails, signs, track markers and toilets will not be provided in wilderness.
- management of wilderness and surrounding areas will be consistent with the principles in the Malimup Communiqué[17].
- wherever possible, ground disturbing activities for fire management will be conducted outside of wilderness. This includes construction and maintenance of access roads, firebreaks, fuel-reduced buffers, and water points.
- prescribed burning within wilderness may be carried out for the protection and maintenance of biological values and processes as determined through the preparation of area and regional management plans and

[17] The Malimup Communiqué was developed between indigenous communities, government authorities and non-government environmental groups in May 1998 at Malimup Springs in Western Australia. It is concerned with indigenous people and the management of areas reserved/zoned as wilderness, primarily within national parks, or other lands reserved for conservation or recreational purposes.

interim management guidelines.
- appropriate fire protection strategies according to established standards will be implemented in areas that surround wilderness where life, property and natural resource values may be threatened.
- any existing vehicle tracks and constructed walk trails within wilderness that are not required for emergency and essential management purposes will be closed.

The NWI assessment indicates that Cape Range peninsula contains large areas of potential wilderness, including a significant proportion within the existing Cape Range National Park or proposed additions to it (See Figure 2 *Wilderness Quality* above).

However, given the strong community support for the development of walk trails and other recreation opportunities in the range it is intended that the creation of a wilderness area will not be pursued over the life of this plan. The park will nevertheless continue to be managed in a way which recognises and protects the area's remote values.

25 – Recreation and Tourism Opportunities

Key Points
- Visitation to Cape Range National Park and the coastal strip south of the park has increased markedly over the past 10 years, with an increasing pressure on the natural environment. To provide for the long-term strategic development of the coast between Carnarvon and Exmouth, the WAPC has developed the Ningaloo Coast Regional Strategy.
- There is pressure on natural area managers to cater for greater numbers of visitors but it is essential that environmental and social conditions which are attractive to visitors are maintained.
- Recreational succession can be minimised by assigning areas to different visitor management settings for the life of the plan.
- The provision of recreation experiences, facilities and services in a given area should consider the range of opportunities available in neighbouring areas to avoid unnecessary duplication and allow the greatest diversity of recreational opportunities.

The objective is to provide visitors with a range of sustainable nature-based recreation experiences.

This will be achieved by:
1. ensuring future recreational development is guided by the visitor management settings as specified in this management plan, or ensuring any recreation development proposals inconsistent with the visitor management settings are referred to the Executive Body and the Conservation Commission.
2. maintaining a range of day use and camping recreation options (i.e. size and social conditions) within the 'highly modified' coastal setting (see Table 6).
3. considering the recreation and tourism opportunities proposed for the Carnarvon – Exmouth coast in the WAPC's 'coastal tourism framework' to avoid unnecessary duplication and allow the greatest diversity of recreation and tourism opportunities.

Key Performance Indicators (see also Appendix 1)

Performance Measure	Target	Reporting Requirements
25.1. The range of visitor management settings (i.e. from remote through to highly modified).	25.1. Maintain over the life of the plan.	Every 5 years.
25.2. Visitor satisfaction levels.	25.2. Maintain or increase over the life of the plan.	Every 2 years.

26. ACCESS

The public conservation estate is generally available for a variety of recreational uses where conservation values are not unduly compromised. Provision of access is the main management tool the Department uses to enable visitors to recreate on the public conservation estate. This can include access to reach a destination for recreation, or for the experience provided by the type of access itself (e.g. four wheel driving, bush walking). However, there are some areas where public access may need to be restricted due to concerns over public safety,

cultural sensitivity, protection of conservation values, and/or preservation of a particular recreational experience. Public vehicle access within the national park is shown in Map 7.

Vehicle Access

Vehicle access in the eastern area of the park is via Shothole Canyon and Charles Knife Roads, both unsealed two-wheel drive roads. Charles Knife Road is gazetted[18] to the park boundary only, and Shothole Canyon Road is not gazetted at all. Charles Knife Road has a spur road leading to the Thomas Carter Lookout. Both roads are expensive to maintain and may occasionally present visitor risk issues from falling rocks or road subsidence—Charles Knife Road in particular is narrow and cut into the cliff face in many places and is quite precarious. The majority of the length of these roads (and most dramatic scenery) is within that part of Exmouth Gulf Station that is proposed to be added to the conservation reserve system.

Vehicle access in the west of the park is via Yardie Creek Road, a bitumen road which runs down the coast along the length of the park, and a series of spur roads which provide access to the various recreation sites. South of Yardie Creek, the extension of Yardie Creek Road is named Ningaloo Yardie Creek Road.

For the majority of its length the existing Yardie Creek Road was not built within the previously created road reserve as that alignment proved unsuitable. Most of the existing bitumen Yardie Creek Road is currently not situated within a formal road reserve. The sections of dedicated road reserve that were not used for construction of the Yardie Creek Road should be added back to the national park, and the area upon which the road was built needs to be excised from the park for the purposes of road reserve. The road reserve excised from the park should be kept to the minimum width required in order to minimise vegetation impacts.

Yardie Creek forms a natural barrier preventing two-wheel drive traffic between the north and south coastal parts of the park. Four-wheel drive vehicles may cross the sandbar at the creek mouth when conditions permit (i.e. when the water level is low). A survey by Polley (2002) revealed that 63% of visitors supported the retention of 4WD access over Yardie Creek. The WAPC (2004) determined that the "…provision of a permanent crossing at Yardie Creek would detract significantly from the environmental values, amenity of the area and the current visitor experience" and that "… the existing natural sandbar crossing the mouth of the creek is more aesthetically and environmentally acceptable." To this end, the WAPC determined that Yardie Creek should remain a natural four-wheel drive crossing only, a conclusion shared by the Conservation Commission.

The concept of improving access over Cape Range has been identified previously. Several possible options have been identified, including:

- extending Shothole Canyon Road or Charles Knife Road across the range to Milyering;
- constructing a road from south of Yardie Creek to Learmonth;
- providing access along the existing Sandy Bay Track.

The latter option is not possible at the current time because it traverses parts of Exmouth Gulf Station not currently vested with the Conservation Commission (see *Proposals for Additions to the Conservation Reserve System in* Section 12). Providing access along the existing Sandy Bay Track would also involve resolving Department of Defence issues as the track crosses the RAAF Base Learmonth and public access to the range immediately east has security implications. The implications of activities that may occur within the proposed Conservation and Limestone Resource Management reserve (see *Proposals for Additions to the Conservation Reserve System* in Section 12) will also require consideration.

Access over the range should be limited to four-wheel drive vehicles via the existing Sandy Bay Track, on the basis that a satisfactory link to Murat Road can be negotiated.

The Sandy Bay track option is favoured in the long term for a number of reasons:

- the alignment already exists;
- some limited access could be provided in the short term, allowing information on use patterns and impacts to be evaluated prior to negotiating access for the entire length of the road;
- the western end of the track traverses sand dune country that is not available with the other options. The dune fields have low topographic relief and are consequently unlikely to erode, and support flora that is uncommon in the park and likely to be of interest to visitors;

[18] i.e. a public road 'dedicated' under the *Land Administration Act* 1997

- it provides a type of visitor experience that is increasing in popularity.

In the short-term access to the top of the range will be from the western side only. Access will be subject to a permit or alternative access monitoring and management system that enables the Department to obtain information on use levels and patterns and manage environmental impacts, visitor safety and visitor expectations. The level of permitted access (e.g. number of permits issued) may vary over the life of the plan, subject to review by the Conservation Commission. In order to manage this access, the Department will utilise provisions under the CALM Act or CALM Act Regulations to restrict access to the sections of track within Conservation Commission vested land. Safety issues associated with passing ascending/descending traffic may necessitate the development of lay-bys, or making the route one-way (west to east) in the long-term. Any operators using Sandy Bay Track will be included within the vehicle limits imposed.

Other roading requirements over the life of the plan will be restricted to access to new visitor facilities (see Table 6), or realignments for protection of environmental or cultural values.

Beach and Boat Access

It is possible to launch small boats across the beach at Neds, Mesa, Lakeside, Tulki, Pilgramunna, Osprey, Yardie Creek, South Yardie, and Boat Harbour. These are all 4WD soft sand boat launching areas. Primarily campers, rather than day visitors, use these, although Polley (2002) determined that 86% of visitors did not travel with a boat. It is intended that boat launching areas within the park will not be hardened over the life of this plan as a formal boat ramp provided in Jurabi Coastal Park 3 km north of the national park boundary at Tantabiddi is expected to meet demand over this time. This ramp also caters for much larger vessels. A boat launching facility for large vessels has been constructed south of the Coral Bay settlement at Monck Head.

For safety reasons, the experience of beach users, to protect conservation values and to maintain scenic amenity from boats offshore, beach driving is not permitted in the national park although vehicles are allowed on beaches during boat launching and retrieval in specified locations. At some of these sites, in particular Mesa, Lakeside, Pilgramunna and Yardie Creek, visitor safety and the experience of beach users are compromised by vehicles driving and parking on the beach. In addition, other beach-goers take advantage of the opportunity to park their vehicles on the beach while they picnic or swim. Site design and management measures can be used to address recreational use conflict at these sites.

Visitors use boats to access the marine park for activities such as snorkelling and diving and therefore boat launching is currently allowed from some sites adjacent to a sanctuary zone.

Ongoing use of over-the-beach boat launching at any site will be subject to maintaining visitor safety and recreational experience, and consistency with marine park management strategies. Consultation between the Conservation Commission, the Department and Marine Parks and Reserves Authority will be required where proposals within the marine park recreation masterplan have implications for the management of the national park. Community consultation may also be required for significant changes to boat launching access.

The use of unregistered off-road vehicles[19] (e.g. ATVs, off-road motorbikes and dune buggies) is not permitted within the national park. This prohibition will remain in place for the life of this plan.

Non-powered boating (in particular kayaking and canoeing) is an increasingly popular activity in the marine park. Kayaks/canoes can be readily carried to the shoreline from adjacent car parks and require no particular launching facilities. Work has commenced on determining the viability and management requirements of a long-distance kayak/canoe trail within the marine park. Planning for a long-distance kayak/canoe trail would need to consider the requirements for camping facilities along the coast (see *Camping* in this section).

Kayaking/canoeing is also a popular activity in Yardie Creek. In order to minimise potential impacts to nesting and roosting birds and rock wallabies, power boats (except those used in commercial tours or for management purposes) are not permitted on the Creek. Kayaking or canoeing also has the potential to disturb these fauna if numbers continue to increase, and therefore a system to manage the level of use (e.g. permit or registration system) will be introduced to maintain a satisfactory level of protection over the life of the plan. The permit or registration system will allow limits to be placed on the time of day that such vessels can access the creek, as well as the number of watercraft permitted in the creek at any one time. The system will provide visitors with information on how they can avoid disturbing fauna whilst undertaking such activities (e.g. directing paddlers to

[19] As permitted under the *Control of Vehicles* (*Off Road Areas) Act 1978*.

maintain a minimum distance from the 'breeding wall'). If impacts cannot be adequately mitigated, consideration may be given to prohibiting private vessels of all types from entering the gorge.

Pedestrian Access

Limited opportunities for walking are provided for within the park or along the coastal strip. Formal walks of varying standards and lengths exist at Mangrove Bay, Yardie Creek, Mandu Mandu Gorge, and Badjirrajirra Loop (from Thomas Carter Lookout off Charles Knife Road). A walk between the terminus of Shothole Canyon Road and Thomas Carter Lookout has been closed because of visitor risk issues such as unstable and unguarded cliffs.

Six categories of walking trails are recognised by Standards Australia (2001), from trails where there is no modification to the natural environment (Class 6) to broad, hard surface tracks suitable for wheelchair use (Class 1). Of the existing tracks, Yardie Creek is Class 2 and the remainder are Class 3 and above.

There is a demand for more walk trails and improved walk trail conditions in the park (Polley 2002, A. Hogstrom pers. comm.). In particular, Polley (2002) found that 84% of visitors supported the provision of a walk trail across the top of the Cape Range. This could be linked to a coastal walking trail, with a view to extending it southwards to Coral Bay in the long-term (subject to vesting and management arrangements for coastal areas south of the park). The attractive gorges and opportunities to experience Indigenous cultural heritage add to the potential of such proposals.

Table 3 shows existing walk trails within the park and additional trails proposed for development over the life of the plan. These walk trail proposals will be subject to detailed assessment and effective mitigation of potential environmental impacts (e.g. disturbance to black-flanked rock wallabies—see *Mammals* in Section 17).

In order to minimise visitor risks for long distance walkers, the Department will encourage walkers to register their intentions first. Walkers are generally required to be self sufficient with regards to providing their water, however installation of water points may be considered in the context of more specific and detailed trail development planning. Closure of long-distance walk trails during periods of very hot weather may also be necessary for visitor safety purposes.

TABLE 3 Walk Trails Within Cape Range National Park

Walk	Class(es) 1-6
Existing	
Mangrove Bay Walk#	3
Yardie Creek Nature Walk	2
Yardie Creek Gorge Trail	3-4
Mandu Mandu Gorge	4
Badjirrajirra Loop	4
Proposed	
Coastal Track*	2-4
Milyering Loop*	1-2
Across the Range Walk (e.g. Milyering to Exmouth)	5
Reopening the walk between the terminus of Shothole Canyon Road and Thomas Carter subject to resolution of visitor risk issues.	

* Length to be determined

Possibility of extension as part of broader site improvements.

Access for Visitors with Disabilities

The Department's *Disability Access and Inclusion Plan (2007-12)* proposes that:

- Department-managed recreation areas are accessible to people with disabilities;
- buildings are accessible to people with disabilities; and
- information and services provided by the Department are accessible to people with disabilities.

Strategies identified to help deliver these outcomes include:

- progressively updating recreation sites and access to Department offices based on visitor numbers, costs and

ease of modification of existing facilities;
- ensuring that, wherever practicable, new recreation facilities are accessible to people with disabilities;
- enhancing access of information regarding Department services to people with disabilities;
- ensuring information is clear, visible and complies with the required standards; and
- making management plans available in different formats as requested.

These recommendations impact on this management plan in several ways. Firstly, existing and proposed facilities within the park need to be reviewed over the life of the plan to determine the possibility of promoting greater access for disabled visitors. Milyering was designed for disabled access but changes to standards since its construction mean that it no longer meets standards. Other sites of high priority include Mangrove Bay, Turquoise Bay, Lakeside, Yardie Creek and Sandy Bay on the western side of the range, and lookout facilities on Charles Knife Road on the eastern side.

The Department provides rubber-tyred 'tidal' wheel chairs for disabled visitors at the Milyering Visitor Centre.

Access for Management

Access specifically for management that cannot be provided on public tracks is occasionally required. For example, the Department may need to use tracks within the park that are closed to the public for fire management, flora and fauna monitoring, feral animal control and weed control. Access to launch boats over the beach may also be needed occasionally.

26 – Visitor Access

Key Points
- Access needs to be carefully managed so it does not compromise the qualities of remoteness valued by visitors.
- Two-wheel drive vehicle access to the coast is catered for in Cape Range National Park.
- Boat launching across the beach is provided at a number of sites within the national park, but has the potential to compromise visitor safety, the experience of beach users, conservation values and scenic amenity from boats offshore.
- Opportunities for walking within the national park are few, and there is significant demand for a walking track across the range.
- There are opportunities to improve access and services for disabled visitors.

The objective is to provide a range of access types that do not adversely impact on key values and facilitate visitor appreciation of these values.

This will be achieved by:
1. maintaining the crossing at Yardie Creek in its current state.
2. continuing to improve safety and reduce ongoing maintenance costs of Charles Knife and Shothole Canyon roads within the national park (e.g. sealing and/or safety barriers).
3. maintaining the Sandy Bay track as four wheel drive vehicle access only.
4. utilising provisions under the CALM Act or CALM Act Regulations as necessary to support a permit (or alternative access monitoring and management system) for the Sandy Bay track.
5. periodically reviewing in consultation with the Conservation Commission the permitted level of access to the Sandy Bay Track (with an initial review after 1 year).
6. ensuring any commercial operators using Sandy Bay Track are included within the access limits imposed for the Sandy Bay Track, and that any commercial tour groups kayaking/canoeing on Yardie Creek are also included in access limits for the creek.
7. prohibiting vehicle access onto beaches within Cape Range National Park except for the purposes of boat launching and retrieval.
8. providing for across the beach launching of small boats at Neds, Mesa, Lakeside, Pilgramunna, Tulki, Osprey, Yardie Creek, South Yardie and Boat Harbour unless there are overriding management considerations (e.g. issues with visitor safety, conflict between recreational uses, unacceptable environmental impacts).
9. altering site design and management where necessary to address conflict between boat launching and other activities.
10. continuing to prohibit the use of unregistered off-road vehicles (e.g. ATVs) within the park.
11. closing those vehicle tracks within the national park that are not identified on Map 7, or are otherwise

necessary for management, to protect conservation and cultural values, or for reasons of public safety.

12. maintaining a speed limit of 80 km/hr on Yardie Creek Road. Areas within the park where specific safety issues and wildlife corridors are identified may, subject to review and approval by Main Roads, be classified as 40-60 km/h.
13. installing wildlife warning signs at appropriate locations (e.g. dusk to dawn warning signs) subject to review and approval by Main Roads.
14. introducing an access management and monitoring system for kayaking in Yardie Creek (e.g. permit or registration system), maintaining a maximum of five kayaks/canoes at a time, and amending these limits if/as necessary in accordance with a review to be conducted by the Department and Conservation Commission (initially 1 year from implementation).
15. investigating and providing improved opportunities for walking within the park, including for example the proposed walk trails indicated in Table 3.
16. ensuring potential adverse impacts on the values of the park are assessed and can be effectively mitigated prior to developing new walk trails.
17. encouraging long-distance walkers to register their intentions (e.g. in logbooks or with the Department).
18. informing walkers to carry water at all times, but considering the provision of water facilities for long distance walkers as part of detailed trail development planning.
19. improving facilities and services for disabled visitors, consistent with the Department's Disability Access and Inclusion Plan, by:
20. reviewing conditions in the park, and in particular at Mangrove Bay, the Milyering Visitor Centre, Turquoise Bay, Lakeside, Sandy Bay and along Charles Knife Road; and
21. considering disabled visitors in the design of new facilities.

27. VISUAL LANDSCAPE

The role of landscape management is to ensure that all uses and activities are planned and implemented to complement rather than detract from the inherent visual quality of the environments in which they occur.

In the context of this section, the term 'landscape' refers to the appearance or visual quality of an area. For many, visual appearance is the most direct way visitors will experience an area and therefore, is often the criterion by which land management practices are judged.

Landscape Character Types

Every landscape has an identifiable visual character determined by its context of geomorphology, hydrology, soils, vegetation, land use and cultural heritage values. According to these features, landscapes in Western Australia have been broadly identified and described as Landscape Character Types in order to assess their visual landscape values (CALM 1994).

The Landscape Character Type that has been identified for the park is the North West Cape Ranges.

Scenic Quality

Within each Landscape Character Type, the scenic quality has been classed as high, moderate or low. This is typically based on diversity, uniqueness, prominence and naturalness of landform, vegetation and waterform within each type (CALM 1994). Areas of high scenic quality are identified in Table 4.

The majority of the North West Cape Ranges Landscape Character Type is classified as high scenic quality.

TABLE 4 Areas of High Scenic Quality in the Park

Landform	Vegetation	Waterform
Deeply eroded canyons and well-defined valleys with heavily dissected steep slopes and numerous lateral tributaries e.g. Shothole Canyon.	Single plants or groups of plants that are focal points due to shape, colour, isolation, or position in the landscape e.g. variable barked bloodwood (*Corymbia dichromophloia*).	Unusual ocean shoreline motion and colour due to islands, reefs and shoreline configuration e.g. Ningaloo Reef.

Exposed ridges, major rock outcrops and vertical cliffs or overhanging rock walls e.g. Yardie Creek. Areas of dissected and steeply sloping terrain, which forms an abrupt, contrast with adjoining landforms e.g. Cape Range and coastal plains. Hills, blowouts and dune formations of distinctive height, configuration or texture which are visually prominent in the landscape. Diverse coastline edges with low headlands, sandy points and tidal flats e.g. Mangrove Bay.	Strongly defined patterns of vegetation associated with rock outcrops, watercourses, tidal flats and mudflats e.g. mangroves. Ephemerals or other vegetation showing vivid displays of colour e.g. Sturt pea (*Swainsona formosa*).	Rock pools and other permanent water features e.g. Yardie Creek. Intermittent watercourses, saline mudflats or inundated tidal zones that become focal points due to contrast with associated terrestrial and vegetation features e.g. Mangrove Bay.

(based on CALM 1994)

Visual Landscape Management

Visual landscape management involves maintaining, restoring or enhancing natural and cultural landscape values, as well as planning and designing land use activities and developments to provide diverse views and minimise negative impacts. Human imposed changes to the landscape should be subordinate to the established natural visual character.

Key factors to consider in visual landscape management include:

- visual changes to the landscape occur continually—natural changes are generally subtle, harmonious and occur very slowly (although there are exceptions such as stochastic events such as fire, storms and cyclones) whereas, human-imposed changes can visually dominate natural elements, appear discordant, alien and can occur abruptly if not done well; and
- the ability of the landscape to absorb change without loss of scenic value, which depends on factors such as slope, soils, vegetation cover and scope of change.

Guidelines for Management

The Department's Policy Statement No. 34 *Visual Resource Management of Lands and Waters Managed by the Department* provides broad guidelines for landscape management, particularly the planning and implementation of new facilities, buildings, recreation sites, signs and infrastructure.

The relatively unspoilt nature of the park's landforms and low-lying vegetation contributes to a visual landscape that is highly sensitive to changes. For example, minor tracks, telecommunication towers on the Cape Range and gravel pits are highly visible when viewed from Yardie Creek Road. It is important to take advantage of all opportunities to minimise the visual impact of development, for example by positioning sites in low-lying areas or dune swales. It is also important to ensure that visual impacts are considered from both land and sea perspectives.

27 – Visual Landscape

Key Points

- The park has been characterised as North West Cape Ranges Landscape Character Type.
- The Department's Policy Statement No. 34 *Visual Resource Management of Lands and Waters Managed by the Department* provides broad guidelines for landscape management. Guidelines specifically relating to tourism development on the North West Cape are recommended by the WAPC.

The objective is to conserve and facilitate visitor's appreciation of visual landscape values.

This will be achieved by:
1. assessing any proposed management activities and development of park facilities to determine their impact on landscape/seascape values.
2. planning fire management programs to minimise negative impacts.
3. liaising with neighbouring land managers and local government to ensure that the Department's visual landscape management guidelines are considered in any development proposal with the potential to impact on the visual landscape values of the conservation estate, and providing advice upon request.
4. encouraging sensitive management of visual resources along Yardie Creek Road and from walking tracks.
5. following the general landscape management guidelines set out in Policy Statement No. 34 and Appendix 7.
6. providing viewpoints and other opportunities for visitors to appreciate the park's landscape values.

28. RECREATIONAL USE

Much of the recreational activity in the park is focused on the marine environment of the Ningaloo Reef. Surveys by Wood and Hopkins (2001) revealed that 83.6% of visitors to Exmouth considered Ningaloo Reef as a reason to visit the area, with 57 % considering it the most important reason. In contrast, 59.9 % considered Cape Range National Park as a reason for visiting but only 12.6 % considered it the most important reason. Similarly, in a survey of over 500 visitors to Cape Range National Park, Polley (2002) reported that the most popular activities were appreciating nature and scenery (85%), relaxing (82%), swimming (71%), snorkelling (68%), viewing marine wildlife (66%), viewing terrestrial wildlife (65%), walking/hiking (62%), and photography (61%). Fishing was participated in by 43% of the visitors surveyed.

Most recreational development within the national park is consequently focused on the coastline, particularly in areas where there is one or a combination of the following:

- good access for snorkelling on corals;
- protection from the prevailing winds;
- easy vehicle access; and
- available boat launching.

The most popular site within the national park is Turquoise Bay, which meets the first three criteria, although several other sites could help meet this demand with appropriate development, provision of appropriate information, and ongoing management. Provision of greater recreational opportunities at more 'robust' and a wider range of sites could help alleviate the crowding that occurs at Turquoise Bay during peak periods.

Fishing

Beach fishing occurs within Ningaloo Marine Park and is dealt with in the management plan for that park. In accordance with the marine park management plan, line fishing from the shore is not permitted along 70% of the marine park. Special purpose (shore-based activities) zones have been established adjacent to specific sanctuary zone areas (e.g. parts of Osprey Bay Sanctuary Zone) to permit line fishing from the shore. These special purpose (shore based activities) zones extend to 100 metres offshore.

Fishing has also occurred within Yardie Creek at times. The impacts of fishing within an intermittently closed system are not clear – the creek is often closed to the ocean by a sandbar, sometimes for several years at a time. Large resident fish have also become a feature of the boat tours along the creek. Given the system can be closed for lengthy periods of time, it is feasible that fish populations could be significantly reduced through the combined effects of natural predation and fishing. Anecdotal reports indicate that current use of Yardie Creek for fishing is low. Fishing in Yardie Creek will be prohibited over the life of this plan.

Fishing

Key Points
- Line fishing from the shore is permitted along the marine park other than at specific sanctuary marine park zones.
- Special purpose (shore based activities) zones have been established to permit line fishing from the shore adjacent to specific sanctuary zone areas.

- The impacts of fishing on fish populations periodically trapped in Yardie creek are unknown.

The objective is to allow shore based fishing consistent with the zoning scheme for Ningaloo Marine Park.

This will be achieved by:
1. ensuring line fishing from the shore only occurs in permitted zones.
2. prohibiting fishing in Yardie Creek.

Water-based Activities

Water-based activities such as swimming, snorkelling, surfing, wind-surfing, kite-surfing and kayaking occur in the marine park and are therefore managed in accordance with the Department's *Management Plan for the Ningaloo Marine Park and Murion Islands Marine Management Area 2005-2015*. However, as the access points, facilities and services associated with these activities are within the terrestrial reserve there may be associated terrestrial management issues such as:

- potential impacts on visitor safety through conflict with other user groups/recreational pursuits;
- coastal environmental impacts; and
- the need for associated facilities and services (e.g. access, signage and other information).

Planning of the recreation site proposals indicated in Table 6 and Map 8 of this plan have been cognisant of the zoning and management plan for the marine park as well as terrestrial management issues. A 'recreation masterplan' which is to be prepared under the marine management plan will need to consider recreation site proposals in this plan, and discussion between the Conservation Commission, Department and Marine Parks and Reserves Authority will be required where the recreation masterplan has significant implications on management of the national park.

See Section 26 *Visitor Access* for discussion of boating access management issues.

Swimming and Snorkelling

While swimming and snorkelling can be undertaken along the length of the Ningaloo Reef, Turquoise Bay is a premier site for both activities due to (a) the ability for snorkellers to drift on the south-north current caused by a gap in the reef, and (b) the protected beach with a sandy bottom free of rocks. This combination, unique within that portion of the marine park adjacent to the national park and coastal parks to the north, and uncommon elsewhere along the coast, has led to overcrowding of the Turquoise Bay recreation site at peak periods. In addition to overcrowding there have also been visitor safety issues at this site, with snorkellers getting caught in the current and being taken out through the gap in the reef. Warning signs and other information are in place at Turquoise Bay and the visitor centre to inform visitors of safety issues, but further safety measures will be implemented (e.g. installation of a phone, use of buoys to serve as direction markers, additional warning measures when current is particularly strong).

It is proposed to reduce the level of crowding at Turquoise Bay by developing other sites that are suitable for swimming (e.g. Sandy Bay) or snorkelling (e.g. South Mandu and Lakeside) access. Appropriate facilities to support day-long visits at swimming beaches, such as shade shelters and tables, can add to the attraction. In addition, staff at the park entry station and Milyering Visitor Centre will continue to direct visitors to sites that best suit their expectations and desired experience.

Another management strategy that can be used to deal with overcrowding is to cap the number of visitors permitted at the site. This has been difficult at Turquoise Bay where at peak periods vehicles are often parked along the roadway, leading to vegetation damage and visitor safety issues. Limiting parking facilities at the site must be coupled with information on alternative locations, enforcement, and provision of facilities at other sites that visitors may access for swimming, snorkelling or relaxing on the beach.

The Oyster Stacks is a popular site that has suffered damage when snorkellers stand on the corals or inadvertently break pieces off through other direct contact. The likelihood of damage is particularly high when the water above the corals is very shallow. There are also some visitor safety issues at this site as entering and exiting the water can be difficult. Whilst this plan proposes that the Oyster Stacks be maintained as a medium day use site (see Table 6), measures to improve access, visitor safety and information (e.g. regarding the potential for coral damage) are required. Visitor information conveyed regarding this and other snorkelling sites

should include reference to low impact snorkelling, and tide markers and shallow tide restrictions where relevant.

Swimming is popular in Yardie Creek due to its shallow approaches and sandy bottom. Due to the potential impacts on rock wallabies and breeding birds from swimmers within the gorge (e.g. disturbance from loud talking, shouting, splashing), it is proposed to limit swimming to the area to the west of the boat launch as there are numerous alternative sites that can be accessed from the park for swimming. Further restrictions on swimming in Yardie Creek may need to be considered over the life of the plan should these measures prove to be inadequate in preventing disturbance to fauna.

Windsurfing and Kite-Surfing

Observations by staff and other visitors to the park suggest that the popularity of wind-surfing and kite-surfing activities on the peninsula is rapidly increasing. If not managed carefully these activities have the potential to conflict with other recreational uses both in and out of the water. Marine park management issues associated with these activities will be considered as part of the process of developing a marine recreation masterplan under the *Management Plan for the Ningaloo Marine Park and Murion Islands Marine Management Area 2005-2015*, and will include consultation with the windsurfing and kite-surfing fraternity. That process will also require consideration of associated terrestrial management implications such as potential conflict with other recreational uses provided for in this management plan, and the need to specify appropriate access and egress areas that provide sufficient space for setting up and dismantling equipment.

Water-based Activities

Key Points

- The popularity of Turquoise Bay for swimming and snorkelling can result in overcrowding of the recreation site at peak periods. Other locations within the national park can provide access for snorkelling and swimming.
- It is important that visitors to Turquoise Bay are informed of potential safety issues associated with the ocean currents in the area and along the Ningaloo coast in general.
- Measures to improve access, visitor safety and inform visitors regarding the potential for coral damage are required at Oyster Stacks.
- Swimming within Yardie Creek has the potential to impact on rock wallabies and breeding birds.
- The potential for conflict with other recreational uses needs to be taken into consideration when providing for access to the marine park for wind-surfing and kite-surfing.

The objective is to facilitate access to the marine park for water-based recreation activities (consistent with the zoning scheme for Ningaloo Marine Park) except where there are unmanageable impacts on the key values of the park, or risks to visitor safety.

This will be achieved by:

1. facilitating consultation between the Conservation Commission and Marine Park and Reserves Authority as required regarding marine 'recreation masterplan' proposals that would significantly impact on management of the national park.
2. further developing opportunities for day use and the purposes of swimming and relaxing on the beach (e.g. at Mesa, Sandy Bay and Kori Bay) and snorkelling (e.g. Lakeside).
3. consulting with the Marine Parks and Reserves Authority about facilitating access to more 'robust' snorkelling sites to decrease visitor pressure on Turquoise Bay.
4. capping visitor capacity at Turquoise Bay as indicated in the section on Day Use.
5. continuing to provide information to visitors regarding low impact snorkelling, as well as the safety risks associated with snorkelling and swimming where strong currents or other safety hazards exist.
6. in consultation with the Marine Parks and Reserves Authority, implementing further safety measures at Turquoise Bay (e.g. installation of buoys or other markers).
7. identifying and implementing measures to improve visitor access, safety and reduce coral damage (e.g. through tide markers and shallow tide restrictions, education and interpretation) at The Oyster Stacks and other snorkelling access sites as required
8. designating egress and access points to the water for windsurfing and kitesurfing where necessary to avoid potential for conflict with other visitor activities. This will include consultation with the Marine Parks and Reserves Authority and the windsurfing and kite-surfing fraternity.

Abseiling and Rock Climbing

Abseiling occurs on cliffs within the park, as well as elsewhere on the peninsula for the purposes of accessing vertical entrance caves. Pilgonaman Gorge, Mandu Mandu Gorge and a few sites accessed from Charles Knife Road are the main sites where these activities have been known to occur. With increasing visitation, the demand for rock climbing and abseiling opportunities is likely to rise. Knowledge of existing abseiling and rock climbing use is through informal observation, and there is a need to more accurately monitor the extent and patterns of use.

The use of the park for abseiling and rock climbing is appropriate provided that these activities can be managed to avoid significant adverse impacts on the park's flora and fauna. These impacts include for example:

- disturbance to black-flanked rock wallabies;
- disturbance cliff nesting birds (e.g. peregrine falcons) and the potential for their subsequent abandonment of nests/eggs;
- damage to vegetation and the creation of inappropriate informal access routes; and
- soil compaction and erosion.

The results of rock wallaby surveys in 2005 indicate that most of the areas used for abseiling and rock climbing correspond with some of the most significant habitat areas for the threatened black-flanked rock wallaby. There is consequently a need to review whether or how these activities can continue to be accommodated in the light of this new information regarding potential impacts. The review will include assessment of sites against criteria based on conservation of the park's key values and visitor safety, and involve consultation with relevant stakeholder groups (e.g. climbing associations and other relevant specific interest groups, caving groups, relevant commercial operator groups, and the SES).

Opportunities for rock climbing and abseiling will be accommodated within specific areas within reasonable reach of existing access routes and may be subject to other restrictions (e.g. to specified numbers of people and to certain seasons or times to protect rock wallabies or nesting birds). Under Regulation 33 of the CALM Regulations persons undertaking abseiling must have obtained 'lawful authority'. The District Manager should also be consulted regarding the installation of fixed anchor points within the park. The need for some form of registration and/or booking system to monitor and manage use will also need to be considered.

In the interim until the review is completed, Pilgonomun and Mandu Mandu Gorges will be closed for rock climbing and abseiling, and these activities will be restricted to the eastern side of the Range or any other areas that the Department identifies as appropriate in consultation with commercial operators and other relevant stakeholder groups.

The Department's Policy Statement No. 18 *Recreation, Tourism and Visitor Services* provides further guidance regarding the management of abseiling and rock climbing.

Skill Levels

Abseiling can involve large groups of beginners under instruction. Participants may not necessarily have experience in mountain safety and climbing, and group instructors have a responsibility to ensure that all members of the group observe safety, environmental and ethical standards. Certain minimum standards for experience and competency of instructors, and acceptable student to instructor ratios are required. People conducting commercial rock climbing and abseiling on lands managed by the Department must obtain a commercial activity licence. All commercial operators and not-for-profit groups conducting abseiling with dependent participants must also be registered under the National Outdoor Leader Registration Scheme (NOLRS) or hold current equivalent qualification recognised by the Department[20]. Not-for-profit groups where participants are non-dependent (e.g. military and emergency services training groups or specialist abseiling clubs/groups) may operate under their own training guidelines and competencies and do not require NOLRS accredited qualification, although this is subject to review by the Department as warranted.

[20] For example, the Abseiling Instructors Certificate and Professional Association of Climbing Instructors Schemes are currently regarded as acceptable accreditation.

Abseiling and Rock Climbing

Key Points

- There is a need to more accurately monitor the extent and patterns of rock climbing and abseiling recreational uses within the park.
- Most of the areas used for abseiling and rock climbing correspond with some of the most significant habitat areas for black-flanked rock wallabies. Rock climbing and abseiling has the potential to adversely impact on this species as well as other species restricted to areas used for these activities. There is a need to review whether or how these activities can continue to be accommodated in the light of new knowledge regarding potential impacts on black-flanked rock wallabies.

The objective is to provide opportunities for abseiling and rock climbing recreational experiences provided that associated impacts on key values and visitor safety can be effectively mitigated.

This will be achieved by:

1. closing Pilgonomun and Mandu Mandu Gorges to abseiling and rock climbing, and limiting these activities to the eastern side of the Range or any other areas that the Department identifies as appropriate (in consultation with commercial operators and other relevant stakeholder groups) until a formal review of abseiling and rock climbing in the park has been completed.
2. undertaking a review of abseiling and rock climbing (within 12 months of gazettal of this plan) involving assessment against criteria based on protection of key values and visitor safety, to identify which/whether areas within the park are suitable for accommodating the activities.
3. involving relevant stakeholder groups (e.g. climbing associations, caving groups and the SES) in the review of abseiling and rock climbing.
4. restricting abseiling and rock climbing (e.g. to specific areas, seasons, times, visitor numbers) and implementing other visitor management measures as necessary in the light of the review, to protect black-flanked rock wallabies, nesting birds, other key values and visitor safety. Prohibiting use if unacceptable impacts to key values cannot be effectively mitigated.
5. implementing an access monitoring and management system (e.g. registration or booking system) as required to assist with monitoring and managing visitor use.
6. ensuring visitor risk management assessments including geotechnical investigations are undertaken and responded to as required.
7. ensuring that all commercial operators or group leaders are appropriately licensed and accredited (see Section 29 Commercial Tourism Operations).
8. administering applications for 'lawful authority' and installation of fixed anchor points as required.
9. promoting appropriate codes of behaviour (e.g. the Climbers Association of Western Australia Code of Ethics).

Caving

There is growing acknowledgement of the conservation significance of the Cape Range karst system, including caves, and the fauna it supports (see Sections 14 *Geology and Geomorphology* and 17 *Native Animals and Habitats*). The caves of the Cape Range also have significant cultural and research values. While the number of cavers visiting the park is low compared to other areas of the State, the presence of caves within the park offers a regionally uncommon nature orientated recreational opportunity. Protection of ecological and other values and minimising visitor safety risks are key management considerations in providing for caving in the park.

Vertical caves are most common in Cape Range and almost all caves contain at least one vertical drop (by abseiling) or a climb to gain entry. Specialist equipment and training is required for caving in these caves.

Webb (undated) identified a number of criteria for assessing public use of caves, including:

- presence of delicate speleothem features;
- presence of cave flora and fauna requiring protection;
- levels of carbon dioxide and/or radon;
- risk of rock fall;
- visitor numbers;
- potential for flooding; and
- adjacent land uses.

A number of caves within the national park and Exmouth Gulf pastoral lease area have been examined for possible tourism use/public access (Webb 1995). Using the Department's cave classification system (see Table 5), two caves were assessed as 'discovery cave' class 2/3 and two with 'tourist cave' potential, although the latter were both on the pastoral lease.

The Department's generic Cave Classification System presented in the Department's Policy Statement 18 *Recreation, Tourism and Visitor* Services and replicated in Table 5 will be used as the basis for developing a Cave Classification System tailored to suit Cape Range National Park. All caves within the park will be managed as 'restricted access' until an assessment has been made of the values, potential impacts to these and visitor safety issues. This assessment (e.g. involving consideration of criteria such as, but not limited to, those identified by Webb) will be undertaken in consultation with karst management and other specialists as necessary (e.g. through the North West Cape Karst Management Advisory Committee). It is important that the assessment also includes criteria for evaluation against cultural and scientific or educational values.

TABLE 5 Cave Classification System

Classification	User Group	Recommended Management
Public Access		
TOURIST CAVE (Guided or self guided)	General public	❖ Developed and managed for tourist use and/or as an educational resource. ❖ Clearly signposted with access restricted to specified times. ❖ Payment of a fee required for entry. ❖ Infrastructure installed where necessary to facilitate access, decrease visitation impacts and improve safety.
DISCOVERY CAVE – Class 1	General public	❖ May be required to register at the cave entrance and/or pay a fee. ❖ May be some infrastructure and signage to decrease visitation impacts and improve safety.
DISCOVERY CAVE - Class 2 (horizontal) - Class 3 (Vertical).	Novice groups (general public) lead by an experienced leader (e.g. school groups and licensed commercial operators). Speleologists.	❖ General protection. ❖ Entry permit needed. ❖ Department-approved leader. ❖ May be limited infrastructure.
Restricted Access		
	Experienced and responsible speleologists, scientists.	❖ Maximum protection. ❖ Entry permit needed. ❖ Department approved leader needed. ❖ Speleological club visits. ❖ Access restricted for research, monitoring or management purposes.

The use of all caves within the park will be subject to a permit and registration system[21]. This will allow visitor use to be monitored and controlled to maintain the appropriate visitor experience and provide information to assist with management of potential impacts. It is also proposed to develop and implement a visitation impact monitoring and management program for all caves open to visitation. This will involve consultation with karst management experts (e.g. through the North West Cape Karst Management Advisory Committee) or other specialists as necessary. Promoting caving codes of conduct can also assist in minimising visitation impacts in caves[22]. Where necessary the Department may close or otherwise restrict public use where it is resulting in significant unacceptable impact on caves and associated values. Any gating of caves to prevent unauthorised access should also be done in consultation with karst management experts as inappropriate gating of caves can impact on conservation values.

In Cape Range, discovery caves class 2/3 require vertical descents and considerable experience on the part of the

[21] Tickets purchased for entry into tourist caves represent a permit to enter that cave.
[22] The Australian Speleological Federation have a number of caving codes and guidelines that can be modified if/as necessary to suit local circumstances.

group leader and the participants. All leaders would be required to have the appropriate level of training and equipment, accreditation and public indemnity insurance.

Geocaching

Geocaching is a recreational activity which involves the use of a Global Positioning Satellite to locate hidden containers deposited in a wide range of locations (including but not limited to caves). Individuals and organisations set up caches all over the world and share locations of these on the Internet. GPS users can then use the coordinates of the locations to find the caches. Caches have been found in the park with contents and in locations that present a risk to threatened fauna. Items left in caves or near conduits to the aquifer could result in contamination and have significant impacts on fauna dependent on such habitats. Given the high conservation values at risk and safety considerations, geocaching is not an appropriate recreational activity in Cape Range National Park.

Caving

Key Points

- Protection of ecological and other values and minimising visitor safety risks are key management considerations in providing for caving in the park.
- Webb (1995) identified two potential 'discovery caves' within the national park. The only sites considered to have 'tourist' cave potential are both on the pastoral lease proposed for addition to the park subject to the pastoral surrender process.
- Management of caving in the park will include cave classification, permit and registration systems and must be cognisant of the need to consult karst management or other relevant specialists where necessary.

The objective is to allow caving (e.g. for recreational, scientific and training purposes) while ensuring protection of the ecological and cultural values of the caves and karst systems.

This will be achieved by:

1. managing all caves in the park as restricted access until assessment (environmental, cultural and safety) and classification has been undertaken.
2. allowing (subject to the necessary environmental, cultural and safety assessments) commercial tour operators, registered speleological clubs/groups that carry public indemnity insurance and novice groups led by them to access Bell Cave and Top Hole Cave for caving.
3. facilitating public access to other caves in addition to those identified in strategy 2., subject to assessment and consultation with the Conservation Commission and other relevant stakeholders as appropriate (e.g. the North West Cape Karst Management Advisory Committee, the Coral Coast Park Council, speleological groups such as the Western Australian Speleological Group and the Australian Speleological Federation).
4. ensuring access to any caves in the park is subject to a permit and/or registration system.
5. considering the possibility of developing caves within the Exmouth Gulf pastoral lease exclusion area for tourism use, subject to the area being vested with the Conservation Commission.
6. permitting access to caves within the national park for the purposes of research or emergency services training subject to authorisation by the District Manager and the Coral Coast Park Council (or equivalent traditional custodian representative group). Such authorisation will be subject to the appropriate level of accreditation or expertise, and the Department being provided with any information that may be gained from research.
7. periodically assessing risks (e.g. stability of rock formations, carbon dioxide, radon levels) in all caves open to caving as necessary to minimise visitor safety risks.
8. developing and implementing a visitation impact monitoring and management program in consultation with karst management experts (e.g. through North West Cape Karst Management Advisory Committee) or other specialists as necessary for all caves open to visitation over the life of the plan.
9. closing or restricting public use of caves if/as necessary where use is having unacceptable impact on cave or associated values or presents unmanageable safety hazards.
10. promoting caving safety codes of conduct or guidelines (eg. ASF cave safety guidelines and Minimal Impact Cave Rescue Code modified to suit the planning area) as appropriate.
11. maintaining confidentiality about cave locations as necessary to reduce unauthorised access, and ensuring that any gating of caves undertaken to address unauthorised access is done in consultation

with karst management or other relevant specialists as necessary.
12. monitoring geocaching activities within the park and providing geocaching groups with information about the issues associated with this activity in this particular park. Removing geocaches as necessary.

Scenic Flights and Other Aircraft

The use of aircraft in or over natural areas can have impacts on the biophysical environment and on the quality of visitor experience. On the other hand, it is recognised that flight-based sightseeing of some areas is often the most feasible way to experience the grandeur of the area.

Aircraft activities undertaken on the western side of Cape Range are generally confined to chartered or private flights (e.g. scenic flights, chartered flights to offshore oil rigs), although occasionally the Department of Defence conducts aircraft operations over the Cape Range area.

Most scenic flight aircraft operate from the Learmonth Light Aircraft Base, although a gravel strip exists within the Yardie Caravan Park lease area. Scenic flights can have a significant impact on ground-based visitors. Collins (in prep) found that over 30% of ground-based visitors to Purnululu National Park and the Mitchell Plateau were concerned about scenic flights.

There has been little demand for hang-gliding and parapenting activities in the park to date. This management plan proposes to prohibit hang-gliding and parapenting craft from landing and launching in the park due to:

- the high risk to users associated with low elevation of the western bluff;
- the steep gorges on the east side and the unpredictable nature of the winds within the gorges; and
- the visual impact on other users.

Scenic Flights and Other Aircraft

Key Points
- Scenic flights can disturb the recreational experience of other park visitors. Scenic flights operate from both the Learmonth Light Aircraft Base and a strip within the Yardie Caravan Park lease.

The objective is to minimise any adverse impacts of scenic flights on ground-based visitors to the park.

This will be achieved by:
1. discussing flight plans with companies operating flights that impact on park users to seek to minimise adverse impacts.
2. liaising with the Department of Defence to minimise the impacts of airforce exercises on park users and wildlife.
3. prohibiting the landing of aircraft, including ultralight aircraft, in the park except in emergency circumstances.
4. prohibiting hang-gliding and parapenting in the park.

Special Events

The Department occasionally receives requests from groups to undertake 'one-off' special events within the park. In general, many group activities and events provide important community benefits and are an acceptable use of conservation estate. However, large scale special events have the potential to adversely impact on the park and on the experience of other visitors. The potential impacts of some special events may be able to be effectively managed and in such circumstances approval may be given to use parts of the park, subject to consultation with the Conservation Commission. Before events are approved, the availability of suitable areas outside the park is to be considered. Similarly, the potential impacts on the environment and other visitors, the safety risks to the people involved in the event, and the cost and benefits for the management of the area also require consideration.

The following general conditions apply:

- the event must be consistent with the visitor management setting in which it is to be held (see *Visitor Management Settings* in Section 25);

- any permitted temporary fixtures or facilities constructed for the event must be removed at the completion of the event; and
- any site disturbance such as trail markings must be removed and the site rehabilitated at the completion of the event.

Special Events

Key Points

- From time to time the Department receives applications for special events to take place wholly or partly in the park.
- Before any special event is allowed in the park it must be shown that it is of appropriate significance and cannot be held in a suitable area outside the park.

The objective is to permit special events that do not have significant adverse impacts on environmental values or visitor experiences and ensure that approved events are carried out in a safe manner.

This will be achieved by:

1. evaluating applications for special events in accordance with Departmental and Conservation Commission policies and only allowing special events subject to conditions.
2. consulting with the Conservation Commission as necessary prior to approving large scale events in the park.

Non-Commercial, Education and Not-for-profit Activities

Non-commercial, educational and not-for-profit groups use the park on a regular basis to conduct volunteer activities, bushwalking, camping, leadership, outdoor education and personal development programs. In the past, these groups have used several sites where few or no facilities are provided. This is principally because of the size of the groups or the type of activities they prefer and the lack of formalised group camping areas. Over the last 10 years the number and scale of operations by such groups has grown considerably and there can be a lot of competition between groups wanting to use the same area.

The Department requires all organised non-commercial, educational and not-for-profit groups to gain permission from the local regional or district office prior to undertaking their activities. Guidelines and forms have been prepared for groups seeking Departmental permission for such activities.

Non-Commercial, Education and Not-for-profit Activities

Key Points

- The park is used regularly by non-commercial, education and not-for-profit groups to undertake recreation activities in specific areas.
- Creation of camping areas to cater for groups will help to minimise competition and conflicts between users, maintain visitor experiences and ensure environmental and cultural values are protected.

The objective is to provide opportunities for non-commercial, education and not-for-profit activities without significant adverse impacts to key values.

This will be achieved by:

1. developing a booking system for non-commercial, educational and non-profit groups to avoid overuse and conflict between users.
2. designing group camping areas that cater for non-commercial, educational and non-profit groups (as well as the general public and commercial tour groups—see Overnight Stays and Commercial Tourism Operations in this section).
3. investigating partnerships between the Department and non-commercial, educational and not-for-profit groups that provide opportunities for the delivery of education and interpretation programs.

Wildlife Viewing

Wood and Dowling (2002) and Polley (2002) determined that viewing wildlife rated highly as an activity in both the marine and terrestrial environments at Cape Range/Ningaloo. Polley found that 65% of visitors to Cape

Range National Park participated in viewing land-based wildlife. Most typically this would include rock wallabies at Yardie Creek (and to a lesser extent at Mandu Mandu Gorge), birds at Mangrove Bay and Yardie Creek, turtles nesting on the beaches and euros throughout the park. Sustainable wildlife viewing activities provide valuable opportunities to raise public awareness of wildlife conservation issues both in the park and beyond. However, there are a number of potential impacts associated with wildlife viewing including possible disruption of activities (e.g. feeding, breeding), direct injury (e.g. road kills) and habitat alteration leading to significant increases or decreases in population size (Green and Higginbottom 2001) and so careful management is required to prevent such disturbances. In providing specific opportunities for wildlife viewing by providing boat tours along Yardie Creek, wildlife viewing facilities at Mangrove Bay, and guided turtle-watching tours in the adjacent Jurabi Coastal Park the Department has considered these possible impacts.

It is occasionally reported that some visitors using the walk trail along the northern side of Yardie Creek gorge are wandering off the trail. To further reduce the potential for disturbance of rock wallabies and nesting birds at Yardie Creek, the prohibited area at Yardie creek may be extended (e.g. to include some areas on the northern side of the creek) over the life of this plan. To minimise visitation impacts on the fauna of Yardie Creek, the Conservation Commission has resolved that there will be a limit of up to two commercial operator licences issued for conducting boat tours along Yardie Creek. Currently only one commercial operator is undertaking tours along Yardie Creek, this service being provided for passengers undertaking a broader safari tour in the park. However, it is intended that the other boat tour which is currently run by the Department will also be run by a private commercial operator.

There is a potential for visitors to unintentionally disturb turtles nesting in the park. The impacts of visitors on nesting turtles can be difficult to manage as laying sites vary from year to year, although little nesting occurs in the national park. Adverse effects can be minimised through education (e.g. through initiatives such as the turtle interpretation facility established in the Jurabi Coastal Park), restricting vehicle access on beaches, and the appropriate siting/design of facilities.

Technology can facilitate wildlife viewing opportunities. For example, at the Narracoorte Caves in South Australia remote infrared cameras allow visitors to view cave bats without the need to disturb them. Similarly, visitors to Phillip Island in Victoria can view seals on a nearby island at an interpretive centre. Such technology could be used to facilitate wildlife viewing opportunities in Yardie Creek (e.g. rock wallabies and nesting birds) or subterranean fauna.

Wildlife Viewing

Key Points

- Wildlife viewing is a popular activity in both the marine and terrestrial environment.
- Rock wallabies, birds, turtles, and euros are the most commonly targeted wildlife species.
- Potential impacts include possible disruption of activities (e.g. feeding, breeding), direct injury (e.g. road kills) and habitat alteration.

The objective is to provide opportunities for sustainable wildlife viewing.

This will be achieved by:

1. clearly defining walk trails and strategically locating associated infrastructure facilities (e.g. lookout points and interpretation) along the northern side of Yardie Creek gorge to minimise disturbance of fauna.
2. maintaining existing access restrictions along the southern side of the Yardie Creek gorge system and continuing to enforce this primarily through education and interpretation.
3. extending the access restrictions described in 2 above if necessary (e.g. to incorporate some areas on the northern side of Yardie Creek).
4. continuing to maintain a limit of no more than 2 commercial boat tour licences for Yardie Creek.
5. considering the provision of further specific wildlife viewing opportunities that can increase visitor's enjoyment of the park and awareness of wildlife conservation issues whilst minimising the potential for disruption of activities, direct injury, and habitat alteration.
6. providing or authorising guided turtle-watching within the park if appropriate and providing visitors with information on turtles, their conservation and ways to prevent disturbance.

See KPI 5 in Appendix 1

Day Use

Existing and proposed day use sites within the park are shown in Table 6 and Maps 7 and 8. The table illustrates the intention to provide a range of day use sites, from highly developed, hardened sites with infrastructure to cater for larger numbers of visitors (e.g. Turquoise Bay, Sandy Bay) through to smaller less developed sites.

In Cape Range National Park some day use facilities are shared with camping areas (e.g. Pilgramunna, Lakeside, Osprey Bay), leading to congestion and conflicts between users. Almost half of the visitors to the park support the concept of separating day use and camping areas, while only 14% opposed it (Polley 2002). It is proposed to separate day use areas and camping areas by (a) restricting some existing mixed sites to day use only, or (b) redeveloping existing multiple use areas to better separate user groups. Coupled with this will be an increased capacity at some day use sites, and better use of Milyering Visitor Centre to direct visitors to sites that best meet their requirements (e.g. swimming, snorkelling, boat launching, hiking). The focus on day use sites recognises the long-term requirement for the park to be able to cater for Exmouth's predicted future tourism growth.

To avoid overcrowding of the drift snorkel site and maintain the quality of the visitor's experience, the capacity of Turquoise Bay will remain fixed for the life of the plan and surplus visitors directed to other sites that are suitable for swimming (e.g. Sandy Bay) or snorkelling (e.g. Lakeside). However, capping the car park of Turquoise Bay will not in itself be effective in regulating visitor numbers at the site as groups of visitors on commercial tours can be dropped off and then picked up at a later time. Departmental visitor survey responses suggest that the current levels of visitation at Turquoise Bay are not a significant issue in terms of visitor's experience in the park. Issues with the capacity of the site are largely limited to peak visitation periods (e.g. school holidays).

Day Use

Key Points

- Day use sites and camping sites are often mixed across the park, leading to conflicts between users.
- Exmouth will continue to increase as a tourism hub over the life of the plan, and long-term planning for the park and adjacent areas needs to account for this.
- The opportunity exists to reduce the pressure on Turquoise Bay by developing additional similar facilities elsewhere.

The objective is to provide day-use opportunities that promote visitor enjoyment and appreciation of key values and do not have significant adverse impacts on those values.

This will be achieved by:

1. designing and developing day use sites as per Table 6 subject to detailed assessment for and mitigation of potential adverse impacts on the key values of the park.
2. considering outcomes of assessments of KPIs in this plan in planning and implementation of recreation site developments indicated in Table 6.
3. ensuring the capacity of parking at Turquoise Bay remains fixed at the existing level (i.e. as extended in 2003) unless otherwise approved by the Executive Body and Conservation Commission.
4. continuing to monitor trends in visitor satisfaction levels and taking action if necessary to address significant issues.

Overnight Stays

Built Accommodation

Table 2 summarises proposals in the WAPC's coastal tourism framework for future accommodation developments along the Carnarvon – Ningaloo coast. The Ningaloo Coast Regional Strategy also included the possibility of an ecolodge development of up to 100 beds within Cape Range National Park.

Consistent with the Ningaloo Coast Regional Strategy, this management plan allows for the potential development of one ecolodge[23] within the park in addition to the existing semi-permanent tents provided under a commercial licence at South Mandu. The Department and Conservation Commission will consider any specific market proposals for a low impact, nature appreciation focused, accommodation enterprise with no greater than 100 person capacity (including staff), if they arise over the life of the plan. Any ecolodge approved for the park

[23] Consistent with the definition of an ecolodge in the strategy.

would not have exclusive access to beaches or other key features such as gorges.

Under the Ningaloo Coast Regional Strategy, any proposals for permanent or semi-permanent accommodation outside Exmouth, Carnarvon or Coral Bay need to be assessed against the planning and environmental guidelines specified in the strategy (attached as Appendix 8 (b)). In addition, proposals for an ecolodge within the national park will be assessed against other criteria as the Department considers necessary. For example, the Department will evaluate proposals for their consideration to:

- preventing and mitigating potential impacts on key values of the park and adjacent marine park;
- the management objectives and strategies of this management plan and the *Management Plan for the Ningaloo Marine Park and Murion Islands Marine Management Area 2005-2015;*
- visitor capacities appropriate to the specific proposal site as well as to protection of the broader key values of the park and adjacent marine park;
- the findings of significant ecological and socioeconomic research projects undertaken in the Region (e.g. projects associated with the CSIRO 'Wealth from Oceans Ningaloo Collaboration Cluster' and Western Australian Marine Science Institute initiatives);
- marketing plans appropriate to an operation within a conservation reserve setting; and
- community consultation (including consultation with the CCPAC and Coral Coast Park Council).

Proponents should provide detailed information to allow the Department and the Conservation Commission to assess the proposal as indicated above. Development proposals with in-principle support of the Department and Conservation Commission may also be referred to the Environmental Protection Authority for their consideration of assessment under the Environmental Protection Act, and to the Commonwealth Government for requirements of the EPBC Act with regards to impacts on "matters on national significance".

Camping

The Department manages 13 camping areas within the national park with a total capacity of 109 sites. Some are not necessarily located on the most stable environmental or culturally appropriate sites. Some are also located within watercourses, which raises safety issues in the event of heavy rain or king tides. The largest camping areas are Neds Camp and Osprey with 15 sites each, the smallest North T-Bone and North Mandu with three sites each. It is estimated that approximately 40 000 camper nights are spent in the park annually.

Under the CALM Regulations, campers are limited to a maximum stay of 28 days. The largest proportion of campers spends between 2-5 nights in the park (35%), with 23% spending six nights or more. Of the latter group, 14% stay longer than 11 nights (Polley 2002). This can have a significant impact on visitation during school holiday periods—the average length of stay, coupled with the lack of a booking system, means that many visitors travelling to the park have difficulty finding a campsite. Although 39% of visitors opposed limiting the length of stay, in the interests of providing for equity of access, consideration must be given to introducing a special limit within the park (other than the general 28 day limit) during school holiday periods at least.

Polley's study also revealed a number of other important characteristics of visitors to the park, including:

- campers favoured the status quo when asked about the number of campsites preferred at each camping area. While the survey did not reveal reasons for this, any future camping area redevelopment must ensure that the 'feel' of each area is maintained. This can be achieved through spatial arrangement and screening with vegetation.
- visitors preferred the development of inland sites (42% support from visitors, 26% against) over more coastal sites (35% support, 42% against).

The WAPC (2004) has noted that visitors to the Ningaloo coast are seeking a 'remote and natural experience', yet numbers are increasing at unsustainable levels. The proposals in this management plan aim to retain that experience for the most part, whilst recognising that there is scope for increasing capacity at some sites.

Foremost in achieving these multiple goals are the proposals to:

- develop a new coastal camping area set back from the beach within the vicinity of Milyering/Kori Bay;
- develop inland camping areas;
- designate sites as kayak/canoe access only; and
- redevelop Lakeside, Tulki Beach and North Mandu campsites into day use sites to cater for predicted increase in day visitors.

TABLE 6 Accommodation, Camping and Day Use Sites – Cape Range National Park

Existing					
Camping			Day Use		
Major	Medium	Minor	Major	Medium	Minor
None	❖ Osprey/Bungarra (including kayak site) ❖ Mesa ❖ Neds	❖ Boat Harbour ❖ 1k camp ❖ Yardie Creek ❖ Pilgramunna ❖ North Mandu ❖ Tulki Beach ❖ Lakeside ❖ North T-Bone ❖ Kurrajong	❖ Yardie Creek ❖ Turquoise Bay ❖ Milyering Visitor Centre	❖ Sandy Bay ❖ Mandu Mandu Gorge ❖ Oyster Stacks	❖ South Yardie Creek ❖ Pilgramunna ❖ Bloodwood ❖ South Mandu ❖ Trealla ❖ Varanus ❖ Lakeside ❖ Kori Bay ❖ T-Bone Bay ❖ Mesa ❖ Neds ❖ Mangrove Bay ❖ Cape Range Oil Well No.2* ❖ Thomas Carter Lookout* ❖ Shothole Canyon* ❖ Jurabi Turtle Interpretive Centre
Other					
Major	Medium	Minor			
	South Mandu – safari tent (semi permanent)				

TABLE 6 Accommodation, Camping and Day Use Sites – Cape Range National Park (Continued)

Proposed (See 28. Recreation Use – Overnight Stays for an explanation)					
Camping			Day Use		
Major[1]	Medium[2]	Minor[3]	Major[4]	Medium[5]	Minor[6]
❖ Kori Bay/Milyering ❖ Osprey/Bungarra	❖ Kurrajong ❖ Neds	❖ Boat Harbour ❖ 1 K Camp ❖ Yardie Creek ❖ Pilgramunna ❖ Varanus (walk/kayak in) ❖ Mesa ❖ *Range Top Camp** ❖ *Walk Trail Camp* ❖ *Site accessible from Shothole Canyon terminus **. ❖ *Site accessible from Charles Knife terminus** ❖ *Walk Trail Camp** ❖ North T-Bone (walk/kayak in)	❖ Yardie Creek ❖ Sandy Bay ❖ Turquoise Bay ❖ Milyering Visitor Centre ❖ Lakeside ❖ Kori Bay	❖ South Mandu ❖ Mandu Mandu Gorge ❖ Oyster Stacks ❖ Mesa ❖ Mangrove Bay ❖ Tulki Beach	❖ South Yardie Creek ❖ Pilgramunna ❖ Bloodwood ❖ North Mandu ❖ Trealla ❖ T-Bone Bay ❖ Neds ❖ *Sharks Tooth** ❖ Cape Range Oil Well No.2* ❖ Thomas Carter Lookout* ❖ Shothole Canyon*
Other					
Major	Medium[2]	Minor[3]			
site undetermined – ecolodge	South Mandu – semi permanent tents				

* inland sites
[1] major camping area comprises up to 50 individual sites. Major camping areas may also include an additional group camping sites, where approximately 25 people could be accommodated on a single large site.
[2] medium camping comprises up to 25 sites
[3] minor camping comprises up to 10 sites
[4] major day-use area comprises more than 26 bays
[5] medium day use comprises up to 25 bays
[6] minor day use comprises up to 10 bays
New sites in italics

The park's existing and proposed recreation sites are summarised in Table 6 and Maps 7 and 8. The proposals in Table 6 and Map 8 are based on a preliminary investigation of the physical capacity of each area only. The implementation of these proposals will be subject to further detailed assessment and effective mitigation of potential adverse impacts on ecological or other values. Although existing camping areas have the capacity to increase marginally (apart from Osprey – Bungarra), the main focus over the life of the plan will be the development of new camping areas set back from the coast near Kori Bay/Milyering and four inland sites.

In the light of new information regarding the distribution of black-flanked rock wallabies on the peninsula, some of the areas proposed for inland camping sites in the *Cape Range National Park Draft Management Plan 2005* are no longer deemed the best areas for this type of recreational use. However, the development of alternatives to coastal camping experiences remains a key aspect of recreation management in the park, and therefore substitute areas for inland camping will be investigated and developed subject to further detailed assessment. The substitute areas will be:

- within the vicinity of the existing access provided by Charles Knife and Shothole Canyon Roads;
- associated with the Sandy Bay 4WD track; and
- associated with any over the range walk trail developed over the life of this plan.

Each inland camping area will be a 'minor' camping area and not exceed a maximum of 10 sites. The number of inland camping sites in total would not exceed 40 sites (i.e. the maximum capacity previously identified in the *Cape Range National Park Draft Management Plan 2005*). The development of any inland camping areas in locations other than those indicated on Map 8 and which have therefore not been considered as part of this management plan will be subject to further consultation regarding their location (including consultation with the Conservation Commission, the Coral Coast Parks Advisory Committee and the Coral Coast Park Council).

It is recognised that some visitors prefer to camp in groups. Group camping areas are also used by visitors on commercial tours. The proposed camping area near Kori Bay/Milyering will be designed to include some provisions for group camping. New camping areas developed inland may, where possible, also provide for small group camping areas. Group camping sites will be designed in a way to minimise conflicts with other campers (e.g. by restricting group camping to a particular area).

Coastal camping opportunities are proposed for long distance walkers and users of non-powered vessels. Although further detailed assessment is required, preliminary investigation has identified two existing camping areas that may be appropriate for future walk-in or kayak-in only use—Varanus and North T-Bone. The identification of additional camping areas may be necessary to maintain reasonable travel distances between stations on a long-distance walk or kayak/canoe trail. The intended recreation experience associated with such trails is at the more natural remote end of the recreation opportunity spectrum, and accordingly the development of any new associated camping areas would need to be consistent with this type of experience. Any walk-in/kayak-in only sites additional to those identified in Table 6 and Map 8 will be of a small scale, subject to assessment against environmental and other criteria and consultation with the Conservation Commission and key stakeholder groups.

Fundamental to the success of the proposals to better manage camping is the introduction of a booking system. The Department is currently developing such a system for a number of parks as a trial, with a view to introducing it state-wide. This will allow visitors to visit the park with the surety of obtaining a site during busy periods (in particular school holidays). It is proposed that the system will allow for on-line booking.

Generators are permitted within the park at present, but their use has led to complaints from some visitors with regard to noise pollution. Generators are usually associated with long-term visitors, particularly south of the park where the average length of stay is much longer, and long-term travellers. To reduce conflicts between visitors, it is proposed that:

- generators are restricted to separate designated sites;
- generator size is limited;
- a curfew is applied on hours of generator use; and
- the use of solar power is encouraged.

Overnight Stays

Key Points

- The largest proportion of campers spends between 2-5 nights in the park (35%), with 23% spending

six nights or more. Of the latter group, 14% stay longer than 11 nights. This can have a significant impact on site availability during school holiday periods.
- There is a need for a booking system for camping within the park.
- There is a need to cater for campers who are seeking different experiences.

The objective is to provide opportunities for overnight stays that promote visitor enjoyment and appreciation of key values and do not have significant adverse impacts on those values.

This will be achieved by:
1. staging the implementation of camping and other accommodation development detailed in Table 6 (subject to detailed assessment for and mitigation of potential adverse impacts on values) over the life of the plan to meet visitor growth, but not exceeding the estimated sustainable capacity of 220 sites. Any increase in capacity will be subject to Key Performance Indicators for natural and social conditions being adequately met.
2. providing group camping areas (e.g. for use by commercial, non-commercial, educational and non-profit groups).
3. gazetting areas designated for the purposes of camping under regulation 6 of the CALM Regulations and considering the introduction of a booking system for camping (including walk-in and non-powered vessel sites) within the park.
4. allowing generators only in designated areas, specifying generator capacity/decibel ratings and curfew times, and ensuring generator sites are designed to minimise noise pollution.
5. introducing a maximum length of stay of seven nights during school holiday periods between 1 May and 31 October, and 14 nights at other times during these months if necessary. Any change will be subject to a review by the Conservation Commission.
6. evaluating proposals for ecolodge development in the park if/as they arise, and referring proposals with in-principle support of the Department and Conservation Commission to the Environmental Protection Authority for consideration of assessment under the Environmental Protection Act, or the Commonwealth Government for requirements under the EPBC Act, as necessary.
7. giving due regard to the relevant components of the Ningaloo Coast Regional Strategy – Carnarvon to Exmouth including the (Planning and Environmental Guidelines for Sustainable Tourism on the Ningaloo Coast) in evaluating any proposals for ecolodge development in the park. This will include referring proposals to the Department of Planning under the Ningaloo Coast Regional Interim Development Order.

Cycling

Cycling is a popular recreational pursuit and there is increasing interest in undertaking this activity within national parks and similar natural environments. There is currently no provision in the park for riding bicycles off public roads. Other existing roads/tracks in the park are not suitable for cycling due to incompatibility with existing uses.

Cycling can enable closer interaction with the environment than is the case with motorised vehicles, and may be an appropriate recreational activity to cater for within the park provided that trails are suited to local conditions, appropriately designed/aligned and well maintained. The existing level of demand for cycling within the park is relatively low compared to the demand for other recreational uses. Constructing and managing a trail in the rugged and karstic environment of the park would be difficult and expensive. Given these factors and the need to develop walk trails which will cater for the recreational needs of a greater proportion of visitors, the development of a cycle trails may not be feasible over the short-term (e.g. life of this management plan).

It is important to ensure that recreational opportunities in the broader region are considered prior to developing any cycle trails in the planning area – trails that link to or complement other trails would generally be preferable to circuits within the park. Any cycle trail development proposals that arise over the life of this plan will require consultation with the Conservation Commission.

Cycling

Key Points
- Cycling within the park is currently limited to public roads. Other existing roads/tracks are not suitable for cycling due to incompatibility with existing uses.

- The development of cycle trail/s within the park could be appropriate, but may not be feasible over the short-term.

The objective is to ensure that any cycle trails developed within the park promote visitor enjoyment and appreciation of key values and do not have significant adverse impacts on those values.

This will be achieved by:

1. developing, if resources allow and subject to consultation with the Conservation Commission, a dedicated cycle trail in the park if a significant demand arises and if potential impacts on the park's key values can be effectively mitigated.
2. ensuring that opportunities to complement and link in with other trails and recreation opportunities within or near the planning area are given consideration in prior to developing any cycle trails in the park.

Visitor Services

Rubbish Collection

Services provided at day use sites vary throughout the park. Rubbish bins are provided at all camping areas and at the Milyering Centre, and are emptied as necessary. However, this service requires removal of the rubbish to Exmouth, which may become cost-prohibitive. The Department and would prefer to increase the efficiency of rubbish disposal over the life of the plan by providing one or two collection points (including recycling facilities) and/or encouraging visitors to remove their own litter with a long-term aim to remove bins altogether. This will depend on resolving existing barriers to recycling in remote communities such as Exmouth, which currently has limited recycling facilities.

Barbeques

Over the past 10 years all gas BBQs were removed, campfires prohibited, and visitors encouraged to bring portable cooking equipment with them. This management strategy will be retained.

Water Supply

Water is available at one location in the park (Neds Bore). Water is not supplied to any of the day use or camping sites, and it is proposed that this situation remain for the life of this management plan. However because of visitor safety issues associated with long-distance walk trails, the installation of water points associated with these may be an exception. This issue will be given further consideration during more detailed walk trail development planning.

Any groundwater extracted from the park over the life of the plan, to service recreational developments for example, is to be taken and used sustainably (see Section 38).

Toilets

Toilets are provided at all camping areas and some day use sites. These toilets all have sealed chambers to prevent leaching of waste material into the anchialine system. Composting toilets are also available at Milyering Visitor Centre.

The licensed commercial accommodation at South Mandu operates waterless composting toilet systems. As part of the licence conditions, the licence holder must comply with environmental health standards for potable water, grey water and sanitary facilities as determined by the Department and the Shire of Exmouth.

A sullage disposal point is provided by the Shire in Exmouth townsite. Its availability will be communicated in park information.

Visitor Services

Key Points

- The Department provides a number of services in the park to support and enhance visitors' experience of the park whilst minimising environmental impact.

The objective is to ensure that services provided to visitors are efficient and compatible with other park management objectives.

This will be achieved by:

1. increasing the efficiency of rubbish disposal over the life of the plan (e.g. by providing one or two collection points and/or encouraging visitors to remove their own litter with a long-term aim to remove bins altogether).
2. ensuring that any water abstraction within the park is ecologically sustainable.
3. not providing water to recreation sites (with the exception of any ecolodge developed over the life of this plan) unless there are overriding safety or other management issues.
4. ensuring that toilets within the park do not allow contamination of groundwater.

29. COMMERCIAL TOURISM OPERATIONS

A commercial concession is a right granted by way of lease or licence for occupation or access and use (respectively) of an area of land or water managed by the Department. Commercial concessions can increase the range of recreation opportunities and facilities within national parks. Commercial concessions must be consistent with the purpose of the park, the protection of its values and with the objectives of this plan. All commercial concessions are subject to approval by the Minister for Environment after consultation with the Conservation Commission or the Marine Parks and Reserves Authority as appropriate.

Leases, which allow a lessee to occupy a particular area of land, are granted under section 100 of the CALM Act. A lease provides security to protect significant investments and may be for a term not exceeding 21 years and may involve an option to renew that lease for a further term up to 21 years. The length of a lease is usually proportional to the level of investment and the return on that investment. Existing lease arrangements in the park are unrelated to tourism (see Section 36 *Utilities and Services*).

Any ecolodge development implemented over the life of the plan is likely to be subject to a lease. Similarly, commercial operations within the Milyering Visitor Centre could also be leased to private enterprise. The commercial function of the Milyering Visitor Centre needs to be reconsidered as part of the proposal to consolidate Milyering as the major visitor hub by developing a major camping and day use area. As well as its role in delivering information, education and interpretation, possible future commercial services could include:

- a shop focusing on provisions for campers, souvenirs and merchandise;
- a café;
- a booking agency for tour operations in the national park and Ningaloo Marine Park; and
- rubbish removal and general campground servicing.

Long-term leases to commercial concessionaires could also assist in paying for the future redevelopment of the centre. The criteria for selection of lessees include a requirement for proponents to demonstrate how the business will work with the local community (including traditional custodians) to maximise community benefits.

Licences allow operators to access and use lands and waters managed by the Department. All private tour operators conducting commercial tourist activities on conservation reserves are required to obtain a licence in accordance with the CALM Act. Licensing assists the Department to monitor access and use of lands and waters under its control, and ensure that the conservation values of these areas are maintained. By protecting these values, tour operators will be able to continue to visit areas maintained to the satisfaction of visitors.

The Department issues two types of licences, depending on the nature of the activity, the security of the resource, and the risk to the participants and other users. T Class licences are issued when the number of licences is unrestricted. In these circumstances, environmental and visitor management objectives can be achieved simply through appropriate licence conditions. The majority of tour operators fall into this category. Currently the Department issues one, three and five-year licences. The term of the licence depends on the achievement of tourism accreditation by the operator and to what level this is achieved.

The Department can grant a T class licence for up to five years and renew it for the same period. There are currently 179 operators licensed (T Class) to operate in Cape Range National Park, although almost do not actually run tours in the park. Others may use the park to access Ningaloo Marine Park for marine-based activities.

The other type of licence issued by the Department is an E Class licence. E Class licences are issued where there are safety, environmental or management concerns and the number of licences needs to be restricted, such as with boat tours in confined areas. Generally, although not necessarily, E Class licences are issued following a formal Expression of Interest process, and can be for periods of up to 5 years, with a renewal of up to 5 years. There are currently two operators with E Class licences in the park (tented accommodation provided at South Mandu, and a launch tour of Yardie Creek which is run as part of a broader safari tour). The Department also currently runs a Yardie Creek boat tour, but may seek for this to be operated through the private sector in the future. The Conservation Commission has resolved that no more than 2 licences are to be issued for conducting boat tours along Yardie Creek.

In addition to the generic standards and accreditation for commercial operator licences, operators permitted to undertake activities such as rock climbing, abseiling and caving in the park will be subject to additional conditions in order to maximise visitor safety and environmental protection. These will include for example minimum safety, training, experience and/or accreditation requirements and observance of specified minimal impact or other codes of conduct as necessary.

29 – Commercial Tourism Operations

Key Points

- Tourism concessions can increase the range of recreation opportunities and facilities within national parks.
- All commercial tour operators require a licence from the Department. Accreditation will enable longer-term licences to be issued.
- The development of an ecolodge would most likely be done through a lease arrangement.

The objective is to ensure that commercial tourism activities are compatible with other park management objectives, and to extend the range of services and recreational experiences available in the park through the involvement of private enterprise.

This will be achieved by:

1. considering (and issuing as appropriate) tourism concessions that:
   - are consistent with the park's management objectives;
   - facilitate park management; and
   - provide a service or facility to park visitors that the Department would not otherwise be able to provide.
2. encouraging licence holders that operate in the park to undertake tourism industry accreditation appropriate to their activities.
3. ensuring operators permitted to undertake rock climbing, abseiling and caving in the park are subject to specific safety and environmental protection licence conditions as necessary (e.g. minimum safety, training and experience requirements and observance of minimal impact or other codes of conduct).
4. considering (and implementing as appropriate) options and proposals for leasing of commercial services that could be delivered through the Milyering Visitor Centre.
5. ensuring any commercial recreation and tourism operations in the park are at least cost-neutral to the Department.
6. providing resources and training for the tourism industry in interpreting the Department's role and the park's key values.

30. VISITOR SAFETY

In addition to a genuine concern for visitor welfare, the Department has a legal responsibility to consider the personal safety and welfare of visitors to the public conservation estate. The Department aims 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 in the process. To assist in minimising the incidence of injury to visitors, the Department has developed Policy Statement 53 *Visitor Risk Management* and provides for the implementation of a visitor risk management program for the park that includes:

- carrying out periodic safety audits of all park recreation sites, facilities and visitor services to identify and assess risks and potential hazards. This information is used as part of the basis for preparing and implementing recreation site and facility maintenance programs;
- developing and maintaining an information gathering and recording system to monitor the hazard condition

of sites and facilities and the frequency, situation and type of visitor safety incidents that occur in the park;
- promptly investigating all reported visitor accidents and injuries and implementing appropriate risk mitigation measures; and
- providing information to enable visitors to consider risks of recreational activities in the park and be empowered to act in an informed manner in providing for their own safety.

Whilst some activities (e.g. caving, abseiling, rock climbing) are considered high risk and are carried out at the visitor's own risk, strategies such as access controls, promotion of safe codes of conduct and standard requirements for commercial operators are included in this plan to minimise hazards.

The Department also works closely with the State Emergency Service, the Western Australian Police, ambulance and volunteer fire brigades in managing visitor risk within the park.

Risks within the park are not restricted to recreation activities. There is also a significant risk to drivers from euros travelling along Yardie Creek Road, particularly at night. Research by Polley (2002) found that 61% of visitors supported reducing the speed limit on Yardie Creek Road. The speed limit at present (a public gazetted road) is 80 km/hr. A number of options exist to minimise the number of accidents, including:

- reduce the legal speed on the road, subject to review and consultation with Main Roads;
- ensure adherence to the existing speed limit; and
- educate users to be more cautious when travelling between dusk and dawn.

30 – Visitor Safety

Key Points
- Visiting and enjoying natural areas can involve visitor risks either through the recreational activity itself or by natural events (e.g. wildlife).
- The Department has a moral and legal responsibility to minimise visitor risk. It does this by implementing Departmental policy and a visitor risk program.
- Recreation sites and services are regularly audited to identify and facilitate minimisation of visitor risks.

The objective is to minimise risks to public safety while maintaining a range of visitor experiences wherever possible.

This will be achieved by:
1. continuing to implement a visitor risk management program.
2. maintaining and implementing emergency response plans as required (e.g. for wildfire, cyclone or major storm events).
3. providing information (including signs where those hazards associated with structures, facilities, activities or natural attractions may not be obvious) to enable visitors to consider and cater for risks associated with their activities in the park.
4. ensuring commercial concessionaires are appropriately trained or accredited and carry appropriate insurance when undertaking high risk activities in the park (see Section 29 Commercial Tourism Operations).
5. applying industry standards and utilising appropriate expertise and quality of materials in the design and construction of facilities and structures.
6. maintaining a speed limit of 80 km/hr on Yardie Creek Road. Areas within the park where specific safety issues and wildlife corridors are identified may be classified as 40-60 km/hr, subject to review and approval of Main Roads.
7. installing wildlife warning signs at appropriate locations.
8. adopting codes of safe conduct for high risk recreational activities within the park (such as abseiling, caving) and promoting and publicising them as appropriate.

PART F. MANAGING RESOURCE USE

31. INDIGENOUS CUSTOMARY ACTIVITIES

The hunting and gathering of food by Aboriginal people is an important part of their culture enabling them to maintain links with the land, share knowledge and partake in traditional practices.

The importance of traditional food is acknowledged under section 23 of the Wildlife Conservation Act, in that Aboriginal people may be exempted from some of the provisions of the Act related to the taking of wildlife. However, Aboriginal people seeking to engage in food gathering in the park, including for ceremonial or demonstration purposes, must obtain prior consent of the occupier of the land.

The Coral Coast Park Council has expressed a desire to legally engage in customary activities, including hunting within the park. This plan allows traditional custodians and those approved by them to undertake such activities for their own purposes subject to previously agreed conditions and criteria such as:

- conservation status of target species;
- sustainability;
- visitor safety; and
- ecological function of target species.

The Department will ensure conformity with any future changes to legislation or Government policy relevant to traditional food gathering.

31 – Indigenous Customary Activities

Key Points

- As part of their culture, Aboriginal people may seek to gather food from land managed by the Department. Exemptions within the Wildlife Conservation Act allow for this customary activity to occur.

The objective is to enable Aboriginal people to pursue customary activities whilst protecting key values and visitor safety.

This will be achieved by:

1. allowing the traditional custodians of the area (through the Coral Coast Park Council) or others approved by them to take sufficient food for themselves and their family as approved by the Department.
2. ensuring that management of food gathering activities conforms to any legislative or policy changes during the life of this plan.

32. MINERAL AND PETROLEUM EXPLORATION AND DEVELOPMENT

The Cape Range peninsula is of considerable interest to the mining and petroleum industries. Exploration activities have identified large quantities of high-grade limestone that is particularly valuable to a variety of industries, including the mining industry, the agricultural industry and the construction industry (Department of Resources Development 2001). The occurrence of this limestone in close proximity to an existing townsite with established transportation and energy-production infrastructure makes the area particularly attractive to mineral development projects. The proposed gas-fired power station to the south of the Exmouth townsite will further heighten the area's attraction for such uses.

The national park, as well as areas proposed for addition to the conservation reserve system are subject to various mining tenements and reserves, including for example, Temporary Reserves (for limestone), Exploration Licences and a number of pending Mining Leases focussed on land proposed as a 'Conservation and Limestone Resource Management' reserve. In addition, the majority of the Cape Range peninsula (including areas of national park or proposed addition to the conservation reserve system) is subject to petroleum exploration permits, although there is no production coming out of the area at this stage. The granting of a mining lease (or

general purpose lease associated with mining operations) within a national park requires the consent of both Houses of Parliament. Where given, Parliamentary approval may involve the imposition of conditions.

The Conservation Commission and the Department believe that proposed additions to the conservation reserve system should be national park but any reserve creation is a matter for Government consideration and determination on a case by case basis. In 1996 agreement was reached regarding the creation of a reserve for the purpose of 'Conservation and Limestone Resource Management' in accordance with section 5(1)(h) of the CALM Act. This agreement by the Ministers then responsible for the Mining Act and the CALM Act represented a compromise position regarding conflicting mining and conservation interests in land proposed for addition to the national park. The compromise was that if a reserve for Conservation and Limestone Resource Management was created within the area, and support was given for future proclamation under the Petroleum Act if required, the remaining land proposed for addition in the *Cape Range National Park Management Plan 1987* could be added to the national park. It was determined that Temporary Reserves over the limestone resource areas would remain in place until the reserve for Conservation and Limestone Resource Management and extensions to the conservation reserve system are gazetted. The Conservation Commission is of the opinion that accomplishment of the 'Conservation and Limestone Resource Management' purpose should see all proposals for limestone extraction confined to that reserve, and does not presume that mining activity will necessarily occur – all mining tenement proposals for the area would still be subject to environmental impact assessment as determined by the Environmental Protection Authority.

Exploration and other activities conducted under the Mining Act and the Petroleum Act are subject to conditions intended to prevent or mitigate potential environmental impacts. The need to protect the special attributes of the broader Cape Range area is recognised in the EPA's position statement for the area, which stipulates that development that potentially threatens the maintenance of ecological integrity must demonstrate avoidance or amelioration of those threats (EPA 1999). All mining proposals with the potential to impact on the key values of the conservation reserve system should be referred to the EPA for their consideration of assessment under the Environmental Protection Act. Further, actions that may have a significant impact on matters of national environmental significance[24] also require referral under the EPBC Act. The Department's and the Conservation Commission's advice would be sought as part of a standard administrative process, for any mining or petroleum proposals with the potential to impact upon the conservation reserve system.

Mining, particularly in karstic environments, can have significant impacts on conservation values. Given that the karst ecosystems of the park are of very high conservation significance (see Sections 14, 15 and 16), the potential impacts of mining are of notable consequence. The Conservation Commission and Department collaborate with other Government bodies such as the Department of Mines and Petroleum and the EPA to prevent or mitigate impacts of mining on conservation reserve values. Potential impacts of mining within or adjacent to the park on the values of the park include[25]:

- contamination of surface or groundwater and associated impacts on stygofauna or other groundwater reliant biota. Examples of contaminants include hazardous chemicals, sediment and alkaline mining effluent. Particular consideration should be given to potential rapid flow routes to the aquifer – Hamilton-Smith *et al*. (1998) state that "Until clearly proved otherwise by down-bore hydraulic conductivity tests we suggest that the potential for aquifer pollution from quarrying and other ground-disturbing activities does exist in this karst province";
- alterations in groundwater levels (and associated impacts on stygofauna or other groundwater-reliant biota);
- localised destruction of caves or other karst features;
- direct or indirect impacts on fauna (e.g. direct disturbance or injury, habitat modification);
- long-term impacts on vegetation (e.g. weed invasion);
- impacts on landscape values and visual or other amenity; and
- impacts on heritage values.

With respect to the potential impacts of mining and petroleum tenements within the park or proposed additions, the Department of Mines and Petroleum advise that:

- even though exploration licences may cover large areas, actual mining operations are usually restricted to relatively small areas; and

[24] Under the EPBC Act matters of national environmental significance include (for example), World Heritage Properties, National Heritage Places, threatened species, migratory species and threatened ecological communities listed under the EPBC Act.

[25] Some of these along with other possible impacts of limestone mining are discussed in more detail in Hamilton-Smith *et al.* (1998).

- the limestone generally becomes lower in grade with depth, making extraction uneconomical, and therefore the mining of limestone below the watertable is unlikely

(I. Briggs, pers. comm.).

In evaluating the potential impacts of mining proposals on conservation values within the conservation reserve system, it is essential that due regard be given to the fact that ecological impacts have the potential to extend beyond humanly defined lines across terrain (Hamilton-Smith *et al.* 1998). For example, potential impacts on the regional hydrogeological systems, processes and the biota that depend on these need to be considered. Environmental impact assessments of mining proposals should include consultation with experts in karst geomorphology.

The Conservation Commission is of the opinion that mining or petroleum proposals in proposed additions to the conservation reserve system, outside of the proposed Conservation and Limestone Resource Management reserve, should be treated as if these areas had already acquired the proposed tenure (i.e. national park). Should mining or petroleum tenements be approved in this area despite the Conservation Commission's position, these should be subject to the principle of environmental offsets[26]. In addition, there is an expectation under the Mining Act that areas disturbed by mining should be rehabilitated and costs borne by the organisation/s responsible for the activity.

32 – Mineral and Petroleum Exploration and Development

Key Points

- The park and proposed additions to the conservation reserve system are subject to both granted and proposed mining and petroleum tenements.
- The Conservation Commission believes that proposed additions to the conservation reserve system should be national park, however it acknowledges previous agreements regarding the proposed Conservation and Limestone Resource Management reserve and any reserve creation is a matter for Government consideration and determination on a case by case basis.
- Mining in karstic environments can have significant ecological impacts.
- All mining and petroleum proposals with the potential to impact on the values of the park or proposed additions to the conservation reserve system should be referred to the Environmental Protection Authority for their consideration of assessment under the Environmental Protection Act.

The objective is to ensure that mineral and petroleum exploration and development (e.g. within the proposed Conservation and Limestone Management reserve) does not compromise the values of the park or any areas proposed for addition to it.

This will be achieved by:

1. referring proposals (for mineral and petroleum exploration and development) that have the potential to impact upon the conservation reserve system to the Environmental Protection Authority for their consideration of assessment under the Environmental Protection Act.
2. liaising with, and providing advice to relevant Government agencies (e.g. Department of Mines and Petroleum), the EPA and industry regarding proposals (for mineral and petroleum exploration and development) as necessary to prevent or minimise impacts on key values of the conservation reserve system.
3. in conjunction with other relevant agencies (e.g. Department of Mines and Petroleum), monitoring activities within active mineral and petroleum tenements that have the potential to impact on the key values of the conservation reserve system, and taking appropriate actions as necessary to address unacceptable impacts.
4. encouraging rehabilitation of all mineral or petroleum extraction sites within proposed additions to the conservation reserve system according to Departmental rehabilitation standards.

33. BASIC RAW MATERIALS

Basic raw materials including gravel, sand, and limestone have sometimes been sourced by the Department from within the park for use in reserve operations such as maintenance and development of car parks and walking tracks. Basic raw materials have/are also sourced from the park and the Yardie Creek road reserve enclave by

[26] Environmental offsets aim to ensure that significant and unavoidable environmental impacts are counterbalanced by a positive environmental gain, with a goal of achieving a 'net environmental benefit' (EPA 2004)

the Shire of Exmouth or Main Roads for maintenance of that segment of the road that is abutted by the national park.

There is a general presumption against the use of basic raw materials from within the park, and extraction should only be considered if:

- it is to be used within the park (or the road reserve servicing the park) for uses directly related to the park's management purpose (e.g. conservation or recreation);
- the proponent has undertaken a thorough assessment of and comparison with alternative options for obtaining the resource outside of the conservation reserve system;
- the Department and the Conservation Commission have acknowledged that no other resource is reasonably available;
- the key values of the park as identified in this plan can be maintained through prior assessment of impacts (normally at the proponent's expense) and implementation of best management practices (e.g. as set out in relevant Departmental guidelines or policy documents);
- the species and communities that would be impacted by a proposal are surveyed and shown to be adequately represented in the park;
- the Department and Conservation Commission are provided with information on ongoing requirements for extraction (e.g. 5 year forward planning for all works that require resource from the park); and
- proponents demonstrate the availability of reserve funds for the proper environmental management and rehabilitation of pits.

Future proposals for basic raw material extraction within the park will be considered by the Department and the Conservation Commission on a case-by-case assessment. Department and Conservation Commission support of basic raw material extraction from the park will be conditional, and may include conditions such as requirements for:

- biodiversity offsets (in accordance with Departmental and Environmental Protection Authority policies) to address any net environmental loss within specific areas;
- specific weed and disease risk management (e.g. specific hygiene requirements);
- siting pits and access to protect visual amenity;
- applying best practice rehabilitation consistent with Departmental policies (e.g. Department Policy No. 10 – *Rehabilitation of Disturbed Lands*); and
- establishing programs to monitor rehabilitation success and control weed infestations.

33 – Basic Raw Materials

Key Point

- Basic raw materials for use in operational activities within the park (or the road reserve servicing the park) should be sourced from outside the park wherever possible.
- Proposals for the extraction of basic raw materials for use in operational activities within the park will be considered on a case-by-case basis.

The objective is to ensure that use of basic raw materials from the park or the road reserve does not adversely impact key values.

This will be achieved by:

1. allowing basic raw materials sourced within the park for use in reserve operations, only if the requirements described above are met.
2. ensuring all proposals for basic raw material extraction within the park which have the in-principle support of the Department, are referred to the Conservation Commission for their consideration and recommendations.
3. referring proposals that are not supported by the Department or the Conservation Commission (but may nevertheless be approved under other legislation) to the Environmental Protection Authority for possible assessment under Part IV of the Environmental Protection Act.
4. ensuring in cases where basic raw material extraction is approved, that best management practices are employed in order to maintain the key values of the park.
5. ensuring that applications for access by Main Roads WA and local authorities to basic raw materials in the park are accompanied by detailed 5 year forward planning addressing alternatives and best practice environmental assessment and management.

34. DEFENCE FORCE TRAINING

The Department sometimes receives requests regarding defence force training on lands and waters it manages. Activities previously conducted within the park have included training/exercises in survival, navigation and leadership. Some activities proposed may be associated with an unacceptable level of ecological impact, and hence not be appropriate for the park. Conversely, in some instances activities may be able to be accommodated without unduly diminishing natural, cultural or recreational values. Where approval for defence force training in the park is granted, this will often be subject to specified conditions.

The types of defence force activities proposed can vary considerably, hence requests to conduct such activities in the park are best dealt with on a case-by-case basis so that the particular impacts of each exercise can be considered, and conditional approval provided if/as appropriate. The Department's Policy Statement 54 – *Defence force training on Department managed lands and waters* also provides guidance on this issue.

As a result of military activities preceding the creation of the national park (and particularly during World War II), the park has been subject to unexploded ordnance (UXO) contamination. The issue of UXO also applies to unallocated land to the north of the park. UXO have a small potential to be unstable posing a risk to health and safety in undertaking recreation site development, fire management or other operational activities. The risk associated with works and activities in areas of existing use are however considered to be extremely low. Risk associated with areas that have had minimal previous access and use may be relatively higher. Given that specific details regarding the location of UXO in the park are incompletely known, a generalised precaution is required. All ground disturbing activities proposed for areas other than existing recreation areas and access tracks require prior approval of the Pilbara Regional Manager. The Department's guidelines for fire management in UXO zones as specified in Fire Operational Guideline 86 should be noted.

34 – Defence Force Training

Key Points

- Not all defence force training activities will be appropriate in the park.
- Approval for defence training activities within the park will be considered on a case-by-case basis and, where given, may be subject to conditions.
- UXO within the park pose a risk to health and safety, particularly in areas that have had minimal previous access and use.

The objective is to allow for defence force training if the impacts on key values can be effectively mitigated.

This will be achieved by:

1. prohibiting training exercises in areas likely to cause unacceptable damage to natural and cultural values or unacceptable disturbance to visitors to the park.
2. assessing impacts of specific proposals for undertaking defence force training activities within the park, and providing conditional approvals if/as appropriate.
3. ensuring all ground disturbing activities proposed for the areas other than existing recreation areas and access tracks have been considered for UXO risk (see Fire Operational Guideline 86 *Unexploded Ordinance*) and are subject to approval by the Pilbara Regional Manager.

35. EMERGENCY SERVICES TRAINING

Emergency service training may be an acceptable use of some lands and waters managed by the Department, although many activities associated with such training may be inappropriate on land of high conservation value such as national parks and nature reserves. The national park is sometimes used by emergency services for search and rescue training including cave and cliff rescues and 4wd training.

As a general guide, the following activities, sometimes associated with emergency services training, are not acceptable in the park:

- damaging, cutting or destroying vegetation;
- taking vehicles off roads and tracks;
- use of support or transport aircraft; and,

- use of domestic animals (for example dogs).

A written application has to be made to the Department before any training exercise can be carried out within the park. Such activities will be assessed on a case-by-case basis, so that the particular requirements of each exercise can be considered, impacts assessed and appropriate conditions applied.

35 – Emergency Services Training

Key Points

- Emergency services training may be an acceptable use of lands and waters managed by the Department if carried out in appropriate areas and in an ecologically sensitive manner.
- Approval for emergency services training activities within the park will be considered on a case-by-case basis.

The objective is to allow for emergency service training if the impacts on key values can be effectively mitigated.

This will be achieved by:

1. prohibiting training exercises in areas likely to cause unacceptable damage to the environment, or unacceptable disturbance to visitors to the park.
2. assessing impacts of specific proposals for undertaking emergency services training activities within the park, and providing conditional approvals if/as appropriate.

36. UTILITIES AND SERVICES

Occasionally utility service providers will seek access to and/or acquisition of areas in the conservation reserve system to facilitate provision of their services (e.g. electricity, gas, public transport infrastructure, water, and telecommunications).

The construction and subsequent maintenance of utility service infrastructure (or associated statutory planning proposals) within or around conservation reserves can result in a number of significant management problems, including, for example:

- disturbance of karstic systems (and other landforms), flora and fauna;
- habitat fragmentation and associated problems;
- increased susceptibility to the spread of weeds and disease;
- impediments to fauna movement;
- increased faunal road deaths;
- increased susceptibility to fire; and
- visual impact.

To limit management problems such as these, it is preferable that all utility infrastructure not servicing the park itself is accommodated outside of it. The initial response in considering proposals for utility service developments is to therefore ensure alternative siting options that avoid impacting on conservation reserve values are considered. In instances where accommodating utility service developments within or adjacent to the park is acceptable, or undesirable but nonetheless unavoidable, the Conservation Commission and Department will provide direction as necessary to minimise adverse impacts on ecological and other values.

Assessment and management of utility or services developments should include consideration of:

- impacts on the karst hydrogeological systems and biota that depend on these;
- potential for use of already degraded areas or existing utility corridors;
- potential disturbance to flora and fauna (particularly threatened or otherwise significant species or communities);
- noise or other environmental pollution;
- related fire risks;
- provision for fauna movement;
- visual landscape impacts;
- impacts on the relevant visitor management setting;
- use of renewable energy sources and recycled products wherever feasible; and

- a strategic planning approach to proposed new corridors to provide optimal routes and minimise impacts on park values.

Developments with the potential for significant impacts on the values of the park may be referred to the EPA for consideration to assessment of environmental impact under the Environmental Protection Act. Referral to the Department of Planning may also be required.

A Bureau of Meteorology weather watch radar facility and a Telstra communication tower have been situated in the park since the 1970s and are managed under a lease arrangement (see Section 29). This plan provides for continuation of these arrangements subject to ongoing Conservation Commission consultation.

36 – Utilities and Services

Key Points

- The construction and subsequent maintenance of utility service infrastructure within or adjacent to the park can cause a number of significant management problems.
- Ideally, all utility services and infrastructure not servicing the park should be accommodated outside of it, but where this is not possible the Department and Commission seek to minimise ecological impacts through assessment of and negotiation regarding development proposals.
- A Bureau of Meteorology weather watch radar facility and a Telstra communication tower situated within the park are managed under a lease arrangement.

The objective is to minimise impacts of utility service developments on key values.

This will be achieved by:

1. opposing utility service developments that cannot be managed to be acceptable on ecological, cultural or aesthetic grounds.
2. liaising with relevant agencies and development proponents where there are no feasible alternatives to the development of utilities and infrastructure in the park and providing direction as necessary to ensure park values are protected.
3. referring development proposals to the EPA for assessment as necessary.
4. seeking contributions to management costs to offset the impacts of developments in accordance with environmental offsets principles.
5. ensuring a financial return to conservation activities is collected at a level equivalent to those that would be charged on private land under standard market conditions.
6. ensuring adequate specialist supervision and monitoring of utility development site works as necessary to ensure adverse impacts on park values are minimised.
7. ensuring that land disturbed by utility service development and maintenance is adequately rehabilitated using appropriate local species, and at the expense of the parties responsible for the development.

37. SCIENTIFIC AND RESEARCH USE

Scientific research activity involving disturbance of flora or fauna (including fossil flora or fauna) requires a licence issued under the Wildlife Conservation Act. Such licences will generally be subject to conditions, including that results are forwarded to the Department. Research involving geoheritage sites has additional requirements (see *Geoheritage* in Section 14).

Whilst access for bioprospecting activities[27] can usually be managed to avoid significant ecological impact, it is preferable that this activity be conducted outside of national parks whenever feasible. Licences allowing bioprospecting sampling will only be issued for the park if there is sufficient justification that the activity needs to specifically occur there, the activity can be conducted in an ecologically sustainable manner, and biodiversity can be protected.

[27] Licences for bioprospecting (exploration activities related to the production of new pharmaceutical, agrochemical and other products) can be issued under the Wildlife Conservation Act and may require a CALM Act licence. Such licences may be issued to assist the Department in fulfilling one of its functions under section 33 of the CALM Act, namely to promote and encourage the use of flora for therapeutic, scientific or horticultural purposes for the good of people in this State or elsewhere, and to undertake any project or operation relating to the use of flora for such a purpose. However, preference is given in any such licence consideration for bioprospecting activities to be undertaken outside the formal conservation reserve system.

For information on scientific research needs of the park see Section 43 *Research and Monitoring*.

37 – Scientific and Research Use

Key Points

- Research that involves disturbances to flora and fauna requires a permit from the Department's Wildlife Protection Branch.

The objective is to allow scientific research that does not have significant adverse impacts on key values and which will assist in delivering the objectives of this management plan or other Departmental objectives.

This will be achieved by:

1. implementing the permit system for research proposals, including specification and enforcement of conditions under which work may be carried out and results disseminated.
2. ensuring the Director of Geological Survey of Western Australia is consulted as necessary regarding research involving geoheritage sites (see Geoheritage in Section 14).
3. ensuring comprehensive documentation regarding fossil extraction undertaken under permit for research purposes.

38. WATER ABSTRACTION

Essentially all of the water used to service public, private, tourism and industrial purposes on the Cape Range peninsula is derived from the unconfined aquifer (see Section 15). As well as being important to humans, the thin freshwater layer of the unconfined aquifer has particular ecological significance (see Section 17), and hence it is important to ensure this limited resource is utilised in an ecologically sustainable manner.

Under section 33(1)(dc) of the CALM Act, a function of the Department is to promote the conservation of water, both in terms of quality and quantity, on the land it manages. In addition, the Department of Water has responsibilities for water resource utilisation and conservation in areas proclaimed under the *Rights in Water and Irrigation Act 1914* and the *Country Areas Water Supply Act 1947*.

The park is within the Exmouth Groundwater Subarea proclaimed under the *Rights in Water and Irrigation Act 1914* and is intersected by a water reserve proclaimed under the *Country Areas Water Supply Act 1947*. The water reserve includes an existing borefield operated by the Water Corporation for Exmouth's water supply, but also covers areas anticipated to be required for further borefield expansion. Under legislation administered by the Department of Water, licences are required for water abstraction proposals within the Exmouth Groundwater Subarea. In addition, water abstraction proposals within the park also require a permit issued under section 101(1a) and (1e) of the CALM Act. These permits are subject to Conservation Commission consideration of the proposal and the approval of the Minister for Environment. Access to the park for the purposes of water abstraction and the development of associated infrastructure for public water supply purposes will be facilitated where potential adverse impacts can be prevented or sufficiently mitigated. Significant proposals will be referred to the Environmental Protection Authority for their consideration of assessment under the Environmental Protection Act (see also Section 36 *Utilities and Services*).

The Department of Water sets the groundwater allocation for the Exmouth West Subarea (in which most of the existing national park lies) at its present level. The allocation plan for the subarea notes that groundwater recharge on the western side of Cape Range is less than on the eastern side, and in view of this, and the land uses associated with conservation reserves, proposes that no increases in current allocation limits are available for this area (Water and Rivers Commission 1999). Proposals within this management plan are in keeping with the policies in the Exmouth groundwater allocation plan. Any groundwater extracted from the national park over the life of the plan will be taken and used sustainably. For example, any proposals for permanent or semi-permanent accommodation (e.g. ecolodge) will only be implemented if any potential impacts on hydrogeological and associated values can be effectively prevented or sufficiently mitigated (see Sections 14 and 15 and Appendix 8b).

Groundwater abstraction in the national park occurs via three wells that provide marginal water. These wells are currently mainly used for management purposes at the Milyering Visitor Centre or elsewhere in the park. Other than this limited provision of water, visitors are generally required to provide for their own drinking (and other) water needs. Education of visitors about groundwater conservation issues will be a key element of sustainable

water resource use.

38 – Water Abstraction

Key Points

- The freshwater lens of the unconfined aquifer underlying the Cape Range peninsula is a limited but significant ecological and socioeconomic resource, and utilisation of it must be sustainable.
- The abstraction and use of groundwater from within and for the purposes of visitor use and management in the park must be within ecologically sustainable limits.

The objective is to ensure human activities within and adjacent to the park do not have significant adverse impacts on the quality or quantity of groundwater.

This will be achieved by:

1. protecting the quality and integrity of the groundwater resource, and ensuring sustainable use within the park by:
2. implementing actions as per Sections 14 and 15 to protect and ensure sustainable use of groundwater; and
3. ensuring that potential adverse impacts on integrity of the aquifer system from site developments and operational activities are assessed and mitigated.
4. allowing access to the park for the purposes of water abstraction and the development of associated infrastructure for public water supply purposes where this is consistent with the CALM Act and where potential adverse impacts can be prevented or sufficiently mitigated.
5. issuing water removal permits in accordance with the CALM Act for the sustainable taking of water from the park subject to consultation with the Conservation Commission and approval of the Minister for Environment.
6. undertaking, and/or working cooperatively with other agencies/organisations to undertake research that will improve knowledge of groundwater-dependent species and communities.
7. informing the relevant government agencies (e.g. the Department of Water) regarding any proposed site development plans within the water reserve.
8. ensuring visitors have access to information regarding local groundwater conservation issues.

PART G. INVOLVING THE COMMUNITY

The Department undertakes a range of activities to develop community awareness and appreciation of the State's natural environment and biodiversity and promote community involvement in and support for its protection and conservation. These include programs aimed at public participation in management, community education, communication and advocacy, developing strategic alliances and partnerships and promoting the health benefits of visiting parks. Departmental policy statements providing guidance for community involvement include:

- Policy Statement No. 15 – *Community Involvement (Public Participation and Volunteers*;
- Policy Statement No. 25 – *Community Education and Interpretation*; and
- the *Good Neighbour Policy*.

39. INFORMATION, EDUCATION AND INTERPRETATION

A communication program is vital to achieving park management objectives and should include:

- information, education and interpretation[28] for visitors;
- opportunities for community involvement; and
- liaison, consultation and advisory services to stakeholder groups.

An effective communication program informs the public of the attractions, facilities, recreational opportunities and interpretive services available, and assists in increasing appreciation and understanding of the natural and cultural environment. It also fosters a sense of community ownership of the park, engenders support for management and encourages appropriate behaviour. Communication is also vital to managing visitor risk so visitors have safe, enjoyable experiences in the park.

Provision of communication services (information, education, interpretation etc) for the park is to a large degree focused on the Milyering Visitor Centre where visitors can view the displays, obtain brochures, purchase books and other merchandise, and/or speak directly with the staff that work in the centre. There is a need to upgrade and improve the interpretation/education displays within the centre as part of a plan to further develop Milyering as a main hub for visitor activities (see introduction to Part E and *Camping* in Section 28). Interpretive signs are used throughout the park to increase visitor understanding of park values and convey information about permitted, appropriate and safe use. Field staff also occasionally conduct guided interpretive activities as resources allow or special needs arise (e.g. requests for guided activities for non-commercial, educational or not-for-profit groups). Routine ranger patrols of the park provide an invaluable opportunity for informal information exchange with visitors. Information about the park is also widely available from many external sources, for example tour operators play an important role in providing information to visitors through guided interpretive experiences and activities. The provision of Departmental advice, resources and training to operators facilitates the delivery of consistent and accurate information and can be useful in reinforcing Departmental messages to visitors.

Detailed communication planning for the park will be undertaken as part of, and to facilitate, the implementation of this management plan. A key objective of the communications plan will be to raise community awareness of, and appreciation for the park's key values (see Section 4). In the event that World Heritage listing is achieved for an area encompassing the park, a particular obligation under the World Heritage Convention will be to strengthen appreciation and respect of the property's world heritage values, particularly through educational and information programs. Similarly it is important that the community is provided with opportunities to increase understanding and awareness of any other internationally significant values or National Heritage values formally recognised over the life of this plan.

[28] Information is usually one-dimensional communication from sender to receiver, for example, the provision of details, facilities, activities, features and regulations and includes off-site promotion of the park and brochures. Education provides resources and programs designed specifically for various educational groups and include worksheets or other support materials. Interpretation explains natural and cultural features and management activities and includes on-site signs, brochures and interpretive activities.

Communication planning will be done in conjunction with recreation site planning and development to identify the best means of conveying communication messages at individual recreation sites in the context of broader park communication and other management objectives. Communication of messages pertinent to Indigenous cultural heritage must involve traditional custodians (see Section 23).

Communications planning for the park should complement and be integrated as much as possible with approaches used for Ningaloo Marine Park and the Jurabi and Bundegi Coastal Parks. Liaison with groups such as tourism agencies and schools is also important.

39 – Information, Education and Interpretation

Key Points

- An effective communication program developed with consideration to the park's regional context is vital to achieving park management objectives and increasing awareness of its key values.

The objective is to promote community awareness and understanding of key values and engender support for their protection and management.

This will be achieved by:

1. developing and implementing a communications plan for the park that is integrated with or complements communications planning for the Ningaloo Marine Park and the Jurabi and Bundegi Coastal Parks.
2. providing information to visitors on the park's key values and other management issues (e.g. visitor safety, wildlife interaction guidelines).
3. upgrading interpretation/education displays within Milyering Visitor Centre.
4. ensuring that traditional custodians (e.g. through the Coral Coast Park Council or equivalent) have a primary and active role in communication planning pertinent to Indigenous cultural heritage.
5. providing support, where possible, to institutions using the park for educational and research purposes.
6. facilitating the dissemination of relevant and factual interpretive material by commercial tour operators to improve communication of messages regarding park values and management.
7. liaising with tourism agencies regarding park communication issues as necessary.

Key Performance Indicator (see also Appendix 1)

Performance Measure	Target	Reporting Requirements
39.1. Level of visitor satisfaction with education and interpretation opportunities available in the park.	39.1. Remains stable or increases over the life of the plan.	Every 3 years.

40. WORKING WITH THE COMMUNITY

Key functions of the Conservation Commission and the Department are to promote and facilitate community involvement in management of conservation lands. The community, as groups or individuals, is encouraged to be involved in both the planning and management of many of the Department's activities.

The community have been involved in preparation of this management plan by providing initial comments on their perspective of the issues within the park via written submissions and consultation meetings. In particular, interested community members have been invited to form the Coral Coast Parks Advisory Committee which provided advice for the Department to consider throughout the preparation of the management plan. The Coral Coast Aboriginal Park Council, established to facilitate Aboriginal involvement in management of the park (see Section 8 *Management Arrangements with Aboriginal People*), was also provided with opportunity to provide advice to the management planning team and will continue to be involved in finalisation and implementation of the management plan as appropriate. At this stage of the planning process interested community members and organisations have the opportunity to formally comment on the proposed management of the park either by written submission or by making an electronic submission on the Department's webpage.

Ongoing community support is essential for the successful implementation of the approved final management plan. The involvement of Aboriginal people, adjacent landowners and managers, park users, tour operators and interest groups is important to the conservation of the park's values. Community members are encouraged to

take part in volunteer activities in the park such as visitor surveys, clean up days, campground hosting and assistance with maintenance, such as erosion control, weed removal, track maintenance, and data collection on visitors and wildlife. In the 2006-2007 financial year over 38, 400 volunteer hours were contributed to park management activities, and 2000 volunteer hours were contributed by wildlife carers tending to sick and injured animals from the Exmouth area. Volunteer activities not only increase the Department's work capabilities and skills base, but also foster communication links and understanding with the community.

40 – Working with the Community

Key Points

- Community involvement and support are critical to the successful implementation of this management plan.

The objective is to facilitate effective community involvement in management of the park.

This will be achieved by:

1. continuing to provide and promote opportunities for involvement of interested community members in management of the park (e.g. the Coral Coast Parks Advisory Committee, the Coral Coast Aboriginal Park Council, and volunteer programs).

PART H. IMPLEMENTING THE PLAN

41. ADMINISTRATION

For administrative purposes, the Department is structured into geographic regions that are further sub-divided into districts. The Cape Range National Park is in the Exmouth District of the Pilbara Region. The day-to-day implementation of the final management plan will be the responsibility of the District Manager, Exmouth District, who coordinates the operational management of the park.

Operational facilities (e.g. Ranger/volunteer accommodation, workshop) are situated near Milyering and at Bungalup. Works to these facilities may be required over the life of this management plan to better accommodate its functions (e.g. use by staff, volunteers, and researchers working in the park).

A number of management access only tracks are also maintained throughout the park for operational purposes (e.g. fire management, weed and introduced animal control operations).

42. RESEARCH AND MONITORING

Research and monitoring are important components of park management, and are required to effectively implement and measure the success of this management plan. Research improves knowledge and understanding of the park's values, and the processes that affect them, including the impacts of human activities. Monitoring the condition of key values facilitates performance assessment and provides a scientific basis for improving and adapting future management to achieve best practices.

It is appropriate that research and monitoring involve a wide range of organisations and groups. The involvement of volunteers, educational institutions and individual researchers can extend and improve research efforts and reduce research and monitoring costs. The Gascoyne Development Commission in conjunction with the Shire of Exmouth is exploring options for the development of a multidisciplinary research centre for use by national and international research bodies, industry and other stakeholders. Opportunities for the Department to develop useful research partnerships would be significantly improved if the concept of this 'Ningaloo Ocean and Earth Research Centre' in Exmouth were realised.

Research Requirements

Departmental research and monitoring activities are subject to a prioritisation process for research across the entire conservation reserve system. For example, departmental research gives priority to:

- describing and documenting Western Australia's biological diversity;
- providing knowledge on how best to conserve the State's biodiversity; and
- increasing knowledge of visitor use patterns and profiles (e.g. demographics, level of use of recreation sites, visitor expectations and perceptions).

Allocating priority for research and monitoring across the State may result in the implementation of programs that have relatively little direct management application to the park but significant application to the broader conservation reserve system and species or communities elsewhere.

Research Projects for the Park

The following park relevant research requirements include knowledge gaps identified by Kendrick and Mau (2002) and others that have been identified through the preparation of this management plan.

- flora and fauna surveys are required. Vegetation mapping of the park is at an extremely broad scale and does not adequately reflect known values. Minimal floristic survey has been undertaken. Similarly, knowledge of fauna species and distribution within the park is incomplete;
- further flora and fauna surveys (including of subterranean fauna) and other research is required for areas proposed for addition to the conservation reserve system (see Section 12.);
- research into the potential impacts of and management responses to climate change, and in particular for

threatened, priority or other species of special conservation significance within the park;
- research to assist in understanding the karst hydrological regimes, and in identifying ecological water requirements for groundwater dependent species and communities (in particular species and communities of special conservation significance);
- research into the status and life cycle requirements of threatened, priority and other species of special conservation significance (e.g. endemic or near endemic species);
- research into the interplay of altered fire regimes, weed invasion and total grazing pressure, and the effects of this on native plant communities, native fauna and habitat.
- research into the impacts and management of buffel grass, including fire management responses and rehabilitation implications;
- research into the relative contributions of introduced and native herbivores to total grazing pressure on native vegetation.

There is also an ongoing need for social research to support continual improvement in recreation planning and management. Other more specific research and monitoring requirements for key performance assessment are reflected in the performance indicators identified in Appendix 1.

42 – Research and Monitoring

Key Points
- Research and monitoring are important components of park management, and are required to effectively implement and measure the success of this management plan.
- The involvement of volunteers, educational institutions and individual researchers can reduce research and monitoring costs, thereby helping to provide quality information for the benefit of the broader community.
- Departmental research and monitoring activities in the park are subject to a prioritisation process for research across the entire State.

The objective is to increase knowledge and understanding (e.g. of the values, threats and visitor use) to improve management and support management performance assessment.

This will be achieved by:
1. identifying and implementing integrated research and monitoring programs that facilitate management of the park, as resources permit and according to priority. Research and monitoring will focus on issues and key values relevant to successfully implementing this management plan, and the establishment of baseline information for future assessment.
2. ensuring relevant information gained through broader Departmental research, monitoring and experience is made available to the District and Region where it can be stored in local office libraries and databases, updated when required and used, if necessary, to modify management practices.
3. developing and maintaining a database of historical, current and required research on the park.
4. incorporating research and monitoring findings into interpretive and educational material, or make otherwise publicly available where appropriate.
5. encouraging and supporting, wherever possible, external agencies and individuals where their research contributes directly to Departmental strategies or the implementation and assessment of this management plan.
6. ensuring that research and monitoring activities do not adversely impact on the values of the park.
7. pursuing external funding sources to assist in achieving research and monitoring objectives.

43. TERM OF THE PLAN

The management plan for the Cape Range National Park will guide management of the park for a period of 10 years from the date the final management plan is gazetted. During this time, amendments to the final management plan are allowed under section 61 of the CALM Act. If an amendment is necessary, the proposed changes will be released for public comment.

At the end of the 10 year period, the management plan may be reviewed and a new management plan prepared. The new management planning process requires full public consultation and approval from the Minister for Environment. If the plan is not reviewed and replaced by the end of the 10-year period, this plan will remain in force.

GLOSSARY

1080	A naturally occurring toxin (sodium fluoroacetate) found in many native Australian plants known as poison peas (*Gastrolobium* sp.).
A Class Reserve	Classification under the *Land Administration Act 1997* reflects security of tenure, level of approval required to alter the reserve's area, purpose or classification.
Aeolian	Wind-deposited materials.
Anchialine	Refers to a groundwater zone in coastal regions where mixing occurs between fresh and salt water.
Anticline	A-shaped folds resembling an arch.
Aquifer	A layer of rock which holds and allows water to move through it, and from which water can be extracted.
Avifauna	The birds or the kinds of birds of a region, period or environment
Biodiversity	The variety of all life forms: the different plants, animals and micro-organisms, the genes they contain and the ecosystems they form; often considered at three levels: genetic diversity, species diversity and ecosystem diversity.
Biogeography	The study of both geography and biology including the relationships between plants, animals, soils, water, climate and humans.
Biotic	Of, or relating to living things; caused or produced by living organisms.
Cape Range peninsula	Land north of a line between Ningaloo Homestead on the west coast and the bay of Rest on the eastern side, including Cape Range and the Rough Range, an area of approximately 2,200 square kilometres.
CAR (Comprehensive, Adequate and Representative) Reserve System	The terms comprehensive, adequate and representative together describe the attributes of an ideal reserve system. These terms are defined in the Australian and New Zealand Environment and Conservation Council's *Guidelines for Establishing the National Reserve System* as: ❖ comprehensiveness – inclusion of the full range of ecosystems recognised at an appropriate scale within and across each bioregion; ❖ adequacy – the maintenance of the ecological viability and integrity of populations, species and communities; and ❖ representativeness – the principle that those areas that are selected for inclusion in reserves reasonably reflect the biotic diversity of the ecosystems from which they derive. In addition to using the scientifically-based CAR criteria, spectacular landforms and scenery as well as natural areas of high public use are also commonly included in parks and reserves.
Catchment	The surface area from which water runs off to a river or any other collecting reservoir.
Climate Change	Climate change is a result of global warming, caused by increases in the concentrations of greenhouse gases such as carbon dioxide, methane and nitrous oxide.
Commercial concession	A lease or licence, administered by the Department to conduct commercial operations on lands or waters held by the Conservation Commission or the Marine Parks and Reserves Authority.
Conservation	The protection, maintenance, management, sustainable use, restoration and enhancement of the natural environment.
Conservation and Land Management Executive Body	The executive body established under section 36 of the CALM Act.
Conspecific	Belonging to the same species.
Critical weight mammals	Mammals weighing between 35 grams and 5.5 kilos.
Cultural Significance	In accordance with the meaning in the Burra Charter, cultural significance means aesthetic, historic, scientific or social value for past, present or future generations.
Culturally Significant Place	The use of the term place in this context has the meaning defined in the Burra Charter, that is, of a site, area, land, landscape, building or other work, group of

	buildings or other works, and may include components, contents, spaces and views.
Director General	References in this plan to the Director General of the Department of Environment and Conservation are references to the "CEO" as defined in section 3 of the CALM Act.
Declared species	Either plants that are declared as weeds or animals that are declared as pests. A list of declared species, with their levels of declaration in various areas of the State is published annually in the Government Gazette pursuant to Section 37 of the *Agricultural and Related Resources Protection Act 1976*.
Disjunct	Populations are said to be disjunct when they are geographically separated from the main range.
Ecological community	An integrated assemblage of species that inhabit a particular area.
Ecological Water Requirements (EWR)	The groundwater regime that will maintain ecological values. EWR are often expressed as water level and quality parameters.
Ecosystem	A community or an assemblage of communities of organisms, interacting with one another and the environment in which they live.
Ecotourism	Tourism focused on appreciation of ecological values, such as to see particular biota or to visit national parks and other reserves
El Niño Southern Oscillation	A term referring to the extensive warming of the central and eastern Pacific that leads to a major shift in weather patterns across the Pacific.
Endemic	Flora or fauna that is naturally restricted to a particular region.
Environmental Offsets	Environmental offsets aim to ensure that significant and unavoidable adverse environmental impacts are counterbalanced by a positive environmental gain, with a goal of achieving a 'net environmental benefit'.
Environmental Water Provisions (EWP)	The actual water abstraction allocation levels made after consideration of the economic and social requirements for the water.
Environmental weed	An unwanted plant species growing in natural ecosystems that modifies natural processes, usually adversely, resulting in the decline of the communities they invade; usually an introduced plant.
Epoch	A unit of geologic time that is a division of a period.
Estuarine	Relating to a water passage where the tide meets a river current; especially an arm of the sea at the lower end of a river.
Eutrophication	The enrichment of water by nutrients, such as compounds of nitrogen or phosphorus. It causes an accelerated growth of algae and higher forms of plant life. These consume more oxygen often leading to an oxygen deficit, which can have a major detrimental effect on the fish other aquatic organisms.
Exotic	A species occurring in an area outside its historically known natural range as a result intentional or accidental dispersal by human activities.
Extant	Still existing.
Fauna	The animals inhabiting an area; including mammals, birds, reptiles, amphibians and invertebrates. Usually restricted to animals occurring naturally and excluding feral or introduced animals.
Feral	A domesticated species that has become wild.
Fire regime	The combination of season, intensity, interval, extent and patchiness of fire in a given area over time.
Flora	The plants growing in an area; including flowering and non flowering plants, ferns, mosses, lichens, algae and fungi (although fungi are strictly speaking not plants). Usually restricted to species occurring naturally and excluding weeds.
Genetic	To do with the hereditary units that are composed of sequences of DNA.
Geoheritage	State-wide to nationally significant features of geology, including igneous, metamorphic, sedimentary, structural, palaeontologic, geomorphic, pedologic or hydrologic attributes that offer important information or insights into the formation or evolution of the continent; or that can be used for research, teaching or as a reference site.
Geology	The study the history of the earth and its life especially as recorded in rocks.
Geomorphology	The study of the earth surface features and their formation.
Germplasm	The genetic material with its specific molecular and chemical makeup that comprises the physical foundation of the hereditary qualities.
Gondwana	The southern supercontinent Gondwana (originally Gondwanaland) included most of the landmasses which make up today's continents of the southern hemisphere,

	including Antarctica, South America, Africa, Madagascar, India, Australia-New Guinea, New Zealand, and New Caledonia.
Groundwater	All free water below the surface in the layers of the Earths crust.
Habitat	The place where an animal or plant normally lives and reproduces.
Herpetofauna	Reptiles and amphibians.
High Water Mark	In relation to tidal waters means highest level of water at spring tides.
Holocene	The present geological time period commencing 10,000 years ago.
Hydrology	The scientific study of the characteristics of water, especially of its movement in relation to the land.
Indigenous	Native or belonging naturally (to a place).
Intertidal	Between the levels of low and high tide (also known as the littoral zone).
Introduced species	See *Exotic*.
Invertebrates	Animals without backbones, for example, insects, worms, spiders and crustaceans.
Jurassic Period	The Jurassic period is a major unit of the geologic timescale that extends from about 195 million years BP at the end of the Triassic to 135 million years BP at the beginning of the Cretaceous. The Jurassic constitutes the middle period of the Mesozoic era, also known as the Age of Dinosaurs. The start of the period is marked by the major Triassic-Jurassic extinction event.
Key Fire Response Species and Communities	Species and communities that are either sensitive to fire or otherwise significant in the development of planned fire regimes (e.g. keystone, threatened, priority, endemic and disjunct species).
Karst	Term used to describe landscapes that are commonly characterised by closed depressions, subterranean drainage and caves. Karst landscapes are formed principally by solution of the rock, most commonly limestone.
Landform	All the physical, recognisable, naturally formed features of land having a characteristic shape; includes major forms such as a plain, mountain or plateau, and minor forms such as a hill, valley or alluvial fan.
Landscape Character Type	A broad scale area of land with common visual characteristics based on landscape.
Late Cretaceous	The Cretaceous period spans the time between the Jurassic period (~135M BP) through to the beginning of the Tertiary period (65M BP). The late cretaceous is significant for all the major body plans of modern life were in place (birds, flowering plants and primitive mammals). The end of the Late Cretaceous is sharply defined, being placed at an iridium rich layer found worldwide that is believed to be associated with the Chicxulub impact crater in Yucatan and Gulf of Mexico dated at 64.3 M BP).
Laurasia	Laurasia was a supercontinent that broke off from the Pangaean supercontinent in the late Mesozoic era. Around 200 million years ago, Laurasia divided into the continents after which it is named: Laurentia (now North America) and Eurasia (excluding India). The southern supercontinent created is called Gondwana.
Lithology	The study and description of the general, gross physical characteristics of a rock, especially sediments composed mainly of broken fragments of pre-existing minerals or rocks that have been transported from their places of origin, including colour, grain size, and composition.
Macropod	A member of a super-family that includes kangaroos, rat-kangaroos and wallabies.
Midden	A mound or deposit containing shells, animal bones, and other refuse that indicates the site of a human settlement.
Miocene	Fourth epoch of the Tertiary Era. Time period from 23.8 to 5.3 million years ago.
National Park	National parks have national or international significance for scenic, cultural or biological values, and can accommodate recreation without detracting from these values. They are managed to conserve wildlife and the landscape for scientific study and to preserve features of archaeological, historical or scientific interest. They are also managed to allow forms of recreation that do not adversely affect their ecosystems or landscapes.
Nature-based tourism	Tourism that is dependent upon the resources of the natural environment and incorporates a range of tourism experiences including adventure tourism, eco-tourism and aspects of cultural and rural tourism.
Palaeocene	Is the first geologic epoch of the Tertiary period of the modern Cenozoic era.

	Meaning 'early dawn of the recent' it stretches from 64-58 M BP and commenced immediately following the mass extinction event at the end of the Cretaceous, known as the K-T boundary that marks the demise of the dinosaurs.
Palaeontology	The study of life in the geological past.
Paleochannels	Ancient stream or riverbeds, cut into the surrounding soil or rock, which have been re-buried by other sediments after the stream changed its course or dried up.
Pathogen	Any organism (bacterium or virus) or factor that causes disease within a host.
Pleistocene	The geological time period commencing about 2 million years ago and ending at the Holocene 10,000 years ago.
Potable	Suitable for drinking.
Priority Flora and Fauna Listings	**Priority 1: Poorly known species**. Species that are known from one or a few collections or sight records (generally less than 5), all on lands not managed for conservation and under threat of destruction or degradation. Species may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements and appear to be under immediate threat from known threatening processes. **Priority 2 : Poorly known species** Species that are known from one or a few collections or sight records (generally less than 5), some of which are on lands not under immediate threat of destruction or degradation. Species may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements and appear to be under threat from known threatening processes. **Priority 3: Poorly known species** Species that are known from collections or sight records from several localities not under imminent threat, or from few widespread localities with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. Species may be included if they are comparatively well known from several localities but do not meet adequacy of survey requirements and known threatening processes exist that could affect them. **Priority 4: Rare, Near Threatened and other species in need of monitoring**. ❖ Rare. Species are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection, but could be if present circumstances change. These species are usually represented on conservation lands. ❖ Near Threatened. Species that are considered to have been adequately surveyed and that do not qualify for Conservation Dependant, but that are close to qualifying for Vulnerable. ❖ Species that have been removed from the list of threatened species during the past 5 years for reasons other than taxonomy. **Priority 5: Conservation dependant species** Species that are not threatened but are subject to a specific conservation program, the cessation of which would result in the species becoming threatened within 5 years.
Quaternary	The present geological period commencing around 2 million years ago, includes the Pleistocene and recent Holocene time periods.
Rehabilitation	The process necessary to return disturbed land to a predetermined state, in terms of surface, vegetational cover, land use and/or productivity.
Relictual/relict	A surviving individual, population, community or species that is characteristic of an earlier period in evolutionary history. Also an area to which a once more widespread population, species or community is now confined.
Representative	In terms of a comprehensive, adequate and representative protected area reserve system; representative enough that the reserves reflect the biotic diversity of the ecosystems.
Soil erosion	A combination of processes in which soil is loosened, dissolved, or worn away, and transported from one place to another by climatic, biological or physical agents.
Statutory	Enacted or required by law.
Stygofauna	Animals that live in underground waters such as those in caves, most being small

	invertebrates. The term is used to describe an array of subterranean fauna that utilise groundwater habitats to varying degrees, e.g. stygobites are obligatory subterranean species inhabiting groundwater, whereas those that occasionally exploit resources in the groundwater system are referred to as stygophiles.
Taxa	A defined unit (for example, species or genus) in the classification of plants and animals.
Teleost	Of or belonging to the Teleostei – a large group of fishes with bony skeletons, including most common fishes.
Temperate	Of mild temperature, the Temperate Zone is the area or region between the tropic of Cancer and the arctic circle in the Northern Hemisphere or between the tropic of Capricorn and the Antarctic circle in the Southern Hemisphere.
Tertiary	The geological period commencing around 65 million years ago and ending at the Quarternary period 2 million years ago includes five defined time periods.
Tethyn	Reference to the tethyn layer of geologic stratification allied with the Tethys Ocean that existed from the Triassic to the Jurassic as Pangea was split into Gondwana and Laurasia.
Threatened ecological community	Threatened ecological communities are assessed by the Department and endorsed by the Minister for Environment. They are non-statutory unless listed under the Commonwealth EPBC Act. There are four categories of threatened ecological communities: presumed totally destroyed, critically endangered, endangered (may be destroyed within 20 years) and vulnerable (may be destroyed within 50 years). As with flora, there are also possible threatened ecological communities that are allocated Priority 1 to 5 within the Department.
Total Grazing Pressure	The total impact of all grazing animals on a particular area including the impact of native and feral animals (and domestic stock if applicable).
Tourism	Generally considered in this management plan to pertain to visitors from outside the area staying overnight in or adjacent to the park.
Troglobites	Subterranean fauna that lives within and has obligatory dependence upon subterranean air filled voids such as cave environments, and that exhibits adaptation to underground life (e.g. eyeless, non-pigmented, with long antennae and limbs).
Troglofauna	Animals that live in subterranean air filled voids such as caves, most being small invertebrates. The term is used to encompass an array of fauna that utilise subterranean environments to varying degrees, e.g. troglophiles which use caves facultatively and trogloxenes which frequently occur in caves but do not complete their life cycle there and usually feed outside of caves.
Tropical	A region or climate that is frost-free with temperatures high enough to support year-round plant growth given sufficient moisture, the Tropical Zone is the land between the tropic of Cancer and the tropic of Capricorn.
Vertebrates	Animals that have a spinal column which includes fish, amphibians, reptiles, birds and mammals.
Visual Landscape	Appearance or visual quality of an area determined by its geology, soils, landforms, vegetation, water features and land use history.

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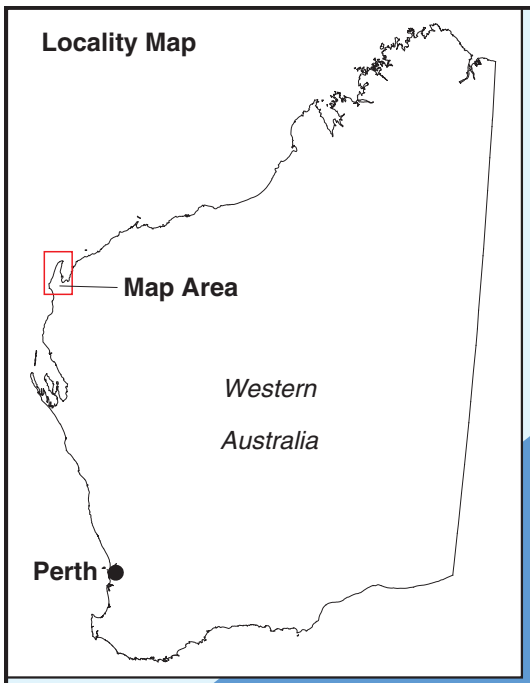
Mau, Roland – Nature Conservation Coordinator, Department of Conservation and Land Management, Exmouth District, Western Australia.

Mawson, Peter – Senior Zoologist, Department of Conservation and Land Management, Western Australia.

Pearson, David – Senior Research Scientist, Department of Conservation and Land Management.

Map 1. North West Cape Tenure



INDIAN OCEAN

N

MUIRON ISLANDS 31775
North Muiron Is
South Muiron Is

North West Cape
North West Reef
Vlaming Head
JURABI COASTAL PARK
Pt Murat
MURAT RD
Jurabi Pt
Yardie Creek
BUNDEGI COASTAL PARK
EXMOUTH
Reef
Low Pt
34055
T-bone Bay
Ningaloo
YARDIE CREEK ROAD
SHOTHOLE CANYON RD
Exmouth Gulf
A 27288 CAPE RANGE NATIONAL PARK
CHARLES KNIFE RD
EXMOUTH ROAD
Turquoise Bay
Pilgonaman Bay
Sandy Bay
Osprey Bay
SANDY BAY TRACK
Yardie Creek
LEARMONTH
Heron Pt
Bay Of Rest
Pt Lefroy
NINGALOO YARDIE CREEK RD
EXMOUTH GULF
MINILYA
Learmonth Air Weapons Range

Legend

- Management Plan Area boundary
- National park
- Nature reserve
- Miscellaneous DEC reserve, jointly vested with the Shire of Exmouth
- Ningaloo Marine Park
- Muiron Islands Marine Management Area
- Ningaloo Marine Park (Commonwealth territorial sea)
- Other Crown reserves (Including variously vested crown reserves)
- Other leasehold
- Unallocated Crown land (UCL)
- Freehold land
- Commonwealth land (Defence)
- Areas proposed for addition to the public conservation estate (see Section 12)
- Proposed Conservation and Limestone Resource Management Reserve (CALM Act section 5(1)(h) Reserve)
- Conservation estate additions proposed by DEC in 1987
- 2015 pastoral lease exclusion area
- Pastoral lease boundary
- 2wd Sealed road
- 2wd Unsealed road
- 4wd Track

Marine Park Zones

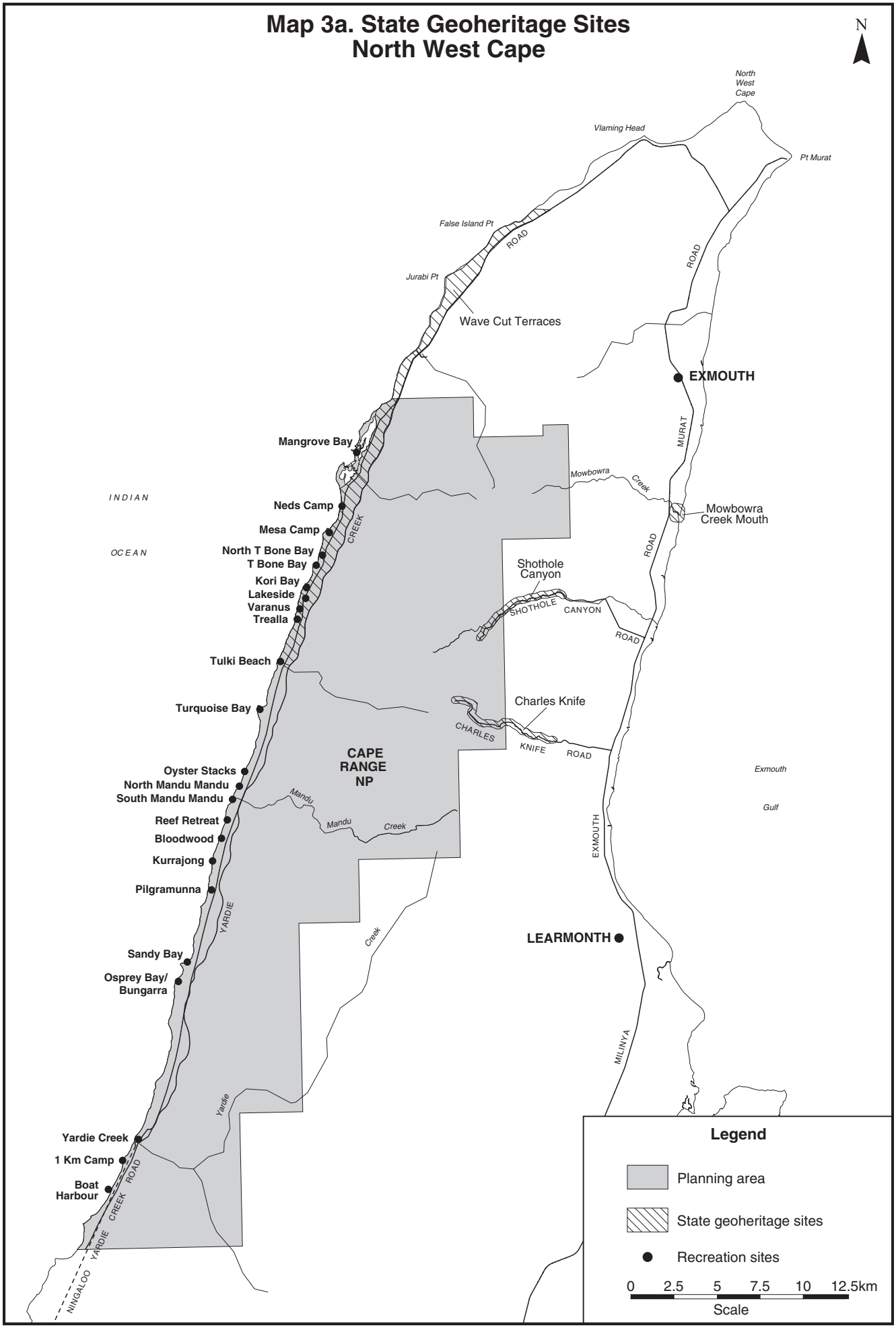
- Sanctuary zone
- Recreation zone
- Special purpose zone
- General use zone
- Conservation zone
- Marine management area (unclassified)

0 2.5 5 10 15 20km

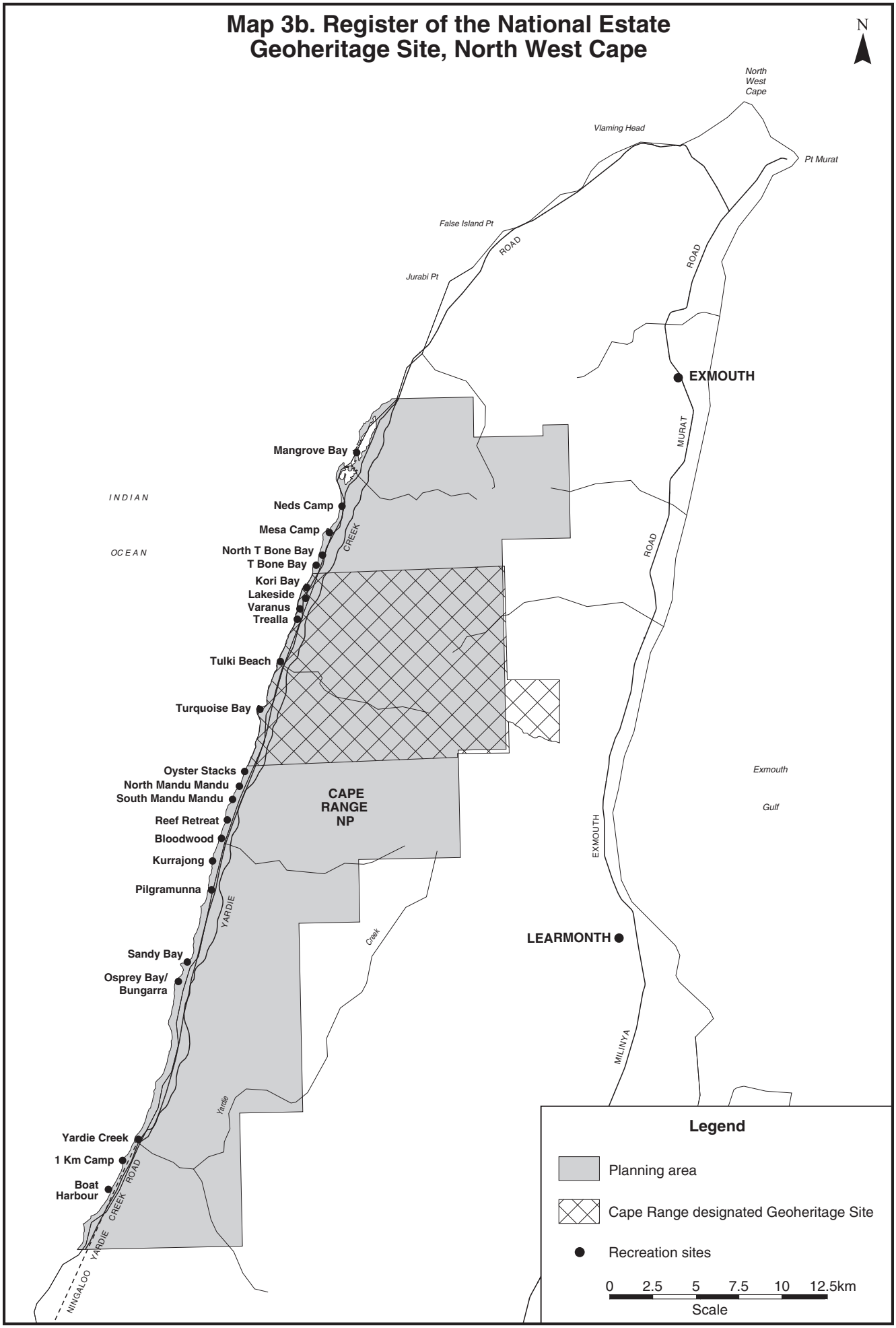
Scale


Map 2. Location of Red Dune Fields within Unallocated Crown Land
N
INDIAN
OCEAN
North West
Cape
North West Reef
Vlaming
Head
Pt Murat
ROAD
Reef
Ningaloo
CREEK
ROAD
YARDIE
Red dune
fields
Exmouth
Gulf
Exmouth
Townsite
MURAT
CAPE
RANGE
NP
A 27288
Legend
Planning area
Unallocated Crown Land (UCL)
0 1 2 3 4 5km
Scale

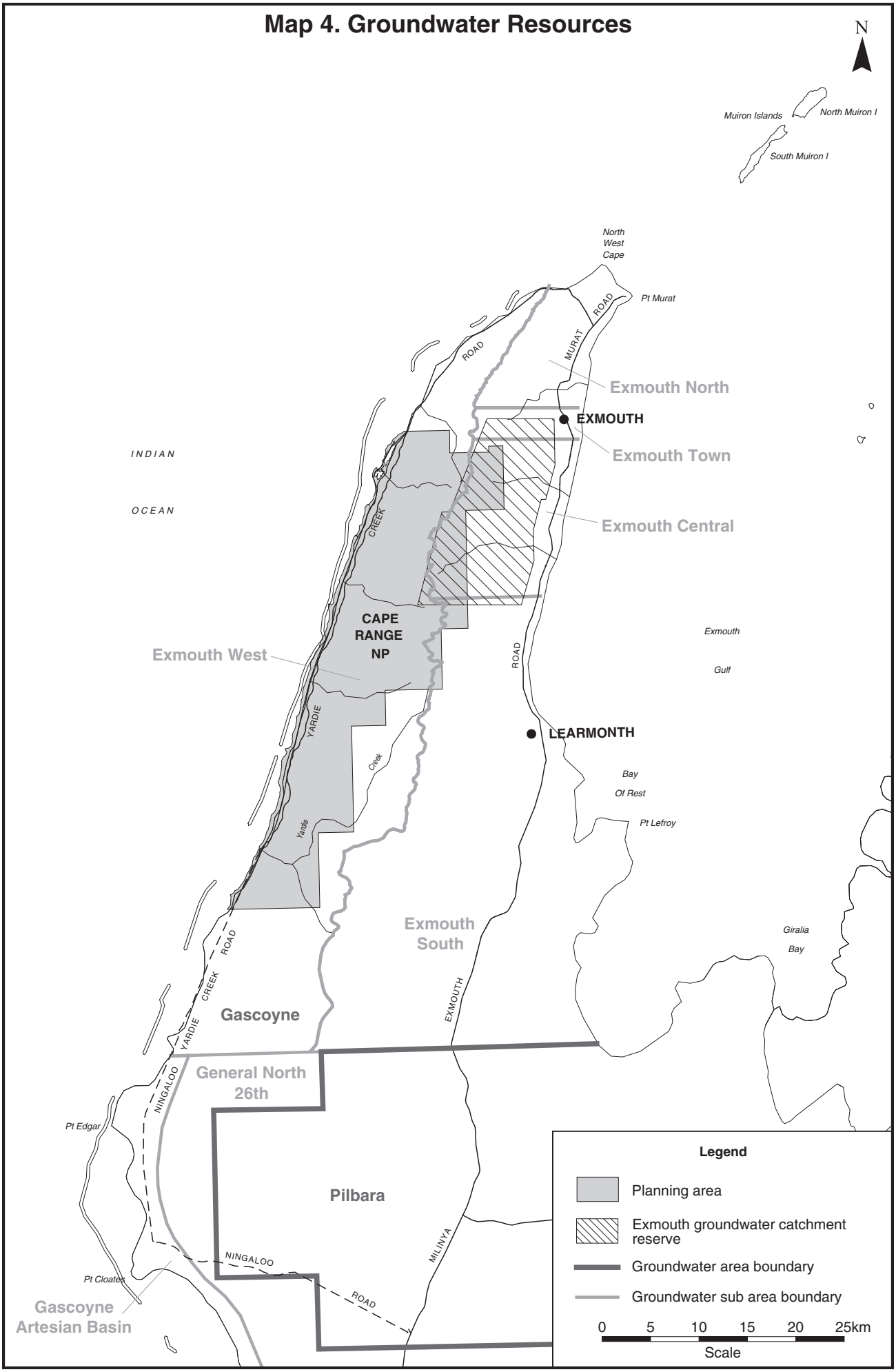
Map 3a. State Geoheritage Sites
North West Cape



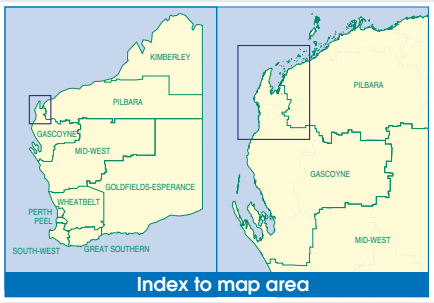
Map 3b. Register of the National Estate Geoheritage Site, North West Cape



Map 4. Groundwater Resources



Map 5 - Ningaloo Coast Regional Strategy



N

SCALE 1:1,000000

0 5 10 15 20 25 30

Kilometres

Map taken from Ningaloo Coast Regional Strategy Carnarvon to Exmouth August 2004, Figure 4; amended to show current DEC managed lands and waters.

Map produced by project mapping section, planning information - mapping and spatial, Department for Planning and Infrastructure, on behalf of the Western Australian Planning Commission, Perth, W.A., August 2004.

Legend

Selected land use zones

- Cape Range National Park and other conservation and recreation reserves
- Proposed conservation and recreation areas
- Australian Government land
- Groundwater catchments
- Conservation and multi-use areas
- Areas of environmental management priority
- Marine reserve system
- Recommended marine protected areas
- Fish habitat protection areas
- Rangelands

Primary access network

- Type 4 or greater - sealed road

Coastal access network

- Track / intermittent track
- Type 1 - unformed road
- Type 2 - formed road
- Type 3 - gravel road
- Type 4 - sealed road

Coastal tourism framework

- Tourism node
- Minor tourism node
- Ecolodge node
- Homestead tourism node
- Coastal camping node
- Day use site

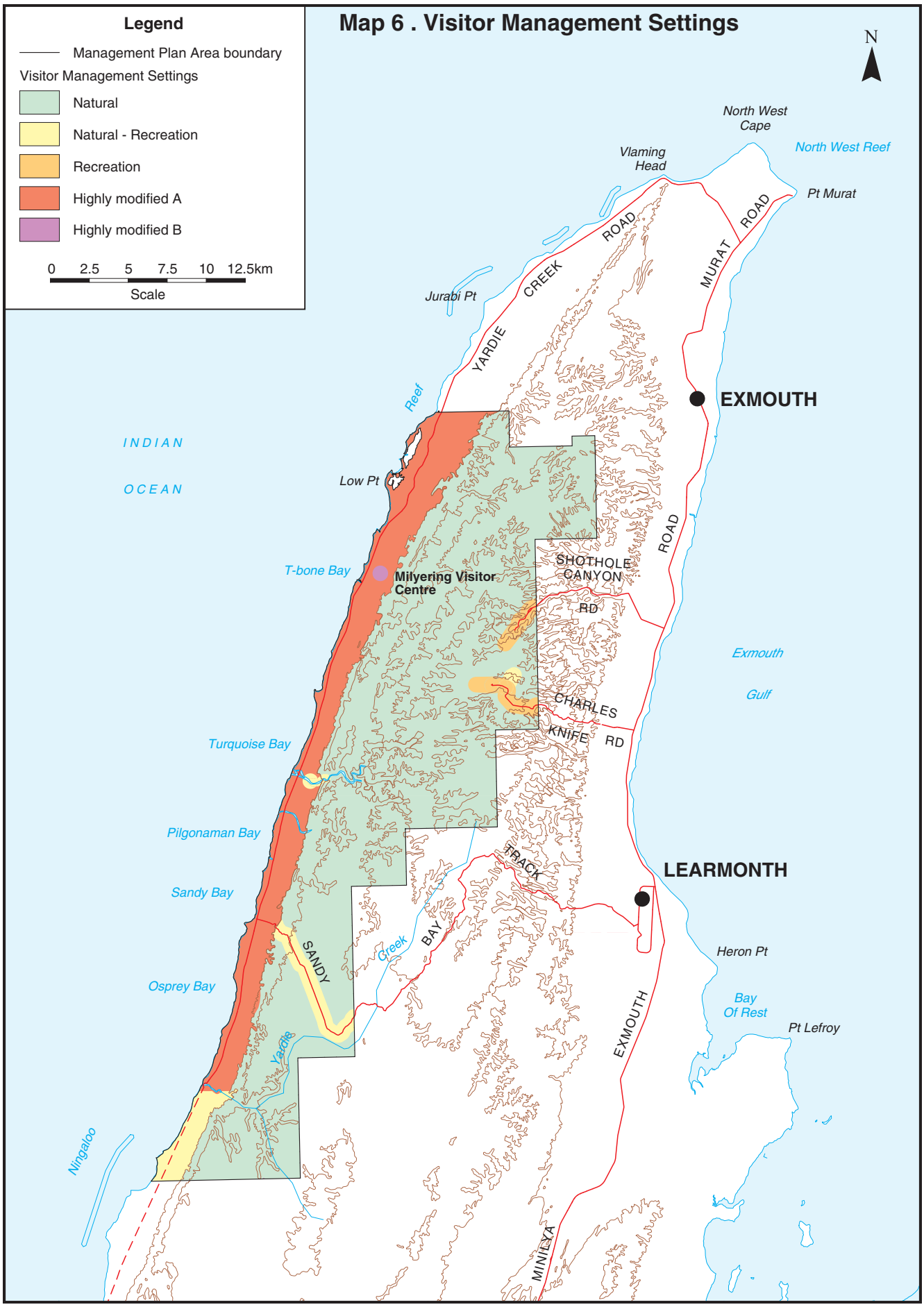
Coastal sectors

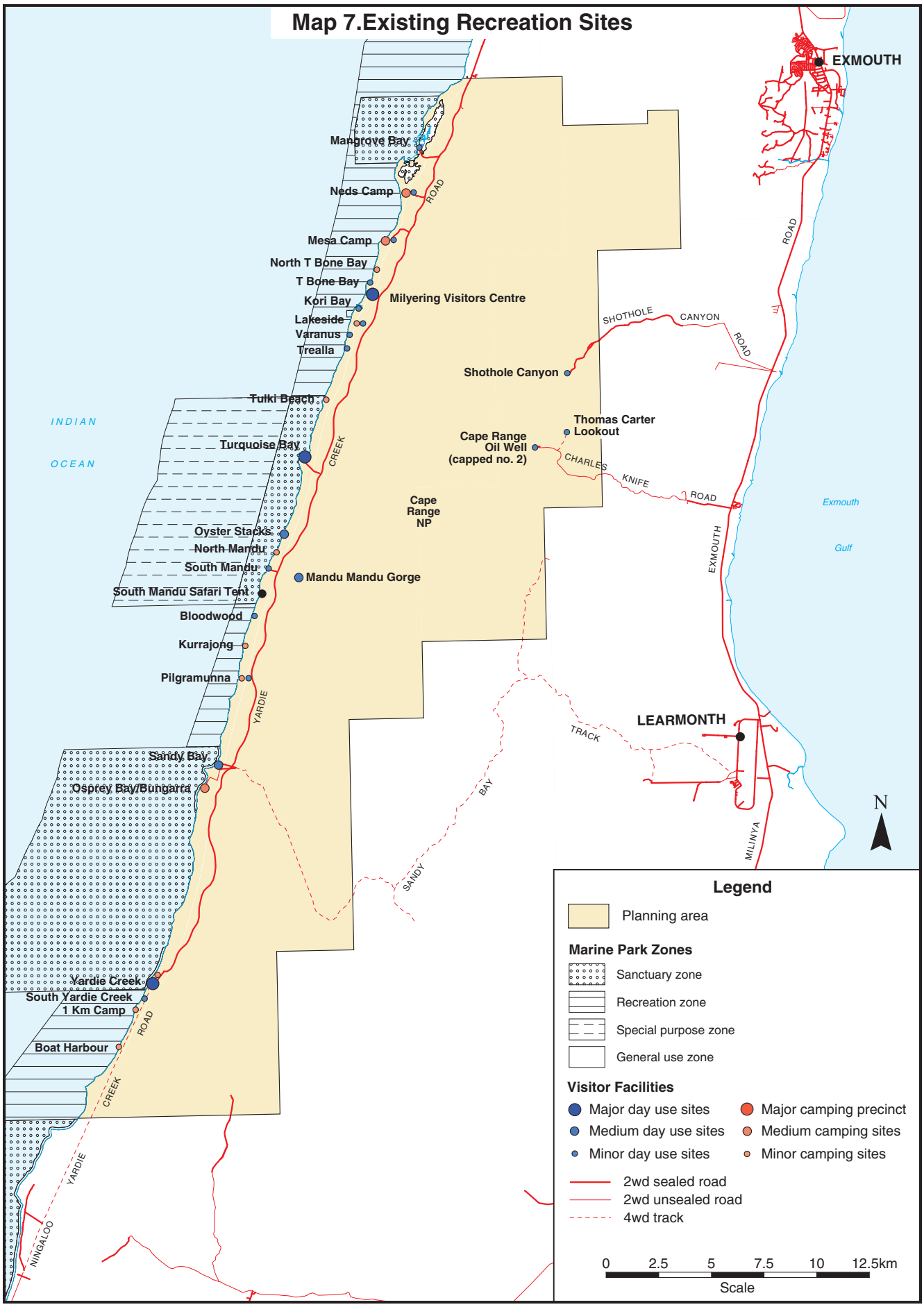
- Remote
- Semi-remote

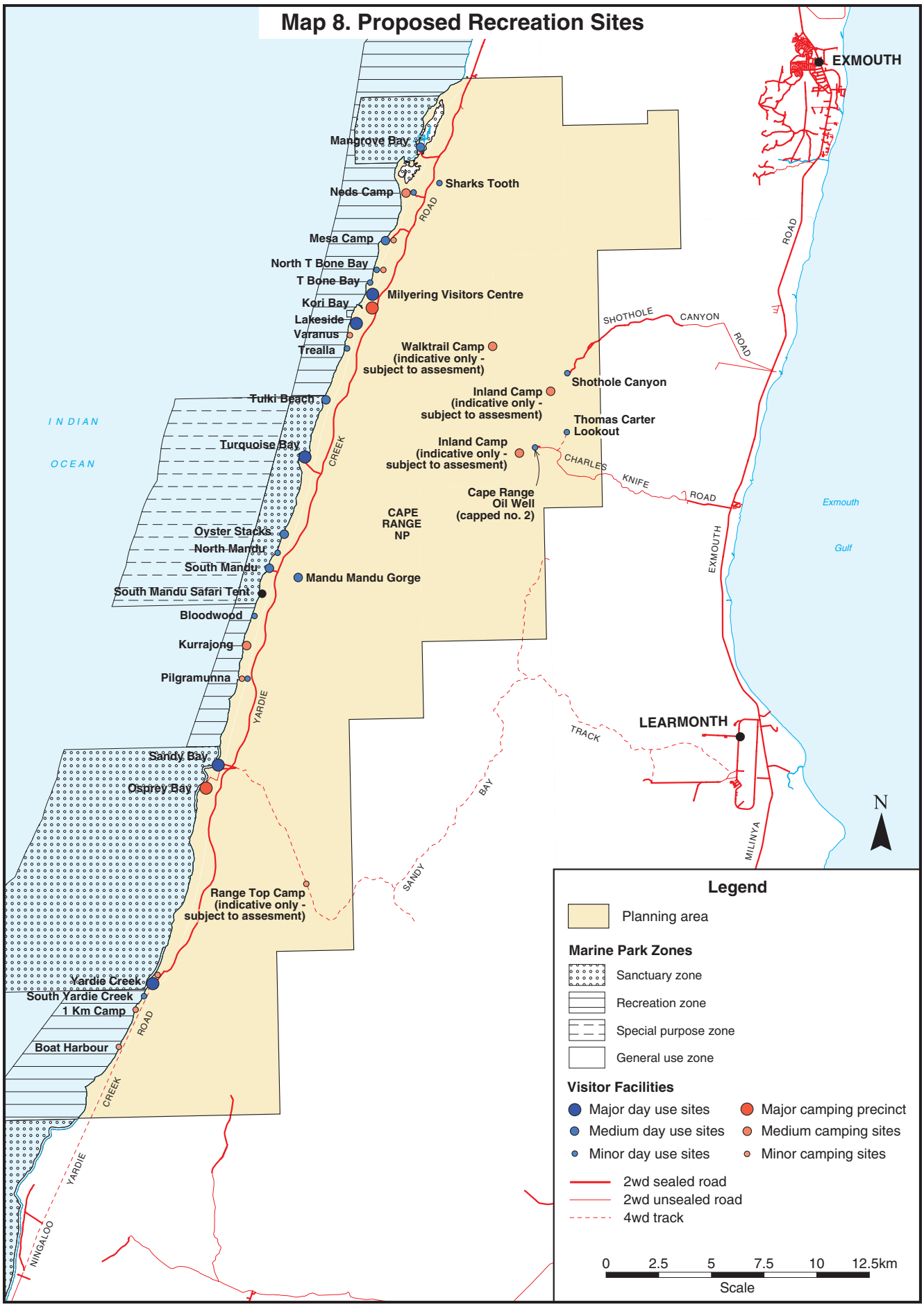
- Regional strategy study boundary
- Pastoral lease boundary
- Local government boundary

Indian Ocean

Vlamingh Head
North West Cape
Yardie Caravan Park
Exmouth
Exmouth Gulf
Learmonth Jetty
SHIRE OF ASHBURTON
Cape Range National Park Ecolodge
Bay of Rest
Doddy's Camp
Winderabandi
Lefroy Bay
Point Billie
SHIRE OF EXMOUTH
Ningaloo Beach
Jane Bay Camp
Giralia Homestead
Bullara
Bruboodjoo
Marrilla
Lagoon/Dog Rock
Mauds Landing
Coral Bay
Cardabia
Fourteen Mile Camp
Maggies
Elles Camp
Stevens Camp
Warroora Minor Tourism Node
Horse Paddock
The Lagoon
Warroora Homestead
Lyndon
Mia Mia
SHIRE OF CARNARVON
Gnaraloo Bay
Gnaraloo Bay Boat Launch
Gnaraloo
Three Mile Camp
Minilya
Wandagee
Wandagee Hill
Red Bluff Camp
Lake MacLeod
Manberry
Seventeen Mile
Cape Cuvier Lookout
Hill Springs
Boologooro
Quobba
The Blowholes
Blowholes
Cooralya
Boolathana
Miaboolya Beach
Gascoyne
Doorawarrah
Carnarvon


Map 6 . Visitor Management Settings
Legend
Management Plan Area boundary
Visitor Management Settings
Natural
Natural - Recreation
Recreation
Highly modified A
Highly modified B
0 2.5 5 7.5 10 12.5km
Scale
N
North West Cape
North West Reef
Vlaming Head
Pt Murat
ROAD
CREEK
MURAT
Jurabi Pt
YARDIE
Reef
EXMOUTH
INDIAN
OCEAN
Low Pt
T-bone Bay
Milyering Visitor Centre
SHOTHOLE CANYON
RD
Exmouth
Gulf
CHARLES
KNIFE
Turquoise Bay
Pilgonaman Bay
Sandy Bay
TRACK
LEARMONTH
SANDY
Greek
BAY
Heron Pt
Osprey Bay
Bay Of Rest
Pt Lefroy
Yardie
Ningaloo
MINILYA


Map 7.Existing Recreation Sites
EXMOUTH
Mangrove Bay
Neds Camp
ROAD
Mesa Camp
North T Bone Bay
T Bone Bay
Kori Bay
Milyering Visitors Centre
Lakeside
Varanus
Trealla
SHOTHOLE
CANYON
ROAD
Shothole Canyon
Tulki Beach
INDIAN
OCEAN
Thomas Carter
Lookout
Cape Range
Oil Well
(capped no. 2)
Turquoise Bay
CREEK
CHARLES
KNIFE
ROAD
Cape
Range
NP
Exmouth
Gulf
Oyster Stacks
North Mandu
South Mandu
Mandu Mandu Gorge
South Mandu Safari Tent
Bloodwood
Kurrajong
Pilgramunna
YARDIE
EXMOUTH
LEARMONT
TRACK
Sandy Bay
Osprey Bay/Bungarra
BAY
N
MILINYA
SANDY
Yardie Creek
South Yardie Creek
1 Km Camp
ROAD
Boat Harbour
CREEK
YARDIE
NINGALOO
Legend
Planning area
Marine Park Zones
Sanctuary zone
Recreation zone
Special purpose zone
General use zone
Visitor Facilities
Major day use sites
Medium day use sites
Minor day use sites
Major camping precinct
Medium camping sites
Minor camping sites
2wd sealed road
2wd unsealed road
4wd track
0
2.5
5
7.5
10
12.5km
Scale


Map 8. Proposed Recreation Sites
EXMOUTH
Mangrove Bay
Sharks Tooth
Neds Camp
ROAD
Mesa Camp
North T Bone Bay
T Bone Bay
Milyering Visitors Centre
Kori Bay
Lakeside
Varanus
Trealla
Walktrail Camp
(indicative only -
subject to assesment)
Tulki Beach
Inland Camp
(indicative only -
subject to assesment)
Shothole Canyon
SHOTHOLE
CANYON
ROAD
Thomas Carter
Lookout
INDIAN
OCEAN
Turquoise Bay
CREEK
Inland Camp
(indicative only -
subject to assesment)
CHARLES
KNIFE
ROAD
Cape Range
Oil Well
(capped no. 2)
CAPE
RANGE
NP
Exmouth
Gulf
Oyster Stacks
North Mandu
South Mandu
Mandu Mandu Gorge
South Mandu Safari Tent
Bloodwood
Kurrajong
Pilgramunna
YARDIE
EXMOUTH
LEARMONTH
TRACK
Sandy Bay
Osprey Bay
BAY
SANDY
MILINYA
N
Range Top Camp
(indicative only -
subject to assesment)
Yardie Creek
South Yardie Creek
1 Km Camp
ROAD
Boat Harbour
CREEK
YARDIE
NINGALOO
Legend
Planning area
Marine Park Zones
Sanctuary zone
Recreation zone
Special purpose zone
General use zone
Visitor Facilities
Major day use sites
Medium day use sites
Minor day use sites
Major camping precinct
Medium camping sites
Minor camping sites
2wd sealed road
2wd unsealed road
4wd track
0
2.5
5
7.5
10
12.5km
Scale

APPENDICES

APPENDIX 1 KEY PERFORMANCE INDICATORS

Key Values	Key Objectives	Key Performance Indicators		
		Performance Measure	**Target**	**Reporting Requirements**
Part C. Managing the Natural Environment				
14. Geology and Geomorphology				
Evidence in various geological, geomorphological and biological features which combine to give unique insights into geoevolutionary history and regional changes in climate, flora and fauna, and the lifestyles of Indigenous peoples.	To maintain the geological and geomorphological diversity and processes of the park and protect sites of known geoheritage.	14.1. Conservation and scientific value of the park's geoheritage.	14.1. No significant reduction of value over the life of the plan subject to natural processes.	Every 5 years.
15. Water Catchment Protection				
An extensive karst hydrological system that supports an extremely diverse subterranean fauna of high biodiversity conservation significance including locally disjunct, endemic and relictual species.	To maintain the hydrological regimes (quality and quantity) of the park, with a particular focus on the ecological water requirements of groundwater dependent species and communities.	15.1. Alterations in karst hydrology (including groundwater quality, quantity, anchialine stratigraphy and hydrological regimes).	15.1. No significant adverse change (e.g. beyond natural seasonal or other cyclic variation) over the life of the plan at selected sites.	Every 5 years.
16. Native Plants and Plan Communities				
A particularly rich flora for an arid limestone environment. The presence of tropical, temperate and arid flora and many taxa at the limit of their range.	To conserve the diversity of native plant, plant communities, and to maintain viable populations of threatened or otherwise significant flora.	16.1. Diversity and condition of native plant communities.	16.1. No significant decrease in known level of diversity and condition over the life of the plan.	Every 3 years.
		16.2. Cover and condition of threatened, priority or otherwise significant flora species or communities (e.g. disjunct, range end, locally restricted).	16.2. No decrease in cover and condition over the life of the plan.	Every 5 years or as per recovery plans if applicable.

17. Native Animals and Habitats				
The presence of subterranean fauna that due to factors such as its rich diversity, ancient affinities, isolation over millions of years, and differing origins is of high biodiversity conservation significance and scientific importance. A rich and diverse vertebrate and invertebrate fauna attributable to the range of habitats available on the peninsula (from mangrove and intertidal marine to sandy ridges, subterranean wetlands, alluvial plains, rocky ranges and caves). The occurrence of fauna species that are threatened, endemic, locally restricted and/or at the limits of their geographic range. Turtle rookeries. Demonstration of the process of speciation of disjunct populations.	To conserve the diversity of native fauna and habitat types and to maintain viable populations of threatened or otherwise significant fauna.	17.1. Diversity of native fauna species and habitat.	17.1. No loss of known species or habitat diversity over the life of the plan.	Every 5 years.
		17.2. Population numbers and range of specially protected fauna species, threatened ecological communities or otherwise significant fauna.	17.2. Remain stable or increase over the life of the plan subject to natural variations.	Every 5 years or as per recovery plans if applicable.
		17.3. Visitor related impacts on turtles, nesting birds sensitive to disturbance, and rock wallabies.	17.3. No significant impacts over the life of the plan.	Every 3 years or as per recovery plans if applicable.
		17.4. Changes in the known level of predation on nesting turtles within the park.	17.4. Decrease over the life of the plan.	Every 3 years or as per recovery plans if applicable.
19. Environmental Weeds				
	To reduce the impact of weeds (and high priority weeds in particular) on the key values of the park.	19.1. The cover of environmental weed species rated as high priority.	19.1. Decrease over the life of the plan.	Every 5 years.
20. Introduced and Other Problem Animals				
	To reduce the impact of introduced and problem animals on the key values of the park.	20.1. Area of the park significantly impacted by goats.	20.1. Decrease over the life of the plan.	Every 5 years.
21. Fire				
	To manage fire to conserve the biodiversity of the park and to protect life and valuable community assets.	21.1. Knowledge of the vital attributes of key fire response species	21.1. Increase in knowledge of the vital attributes of threatened, priority and other key fire response species (see	

			Glossary) over the life of this plan.	
		21.2. Knowledge of the interactions between fire and buffel grass.	21.2. Increase from the extent of knowledge described in this plan (e.g. as reflected in findings or recommendations of research papers and experiment reports).	Every 5 years.
		21.3. Diversity of post-fire seral stages providing habitat diversity.	21.3. A range of post-fire seral stages is established for major native vegetation types over the life of the plan.	Every 5 years.
		21.4. Human life and community assets.	21.4. No losses attributable to the Department's fire management.	Every 3 years.
Part D. Managing Cultural heritage				
23. Indigenous Cultural Heritage				
Confirmed evidence of the earliest known occupation (Pleistocene) based on a marine economy in Australia. Numerous sites and landscapes of Indigenous cultural importance. Non-Indigenous cultural heritage associated with the pastoral and mineral exploration industry.	To conserve the Indigenous and non-Indigenous cultural heritage of the park so that current and future generations can benefit from it.	23.1. Number and condition of sites (i.e. places and objects) of cultural or archaeological significance.	23.1. No reduction or disturbance without formal approval.	Every 2 years.
Potential for demonstrating a successful joint management arrangement between the Department and Aboriginal people.		23.2. Degree of satisfaction amongst traditional custodians (e.g. as represented by the Coral Coast Park Council) regarding level of Aboriginal involvement in park management.	23.2. Increases over the life of the plan.	Every 2 years.

Part E. Managing Visitor Use				
25. Recreation and Tourism Opportunities				
Terrestrial and adjacent marine environments that offer remote and nature based opportunities and experiences. Natural and cultural values which attract nature based tourism and significantly contribute to regional expenditure. Remote qualities of the park.	To provide visitors with a range of sustainable nature based recreation experiences.	25.1. The range of recreation settings (i.e. from remote through to developed).	25.1. No reduction in the area of *natural*, *natural-recreation* or *recreation* visitor management settings over the life of the plan.	Every 5 years.
		25.2. Visitor satisfaction levels.	25.2. Maintain or increase over the life of the plan.	Every 2 years.
28. Wildlife Viewing				
Terrestrial and adjacent marine environments that provide opportunities for viewing a range of native flora and fauna.	To provide opportunities for sustainable wildlife viewing.	See KPI 17.3		
Part G. Involving the Community				
39. Information, Education and Interpreatation and				
Opportunities for interpretation of natural and cultural values, and education of visitors.	To promote community awareness and understanding of the park's conservation values and engender support of management activities.	39.1. Level of visitor satisfaction with education and interpretation opportunities available in the park.	39.1. Remains stable or increases over the life of the plan.	Every 3 years.

APPENDIX 2 THREATENED AND OTHER SPECIALLY PROTECTED FAUNA IN CAPE RANGE NATIONAL PARK

Species Name	Common Name	Ranking	Comments
**Petrogale lateralis lateralis*	Black-flanked rock-wallaby	VU	
**Phascogale calura*	Red-tailed phascogale	EN	sub-fossil
**Pseudomys fieldi*	Shark Bay mouse (Djoongari)	VU	sub-fossil
**Zyzomys pedunculatus*	Central rock-rat (Antina)	CR	sub-fossil
**Milyeringa veritas*	Blind gudgeon	VU	
**Ophisternon candidum*	Blind cave eel	VU	
Stygiocaris lancifera	Lance-beaked cave shrimp	VU	
Bamazomus vespertinus	Western Cape Range Bramazomus	EN	
Draculoides julianneae	Western Cape Range Draculoides	EN	
Hyella sp.	Cameron's Cave Pseudoscorpion	CR	
Stygiochiropus sympatricus		VU	
Falco peregrinus	Peregrine falcon	SP	
**Caretta caretta*	Loggerhead turtle	EN	
**Chelonia mydas*	Green turtle	VU	
**Eretochelys imbricata*	Hawksbill turtle	VU	

* Denotes threatened species listed under the EPBC Act.

CE = critically endangered, EN = endangered, VU = vulnerable, SP = specially protected other than for reasons of being rare, likely to become extinct, or presumed to be extinct, or because they are covered by an international threatened species agreement.

APPENDIX 3 POTENTIAL FAUNA REINTRODUCTIONS INTO THE CAPE RANGE NATIONAL PARK

Species name	Common Name	Conservation Status
Dasycercus cristicauda	mulgara	vulnerable
Antechinomys laniger	kultarr	not listed – data deficient
Macrotis lagotis	bilby	vulnerable
Perameles bougainville	western-barred bandicoot	endangered
Bettongia lesueur	burrowing bettong	vulnerable (island subspecies), presumed extinct (mainland subspecies)
Pseudomys desertor	desert mouse	presumed extinct
Leggadina lakedownesis	Lakeland Downs short-tailed mouse	Priority 4
Dasyurus geoffroii	chuditch	vulnerable
Isoodon auratus	goldern bandicoot	vulnerable
Trichosurus arnhemensis	northern brushtail possum	not listed
Leporillus conditor	greater stick nest rat	vulnerable
Zyzomys pedunculatus	central rock rat	critically endangered

As Identified by Kendrick and Mau (2003)

APPENDIX 4 JAMBA, CAMBA AND ROKAMBA SPECIES – CAPE RANGE NATIONAL PARK

Scientific Name	Common Name/s	JAMBA	CAMBA	ROKAMBA
Arenaria interpres	Ruddy Turnstone; Turnstone	❖	❖	❖
Calidris acuminata	Sharp-tailed Sandpiper	❖	❖	❖
Calidris canutus	Red Knot; Knot	❖	❖	❖
Calidris ferruginea	Curlew Sandpiper	❖	❖	❖
Calidris ruficollis	Red-necked Stint	❖	❖	❖
Calidris subminuta (Calidris minutilla)	Long-toed Stint	❖	❖	❖
Calidris tenuirostris	Great Knot	❖	❖	❖
Charadrius leschenaultii	Large Sand Plover; Large Sand-dottrell	❖	❖	❖
Charadrius mongolus	Mongolian Plover; Lesser Sand Plover; Mongolian Sand-dotterel	❖	❖	❖
Crocethia alba (Calidris alba)	Sanderling	❖	❖	❖
Limosa lapponica	Bar-tailed Godwit	❖	❖	❖
Limosa limosa	Black tailed Godwit	❖	❖	❖
Numenius borealis (Numenius minutus)	Little Whimbrel; Little Curlew	❖	❖	❖
Numenius phaeopus	Whimbrel	❖	❖	❖
Pluvialis squatarola	Grey Plover	❖	❖	❖
Tringa hypoleucos	Common Sandpiper	❖	❖	❖
Tringa incana (Tringa brevipes)	Grey-tailed Tattler	❖	❖	❖
Tringa nebularia	Greenshank	❖	❖	❖
Anous stolidus	Common Noddy; Noddy	❖	❖	
Ardea alba(Egretta alba)	Great Egret; White Egret	❖	❖	
Calidris subminuta	Long-toed Stint	❖	❖	
Fregata minor	Greater Frigatebird; Great Frigatebird	❖	❖	
Sterna anaethetus	Bridled Tern	❖	❖	
Sterna caspia(Hydroprogne caspia)	Caspian Tern	❖	❖	
Sterna hirundo	Common Tern; Asiatic Common Tern	❖	❖	
Sula leucogaster	Brown Booby	❖	❖	
Tringa stagnatilis	Marsh Sandpiper; Little Greenshank	❖	❖	
Charadrius veredus	Oriental Plover; Oriental Dotterel	❖		❖
Merops ornatus	Rainbow Bee-eater	❖		
Oceanites oceanicus	Wilson's Storm Petrel	❖		
Puffinus carneipes	Fleshy-footed Shearwater	❖		
Puffinus pacificus	Wedge-tailed Shearwater	❖		
Sterna bergii	Crested Tern	❖		
Haliaeetus leucogaster	White-bellied Sea Eagle		❖	
Thalasseus bengalensis (Sterna bengalensis)	Lesser-crested Tern		❖	

APENDIX 5 GUIDING PRINCIPLES FOR FIRE MANAGEMENT IN LANDSCAPES DOMINATED BY SPINIFEX GRASSLANDS

1. Climate and vegetation make landscapes dominated by spinifex grasslands highly prone to fire. For thousands of years, lightning and human ignitions have ensured that fire is an environmental factor that has influenced the structure, function and biodiversity of spinifex grasslands.
2. Species and communities vary in their adaptations to, and reliance on fire. Knowledge of the ways in which species and communities respond to fire, and of the temporal and spatial scales of fires in relation to life histories of organisms or communities, underpins the use of fire.
3. Rainfall is a primary driver of the rate of fuel accumulation and subsequent flammability of spinifex grasslands and large, extensive wildfires are usually preceded by several seasons of above average rainfall.
4. The response of species and communities to fire will be influenced by the subsequent rainfall and by the scale and patchiness of fire, which can drive systems towards a new transient state with respect to species composition and structure.
5. Fire management is required primarily to conserve biodiversity. In some circumstances, it may be necessary to manage fire to protect property, infrastructure and cultural values.
6. Fire management should be both precautionary and adaptive, considering the requirements of both fire sensitive (habitat specific) and fire maintained communities and species in order to optimize biodiversity conservation outcomes.
7. Landscapes dominated by spinifex grasslands are vast, remote and difficult to access. Fire management resources are scarce, so active fire management including fire suppression and prescribed burning, should focus on areas of high conservation value and on high value built and cultural assets. On much of the spinifex grasslands, passive management, including allowing unplanned fires to burn, is a realistic and acceptable management option.
8. Fire diversity can support biodiversity both at landscape and local scales. At the landscape scale, a fine grain mosaic of patches of vegetation representing a range of interlocking seral (post-fire) stages will provide diversity of habitats for organisms that are mobile and can move through the landscape. At the local scale, appropriate intervals between fire, based on vital attributes of key species, are necessary to ensure the persistence of sessile or less mobile organisms.
9. Avoid applying the same fire regime (frequency, interval, season and scale) over large areas for long periods and avoid seral and structural homogenization by not treating large areas with extreme regimes such as sustained frequent burning or infrequent burning.
10. The scale or grain size of the mosaic should a) enable natal dispersal, b) optimize boundary habitat (boundary between two or more seral stages), and c) optimize connectivity (ability of key species to migrate between seral stages).
11. A sequence of 2-3 years or more of above average rainfall will result in rapid growth of spinifex and flammable soft grasses, predisposing landscapes to large wildfires capable of burning through fire mosaics. While such events are infrequent, strategically located low fuel buffers 500-1000 m wide may be required to contain wildfires under these conditions.
12. All available knowledge including scientific, local and indigenous knowledge should be utilized to develop ecologically appropriate fire management.
13. Consultation and partnerships with neighbours, including traditional custodians, is an effective way of managing fire for mutual benefit.
14. Fire management should be planned and implemented in an adaptive management framework. Use of tools including remote sensing and aircraft, will be essential for planning and implementing fire use and for mapping and monitoring fire mosaics and fire history.
15. As part of an adaptive management framework, biodiversity monitoring should focus on; 1) threatened species and communities, 2) fire sensitive species and communities and 3) the remaining biota. Threats such as introduced plants and animals, and abiotic processes including weather (rainfall) and fire history, must be monitored/recorded in order to help interpret changes in biodiversity.
16. Where spinifex grasslands have been invaded by flammable weed species such as buffel grass, which is capable of adversely altering the frequency and intensity of fire, prescribed fire should be used conservatively and strategically to break up the run of major wildfires

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APPENDIX 6 MANAGEMENT SETTINGS CRITERIA

	Wilderness Area (as recognised in *Policy 62 – Identification And Management of Wilderness and Surrounding Areas*)		**Natural**	**Natural -Recreation**	**Recreation**	**Highly modified**	
	1A - Wilderness	**1B – 'Surrounding areas'**				**A**	**B**
Principle purposes	Maintaining and restoring the integrity of ecological processes and natural landscapes, maintaining and restoring biodiversity, and maintaining opportunities for solitude by maintaining or restoring the highest degree of apparent and biophysical naturalness and remoteness from permanent modern structures (*refer to Policy 62 – Identification And Management of Wilderness and Surrounding Areas*).	'Surrounding areas' provide a buffer to wilderness areas and will be managed to support wilderness values. Conservation of significant natural and cultural values, with low level recreation.	Conservation of significant natural and cultural values, with low level recreation.	Conservation of significant natural and cultural values, with low to medium level recreation.	Moderate intensity recreation.	Moderate to high level recreation, education and interpretation. Group activities specifically catered for at many sites.	As per 'A' but with high level recreation, education and interpretation and permanent, commercial structures (e.g. shops, cafes, ecolodges).
Description	Natural areas with an NWI rating of ≥12. Wilderness areas are large, remote areas (8000 ha in temperate areas, 20 000 in arid, semi-arid and tropical areas of the State), with minimal evidence of modern human activity (*refer to Policy 62 – Identification And Management of Wilderness and Surrounding Areas*).	Provides a buffer to wilderness areas that will assist in maintaining wilderness values in adjacent areas.	Remote areas with conservation significance. Some evidence of previous development in process of rehabilitation, or existing human activity related to management tracks/trails, designated 4WD tracks and walking tracks.	Modified environment but dominated by natural vegetation and landscapes conservation significance. Signs of past use evident.	Modified environment but includes areas with 'natural' landscape values. .	Highly modified environments with a moderate to high level of nature-based developments set in a mostly natural landscape. Signs of human activity are a regular feature.	As per 'A' but with a higher level of development, facilities and services set in a modified natural landscape (e.g. exotic plants present). Includes structures for commercial purposes.

	Wilderness Area (as recognised in *Policy 62 – Identification And Management of Wilderness and Surrounding Areas*)		**Natural**	**Natural -Recreation**	**Recreation**	**Highly modified**	
	1A - Wilderness	**1B – 'Surrounding areas'**				**A**	**B**
Access (access standards and type of transport used by visitors, resource users and protected area managers)	Vehicles: use of any form of mechanised transport is not permitted within wilderness, except for emergency or essential management operations, or reasons of cultural importance. Walk: constructed walking tracks, signs, track markers and toilets will not be permitted in wilderness, and walking access is via natural routes. AS Walking Track standard 6 only. Existing vehicle tracks and built walking tracks within wilderness, other than those required for emergency and essential management purposes, will be closed. Aircraft: landing of non-fixed wing aircraft is permitted for emergency and essential research purposes only. Flying under 2000 feet for fixed wing aircraft and 1500 feet for helicopters above wilderness is discouraged, except for emergency or essential research purposes.	**Vehicles: use of mechanised transport within areas surrounding wilderness will be permitted on designated access routes, and in other areas for emergency or essential management reasons only.** Walk: AS Walking Track class 5-6; tracks generally formed (class 6 tracks not formed).	Vehicles: 4WD only. Walk: AS Walking Track class 4 to 6; tracks generally formed (class 6 tracks not formed). Boats: non-motorised boats only. Cycle: type 4 cycle trail. Horses: no horses permitted. Airstrip: no airstrips permitted.	Vehicles: 4WD, sometimes 2WD seasonal. Walk: AS Walking Track class 3 to 5; tracks formed. Boats: boats, motorised and non-motorised, on designated routes/areas Cycle: type 4 cycle trail. Horses: designated bridle trails possible. Airstrip: natural earth.	Vehicles: 2WD unsealed. Walk: AS Walking Track class 2 to 4; tracks generally formed. Boats: boats, motorised and non-motorised, on designated routes/areas Cycle: types 2 & 3 cycle trails. Horses: designated bridle trails possible. Airstrip: unsealed.	Vehicles: 2WD sealed. Walk: AS Walking Track class 1 & 2; tracks well constructed; universal access provided where appropriate and practical Boats: Areas may be open to all types of boats. Cycle: type 1 cycle trails. Horses: designated bridle trails possible. Airstrip: sealed.	

	Wilderness Area (as recognised in *Policy 62 – Identification And Management of Wilderness and Surrounding Areas*)		**Natural**	**Natural -Recreation**	**Recreation**	**Highly modified**	
	1A - Wilderness	**1B – 'Surrounding areas'**				**A**	**B**
Site modification (Extent, type and design of infrastructure, facilities, amenities and the style of accommodation provided)	No site modification and no facilities or structures, except existing cultural structures that are essential for reasons of visitor safety, resource protection and/or management operations. Any rehabilitation or repair of worn trails or sites is unobtrusive, with no long-term or permanent marking or hardening of trails or sites. Overnight Stays: campsites not defined but includes 'Wild' or 'Remote' camping. Day Use: day use sites not defined. Walk: walking tracks are not defined.	Services and infrastructure adjacent to wilderness that may impact on landscape values and/or otherwise degrade the quality of such areas should be avoided where possible.	Minimal site modification. Basic toilets, trail markers and signs may occur, but only (1) in critical locations where alternative measures fail to address site degradation or (2) for public health or safety. Camping areas may be defined.	Minor modifications at specific sites. 'Medium' and 'Low' level of development. Overnight Stays: campsites generally defined. Day Use: Car parking generally defined. Facilities: Basic facilities may be provided such as shade shelters, BBQs, toilets.	Modification of sites evident. 'Medium' level of development. Overnight Stays: campsites generally defined; nature-based built accommodation either single structure (e.g. shack/hut) or semi-permanent multiple structures (e.g. safari camp). Day Use: Car parking area defined. Facilities: Facilities generally provided such as shade and interpretive shelters, gas BBQs, tables, toilets.	Modification of site clearly evident. 'Medium' to 'high' level of development. Overnight Stays: nature-based built accommodation with multiple structures and a moderate level of facilities and services (safari camp, ecolodge). Day Use: Defined car parking areas and bays. Facilities: High level of facilities including shade shelters, gas BBQs, tables, toilets, rubbish collection, visitor information in shelter / building.	Modification of site clearly evident. 'High' level of development. Overnight Stays: built accommodation with a high level of facilities and services (e.g. ecolodge, motel style). Day Use: As per 'A'. Facilities: As per 'A' but visitor centres and/or permanent structures for commercial purposes (shops, café's) may be present.
Social interaction (Density of users and degree of social interaction and opportunities for solitude)	Interaction between users is minimal, with usually less than two other groups encountered during a day, and no other groups within sight or sound at campsites. Maximum group size of about six to eight people.		Little interaction between users, with small numbers of brief encounters with individuals or small groups only except at campsites.	High likelihood of contact with individuals and small groups along access routes and at campsites.	High level of contact with others at campsites and along access routes. Campsite design allows for group camping.	Constant interaction expected. Group and family activities important part of visitor experience. Interaction with others unavoidable. Natural setting important but in the security of a safe and managed environment.	

	Wilderness Area (as recognised in *Policy 62 – Identification And Management of Wilderness and Surrounding Areas*)		**Natural**	**Natural -Recreation**	**Recreation**	**Highly modified**	
	1A - Wilderness	**1B – 'Surrounding areas'**				**A**	**B**
Degree of self reliance (level of support services)	Visitors must be totally self-reliant as support services are inappropriate and are not provided (except where necessary to protect wilderness values). Commercial tourism and recreation operators not permitted in wilderness.		Visitors must be totally self-reliant. Support services infrequent or unreliable.	Visitors must still be largely self-reliant. Basic support services provided in specific locations.	Self-reliance requirements are generally low where facilities are provided, but outdoor skills will be important in areas away from roads and tracks.	Minimal self-reliance. High level of support facilities usually present or in close proximity.	
Style of visitor management (level of on-site management, site constraints and regulations)	*On-site visitor management is very low with controls primarily off site.* *All interpretation is off-site; no trail information in brochures.* *Boundary signage only.* *Very infrequent ranger presence.* *Constraints on visitors may apply to areas subject to resource use.* Wherever possible, ground disturbing activities required for fire management will be conducted outside of wilderness. This includes construction and maintenance of access roads, firebreaks, fuel-reduced buffers and water points. Prescribed burning within wilderness may be carried out for the protection and maintenance of ecological values and processes as determined through the preparation of area and regional management plans and interim management guidelines.	Activities, including services and infrastructure, adjacent to wilderness that may impact on landscape values and/or otherwise degrade the quality of these areas should be avoided where possible (such activities are not be permitted within wilderness). Surrounding areas to be managed to complement wilderness and provide a buffer.	Infrequent DEC presence. Information principally off-site (e.g. brochures, guides, maps); minimal signs. Low maintenance.	Some management presence including visits by DEC staff and signs. Information may be provided on-site. Permit system may be used to control access; emphasis on establishing appropriate visitor expectations and behaviour.	May be frequent ranger presence. Interpretive material, brochures and track guides available. Moderate on-site management requirements, including signs and barriers; facilities may be common but clustered.	Frequent staff presence, on-site manager. Could be interpretative and education focus. High degree of on-site management including use of physical barriers and on-site staff; vehicle and pedestrian movement heavily controlled.	

	Wilderness Area (as recognised in *Policy 62 – Identification And Management of Wilderness and Surrounding Areas*)		**Natural**	**Natural -Recreation**	**Recreation**	**Highly modified**	
	1A - Wilderness	**1B – 'Surrounding areas'**				**A**	**B**
Interpretation facilities and services	Signposting not provided on site, although some information provided off-site (e.g. websites, books, DEC offices).	Signposting often not provided but may be at start of pedestrian tracks and/or may be noted on wilderness interpretive signposting (located in 'surrounding area').	Signposting may be provided at trailheads; track markers and signs may occur for public health or safety reasons (e.g. at track junctions). Some guided tours may be permitted (see below).	Signposting may be provided where necessary. Interpretive material off-site or at trailheads; guided tours permitted.	Well signposted at trailheads and along track. Interpretive shelters, displays and leaflets, guided tours may be provided. Primary themes may be expressed at recreation sites. Extensive range of opportunities.	Well signposted at trailheads and along track. Interpretive shelters, displays and leaflets, guided tours may be provided; visitor centre may be present. Primary themes may be expressed at recreation sites. Extensive range of opportunities.	
Commercial uses	Commercial recreation and tourism operations are not permitted within wilderness (*see section 4.3 of Policy 62 – Identification And Management of Wilderness and Surrounding Areas*).	All tourism management operations will be carried out in a manner consistent with maintaining the qualities of wilderness. CTOs permitted, but may need to consider restricted licences to maintain adjacent wilderness qualities (E class).	CTO licences permitted, but may consider regulating numbers to maintain visitor experiences consistent with setting (E class). Focus on nature-based/cultural activities. Leases generally not permitted, or if allowed then setting revised.	CTO licences permitted with focus on nature-based/cultural activities. Leases permitted in appropriate tenure and subject to strict sustainable conditions.	CTO licences permitted, nature-based/cultural and adventure activities. Leases permitted	CTO licences permitted, nature-based/ cultural and adventure activities. Leases permitted.	

	Wilderness Area (as recognised in *Policy 62 – Identification And Management of Wilderness and Surrounding Areas*)		**Natural**	**Natural -Recreation**	**Recreation**	**Highly modified**	
	1A - Wilderness	**1B – 'Surrounding areas'**				**A**	**B**
Probable recreation experiences	Opportunities for isolation, independence, closeness to nature, tranquillity and self-reliance through the application of outdoor skills in an environment that offers a high degree of challenge. Educational and/or recreation expeditions will be permitted within wilderness providing they are consistent with the maintenance of the qualities of the area and operate according to the DEC's code of ethics (*see Attachment 2 of Policy 62 – Identification And Management of Wilderness and Surrounding Areas*).	Activities adjacent to wilderness that may impact on landscape values and/or otherwise degrade the quality of such areas should be avoided where possible, and all recreation and tourism management operations will be carried out in a manner consistent with maintaining the qualities of wilderness.	Opportunities for solitude, independence, closeness to nature, tranquillity and self-reliance in an environment that offers a high degree of challenge. Although the activity may not be based on the use of a motorised vehicle, the influence of vehicles and the safety afforded by them may be significant.	Opportunities for challenging interaction with nature using outdoor skills. Opportunities may have human elements but still high probability that visitors can experience isolation from human influences.	Opportunities to interact with nature while still having access to facilities. Interaction with others expected.	Opportunities for nature appreciation and social interaction in a safe environment. Facilities support group activities. Interaction with others unavoidable.	

*Wilderness areas are classified under section 62(1) (a) of the *Conservation and Land Management Act 1984* to establish management zones to which specific management prescriptions or regulations apply.

Sources: Departmental Policy Statement No. 62 – *Identification and Management of Wilderness and Surrounding Areas*, The Recreation Opportunity Spectrum (Clark and Stankey 1979)

APPENDIX 7 GUIDELINES FOR LANDSCAPE MANAGEMENT

High Quality Scenic Landscapes

- Alterations to the naturally established landscape character should be subtle, remaining subordinate to natural elements by borrowing extensively from form, line, colour, texture and scale found commonly in the surrounding landscape.
- Alterations should achieve a visually inevident condition within one year of project completion resulting in little more than natural change.
- Site specific visual landscape factors should be carefully identified and evaluated prior to any management activities such as developing new recreation sites, access tracks or conducting burning regimes.
- Facilities and activities which utilise and yet disturb very little of the natural environment should be encouraged such as walking tracks and small day use areas.
- Land uses and developments, which do not require particularly scenic environments, should be excluded, this includes mining/quarries, large recreation sites, large car parks, roads, telecommunication towers and powerlines.
- Roads, recreation sites and walking tracks should focus views onto distinctive features by selecting optimum siting and alignment.
- Road design and construction should remain subordinate to landscape elements by utilising minimum design standards, limited cuts and fill, minimum clearing widths, undulating edges, sensitive alignment.
- Interpretive and explanatory signing should be utilised before and during operations which alter landscape character such as new recreation site development, control burning adjacent to travel routes and walking trails.
- Where structures are required they should be sympathetic in design, materials and colour to complement surrounding landscape elements and be carefully sited away from major natural focal points, out of viewer sight-lines and where vegetation or landform screening can be used.
- Essential firebreaks should follow natural landform, vegetation, or land use patterns/lines in the landscape.
- Prescribed burning should be carried out employing prescriptions that minimise impact on landscape values.
- Previously disturbed areas within high scenic quality areas should be given the highest priority for rehabilitation until the desired standard of scenic quality is attained.

Moderate Quality Scenic Landscapes

- Alterations to the naturally established landscape character should borrow form, line, colour, texture and scale from natural elements and may result in an apparent but not dominant impact found commonly in the surrounding landscape.

Low Quality Scenic Landscapes

- Essential but visually depreciative facilities not requiring areas of scenic amenity should be accommodated in these areas first where possible such as gravel pits, quarries, mines, transmission and towers, powerlines.
- Enhancement of scenic quality through rehabilitation works should be considered to upgrade areas to a higher amenity standard.
- Views to disturbed landscapes may require landform and vegetation screening.

APPENDIX 8 (A) PREVIOUS PLANNING STUDIES/DOCUMENTS RECOMMENDING ADDITIONS TO CAPE RANGE NATIONAL PARK

The table below summarises recommendations of core planning and other documents regarding proposals for extensions to Cape Range National Park. Further information on previous planning reports for the region is also available at www.wapc.wa.gov.au/carnarvon_ningaloo/index.html

Document	Recommendations Relevant to Cape Range National Park
Conservation Reserves for Western Australia Systems 4, 8, 9, 10, 11 and 12 as recommended by the Environmental Protection Authority 1975. (Environmental Protection Authority 1975).	Recommended extensions to the north, south, and east of the existing national park (also recommendations to the west, but these had already occurred in 1974 during finalisation of the EPA report).
Cape Range National Park Management Plan 1987-1997 (CALM 1987).	Recommended part of EPA 1975 extensions to the east of the existing national park, but did not reiterate EPA extension recommendations for north and south of the park. The reduced area proposed for addition to the national park was in recognition of conflicting mineral interests and acquisition of the area south of the existing park by the Commonwealth for an air weapons range.
North West Cape Tourism Development Study (Jones Lang Wootton 1993).	Recommended extension of the Cape Range National Park to the south to include the Learmonth Air Weapons Range and Ningaloo Station – to provide management support to an area with significant potential for tourism development.
First Report of the Legislative Council Select Committee on Cape Range National Park and Ningaloo Marine Park (Parliament of Western Australia 1995) AND *Response by the Western Australian Government to the first report of the Legislative Council Select Committee on Cape Range National Park and Ningaloo Marine Park*(Western Australian Government 1997)	The Committee recommended: ❖ Excision of a coastal strip the length of the Ningaloo Marine Park for management by the Department, to provide for management of the Ningaloo Marine Park and its adjacent land-based access areas. ❖ The State Government negotiate the excision of a strip of land adjacent to the Ningaloo Marine Park along the western side of Cardabia Station for management by the Department, to provide better protection and management of Ningaloo Marine Park and the coast. ❖ The State Government negotiate the extension of Cape Range National Park to include Ningaloo pastoral station and a fair and reasonable price should be offered for the station.

Document	Recommendations Relevant to Cape Range National Park
	❖ Eastward extension of Cape Range National Park as proposed by the Department in its 1987 management plan. The committee was hesitant to recommend inclusion of land to the north of Cape Range National Park into the park in view of it being "strongly associated with the community of Exmouth"; it rather supported joint management by the Department and the Shire of Exmouth. It identified the potential for both development and conservation land use (low profile development subject to protection of conservation values). In 1997, the Western Australian Government released a response to the Select Committee's report which supported the intent and principles of the recommendations detailed in the report.
Gascoyne Coast Regional Strategy (WAPC 1996).	Recommended: ❖ Extension of Cape Range National Park for the short-term as proposed by the Department in its 1987 management plan for the park. ❖ Extension of the Cape Range National Park in the medium to long term to include the Learmonth Air Weapons Range and the Ningaloo pastoral lease (i.e. implies support for Jones Lang Wooton recommendations [1993] to extend the Cape Range National Park south to include these areas). ❖ That mineral resource development has regard to the Department's proposed extension to the Cape Range National Park and the Water Authority of Western Australia's public water supply requirements. ❖ A combination of preferred land uses for areas to the north of the existing national park, namely 'conservation' and 'multiple use'. The 'conservation' category included the Cape Range within the unallocated Crown land, and whilst not specifically proposing that this area be added to the conservation reserve system, it proposed "…environmental protection being the key design criterion in relation to all development decisions". The 'multiple use' land use category was intended to " provide for a mix of uses". It was also recommended "development should be permitted provided that it is environmentally sensitive and meets the objectives and requirements of the Exmouth Town Planning Scheme".

Document	Recommendations Relevant to Cape Range National Park
Exmouth-Learmonth (North West Cape) Structure Plan (WAPC 1998).	Recommended: ❖ Extension of the Cape Range National Park as proposed by (1) the Department, to the east and south in its 1987 management plan, with the exception of land within the proposed reserve for Conservation and Limestone Resource Management, and (2) the EPA to the east in 1975, to but not including the scenic amenity corridor along Murat Road south of Shot Hole Canyon Road.
	❖ Setting aside the proposed 5 (g) reserve under the CALM Act for 'Conservation and Limestone Resource Management'. ❖ Extension of the Cape Range National Park in the medium to long term to include the Learmonth Air Weapons Range and the Ningaloo pastoral lease. Recommended the development of interim management agreements (between the Department, Defence and Ningaloo pastoral lessees) for the coastal portion of these areas. The Exmouth-Learmonth Strategy therefore implied ongoing support for WAPC 1996 recommendations for addition of the Learmonth Air Weapons Range and Ningaloo Station to the national park. ❖ Investigation of management options for areas identified as 'Conservation and Land Use Investigation Area' and 'Conservation and Recreation Area'. This was to involve: o assessing the land north of Cape Range National Park for inclusion in the National Park as part of the review of the Cape Range National Park Management Plan, and in the interim providing protection from inappropriate development through the provisions of the Shire of Exmouth Town Planning Scheme. The document indicated provisional support for extension of the national park to the north of the current boundary – i.e. subject to compatibility with a 'desert museum' concept[29], management and leasing arrangement of any desert museum developed by local government, and rating of leasehold properties within the national park extension. o undertaking investigations into the environmental value of a 'Conservation and Recreation Area' to the north-west and west of the Exmouth townsite (note provisional support for additions to the national park from this area as indicated in previous dot point). ❖ Recognition of the recommendations of the Exmouth Water Reserve Water Source Protection Plan and designation of the catchment area as the Exmouth Groundwater Catchment Reserve. The study area of this planning strategy did not include pastoral station areas south of Ningaloo Station.
Ningaloo Coast Regional Strategy Carnarvon to Exmouth. (WAPC 2004).	Identifies a broad land use category of 'Proposed Conservation and Recreation Areas' for areas previously identified as 'Proposed Extension of National Park' by WAPC 1998, with the exception that: ❖ only the northern portion and coastal strip of Ningaloo Pastoral Station (i.e. land that was subject to negotiation during the pastoral lease exclusion process) is included as 'Proposed Conservation and Recreation Area'; and ❖ a strip between one and two kilometres wide along the Ningaloo Coast is also included.

[29] Shire of Exmouth has indicated it is no longer committed to the desert museum concept.

Document	Recommendations Relevant to Cape Range National Park
	The ‘‘Proposed Conservation and Recreation Areas’ category also covers two areas to the north and north-east of the park identified by WAPC 1998 as ‘Possible National Park Extension Area/Reserve for Conservation and Recreation’ and ‘Conservation and Recreation’ respectively. Identifies the Learmonth Air Weapons Range within a ‘Conservation and Multi Use Area’, although indicates support for previous recommendations to include this area into Cape Range National Park should the Department of Defence’s need for the area cease. Proposes that any major proposals for limestone extraction, if deemed environmentally acceptable, should be confined to the proposed reserve for ‘Conservation and Limestone Resource Management’. This document is not explicit regarding WAPC 1998 recommendations for areas previously identified as ‘Conservation and Land Use Investigation’ and ‘Conservation and Recreation’.

APPENDIX 8 (B) PLANNING AND ENVIRONMENTAL GUIDELINES FOR SUSTAINABLE TOURISM ON THE NINGALOO COAST.

Excerpt from the *Ningaloo Coast Regional Strategy – Carnarvon to Exmouth* (WAPC 2004)

1.4.1 Introduction

The Ningaloo coast is a fragile natural area, subject to cyclones and tsunamis, and is the home of rare marine and terrestrial species and landscapes and seascapes that could be damaged irretrievably by insensitive or ad hoc development. This fragile natural area, its flora and fauna, ruggedness, sense of remoteness and potential world heritage values also are the basis of a growing, economically important, nature-based tourism industry. The area is designated as a zone of opportunity in the *Nature based tourism strategy for Western Australia*. The sustainability of the tourism industry and the natural area on which it depends will involve careful planning, management and sympathetic development.

Pressure for substantial developments has intensified over recent years due to the growth in tourism. The coast already is subject to a variety of developments, including roads, formal and informal camping sites, toilets, car parks, boat-launching areas, moorings, interpretation centres, observation structures, accommodation, signs, shelters, paths and picnic areas.

The aim of these guidelines is to:

- provide state agencies, local government, community and proponents with clear guidance regarding sustainable tourism development;
- delineate limits of acceptable change, which will ensure that visitors continue to enjoy a remote and natural experience on the Ningaloo coast; and
- preserve, enhance and protect the environment.

These guidelines primarily are intended to ensure **all** future semi-permanent and permanent tourism accommodation developments or expansion of existing developments on the Ningaloo coast, from the Exmouth Gulf to Carnarvon townsite, outside of the regional centres of Exmouth and Carnarvon, are **low-impact, sustainable tourism developments**. Examples include campsites, camping nodes, ecocamps and ecolodges. These guidelines must be read in conjunction with relevant statements of planning policy such as the *State coastal planning statement of planning policy 2.6* and the Ningaloo coast statement of planning policy 6.3.

1.4.2 Location

All development will be approved **only** where strategic planning has identified sites that are suitable and appropriate for the for small-scale and/or low-impact tourism development proposed.

The Ningaloo Coast Regional Strategy Carnarvon to Exmouth and accompanying Ningaloo coast statement of planning policy 6.3 outline acceptable node locations and development intensities for the entire Ningaloo coast, with a range of tourist services and facilities being provided for . The strategy supersedes previous studies mentioned above.

Tourist activity (which includes camping, caravanning and station accommodation) is spread along much of the Ningaloo coast. Outside of the Cape Range National Park, much of it has occurred in an ad hoc and unmanaged way, with detrimental impacts on the environment resulting from uncontrolled access, waste disposal, rubbish dumping, campfires and wood gathering, and weed invasion. These campsites need to be rationalised and those identified for retention managed adequately through an integrated management process involving pastoral leaseholders, coastal users and the Department of Conservation and Land Management.

Policies

P.1 Proposed tourism developments should be located consistent with the *State coastal planning statement of planning policy 2.6*, Ningaloo Coast Regional Strategy Carnarvon to Exmouth, Ningaloo coast statement of planning policy 6.3, *Ningaloo Marine Park management plan and Cape Range National Park management plan.*

P.2 Subject to environmental assessment, only tourism accommodation development proposals which are staged within the identified tourism investigation envelopes will be considered. Monitoring of

environmental impacts shall be required as part of any approval and where necessary may require the cessation and remediation of an approved development.

P.3 Camping on the Ningaloo coast should be restricted to designated and managed campsites, both in remote and semi-remote settings.

Guideline

G.1 Proposed tourism developments should be located to ensure:

a. an appropriate distance from areas of cultural significance or heritage value including Aboriginal heritage is maintained;
b. stable environmental conditions (geological, hydrological and marine) exist for access, building construction and visitor and management use patterns;
c. soil types are suitable for and capable of development;
d. buildings and infrastructure are located to avoid risk of damage from coastal processes, consistent with *State coastal planning statement of planning policy 2.6*;
e. insect breeding sites, such as those of mosquitoes and biting midges, are avoided;
f. risks and hazards to visitors are minimised;
g. locations of declared rare or priority flora and fauna species are avoided or protected, and disturbance to important breeding or feeding areas is minimised;
h. where possible, the potential for further expansion or upgrading can be accommodated without significant impact on the environment;
i. potential impacts upon Marine Park Sanctuary Zones, fish habitat protection areas and other sensitive marine environments are minimised;
j. where possible, access to suitable artesian water sources is available; and
k. minimal impact or alteration to the natural topography of the site.

1.4.3 Development type and scale

The Ningaloo coast is a fragile coastal environment and its attraction is its environmental, ecological, landscape and remoteness values. The development of sustainable tourism accommodation shall be carefully considered so as not to detract from the Ningaloo coasts amenity values. The type of development envisaged for the Ningaloo coast generally is low-impact accommodation, such as an ecolodge style development which is defined as:

> Ecotourism accommodation, such as an ecolodge, includes the requirement of special care in design, construction and operation so as not to destroy the very resources or qualities that visitors come to experience. With all ecotourism proposals, education about the environment as well as utilisation of local culture, services, products and communities are important as is the actual operation of the facility, and information on these aspects must be included within any proposal. An ecolodge should subtly fit in with the landscape, utilise sustainable power, be low energy incorporating solar passive design, minimal water use, ecologically sensitive waste disposal and recyclable processing of all waste with no resultant pollution.

There is a demand for the provision of small-scale and/or low-impact tourism facilities. From a planning perspective, the Ningaloo Coast Regional Strategy Carnarvon to Exmouth has determined that all major (larger-scale/ higher-impact) tourism developments will be required to locate within the Carnarvon and Exmouth regional centres. The regional centres:

- are physically more capable and suitable for development; and
- have the available infrastructure, i.e. roads, air transport, communications, boat harbour, community facilities, water, sewerage and power.

Given the development on the east coast of North West Cape, incorporating the Exmouth boat harbour and associated marina, tourism and residential development, and the Carnarvon fascine residential development and the potential Whitlock Island tourism development, it is appropriate that further development be focused in those areas. It also is appropriate that the coast be retained largely in its natural state.

Policies

P.4 Subject to environmental and planning approvals larger-scale/higher-impact tourism facility proposals will be confined to Exmouth and Carnarvon.

P.5 Development in Coral Bay will be based on the settlement plan in the Ningaloo Coast Regional

Strategy Carnarvon to Exmouth, with appropriate services being provided to the settlement and, must be in accordance with these guidelines.

P.6 Proposed tourism developments outside Carnarvon, Exmouth and Coral Bay should be small-scale, low impact and environmentally sensitive facilities consistent with the designation in the Ningaloo Coast Regional Strategy Carnarvon to Exmouth, including ecolodge style developments in addition to camping nodes.

1.4.4 Protection of amenity and landscape values

The remoteness values of the region are outstanding. Despite historic pastoral grazing, the landform and vegetation reinforce the unspoilt, natural and remoteness values of the area and its incredible natural beauty. The landform to the north is dominated by Cape Range. The range is flanked by highly eroded limestone terraces, drainage lines and gorges adjacent to red alluvial fans and flats, followed by a relatively narrow strip of aeolian white dunes adjacent to the beach. Vegetation is relatively uniform and low lying, ranging between 0.5 m and 1.5 m, apart from isolated stands of taller trees.

The nature of the landform and vegetation contributes to a visual landscape that is highly sensitive to changes. Already, minor tracks, small telecommunication towers on the Cape Range, and gravel pits are highly visible when viewed from Yardie Creek Road.

While the Milyering Visitor Centre, which is only single storey, is designed, constructed and sited sympathetically, it is visible from a considerable distance. Even essential standard road signs indicating speed, direction and hazards have landscape impact. Notwithstanding this, most of the tourism and minor tourism nodes provide some opportunity to minimise the visual impact of development through locations setback from ridgeline areas or in dune swales.

Policies

P.7 To retain the amenity values of the Ningaloo coast, only small-scale low impact tourism related facilities consistent with the locations, form and scale identified in these guidelines, will be supported.

P.8 Proposed tourism developments should demonstrate an understanding of and be sympathetic with the landform, visual context and resources, views and general landscape values of a particular site and how it is likely to affect the perception of the areas remoteness values.

Guidelines

G.2 Building structures along the coast preferably should not exceed one storey or five metres from natural ground level. Buildings up to two storeys or nine metres from natural ground level may be considered in Coral Bay, provided the proponent demonstrates that the visual impact does not significantly impact on the visual amenity of the site from both land and water, and that the topography is not impacted upon.

G.3 Proponents should prepare visual impact assessment, which should address:

a. the existing landform, vegetation, prominent features and viewsheds (to and from the proposed site);
b. contour information at a minimum of 1 m intervals; and
c. how the development proposal will affect amenity values using physical or computer generated three-dimensional models, including scale, colour, form, line, and texture.

G.4The proposed tourism development should be designed, constructed and operated to ensure:

a. water wise vegetation, preferably West Australian natives where possible, are planted for screening, windbreaks, rehabilitation and landscape treatments;
b. weeds are monitored and eradicated where appropriate;
c. minimal change is made to landform cut and fill and topography to accommodate buildings and infrastructure;
d. disturbance or loss of natural vegetation is minimised or avoided;
e. architectural style, landscape design and construction materials reflect local elements (e.g. landform);
f. impacts on visually prominent areas such as headlands, cliffs and ridges are avoided;
g. that materials used are appropriate for the location, are assessed through visual impact assessment and have low reflective qualities that closely complement the visual amenity of the area;
h. noise pollution is minimised;

i. lighting which may affect nocturnal or breeding animals is minimised;
j. services, including powerlines are located below ground, where practical, provided the environmental impact is acceptable; and
k. isolated structures, such as car parks, toilet blocks, towers and storage areas, blend into the natural setting with appropriate selection of materials and with locally endemic vegetation.

1.4.5 Coastal setback

The Ningaloo coast has diverse landforms and natural systems and the coastal zone differs from place to place. Due to this diversity and in accordance with *State coastal planning statement of planning policy 2.6*, setbacks for development within the coastal zone should be defined following consideration of the natural coastal processes in specific areas, including storm surge and sea-level rise. For example, some areas have extensive mobile dunes while others have rocky foreshores. Some areas have drainage systems that affect mangroves and others have coastal plains, which are subject to tidal or surface run-off inundation. Some areas are important habitats for natural fauna while others have high recreational value.

The coastal zone is dynamic and changes over time. The coast is subject to erosion or accretion due to natural processes and/or as a result of human and animal activity. For example, dunes can be mobile as a result of natural processes or can become mobile as a result of vegetation removal. Therefore, on one hand, developments could be affected by foreshore and dune mobility while on the other; they could affect vegetation and cause dune mobility.

Policies

P.9 Permanent tourist accommodation developments should be set back from the coast based on an assessment of natural coastal process constraints, as per *State coastal planning statement of planning policy 2.6.*

P.10 Development should provide for appropriately managed public access to the coast in keeping with the recommendations of the Ningaloo Coast Regional Strategy Carnarvon to Exmouth.

Guidelines

G.5 An appropriate setback between any permanent tourist accommodation development and the coast, shall be determined consistent with S*tate coastal planning statement of planning policy 2.6*, and in addition shall:

a. incorporate the primary and secondary dunes where they exist;
b. address the stability accretion/erosion of the dune and beach system (beach sand cycle);
c. address inundation e.g. on alluvial floodplains and drainage lines, including from extreme natural events (e.g. cyclone, storm surge or tsunami) and long-term changes in sea level;
d. protect dunes, beaches and near shore waters which provide breeding, nesting or feeding areas for significant fauna; and
e. set back development from visually prominent sites such as headlands, cliffs, beaches and other locations which are a focus of attention or in major viewsheds from other important locations.

G.6 The land within the coastal setback should be maintained and managed to conserve terrestrial, intertidal and near shore natural physical and biological, landscape and cultural features through the preparation and implementation of a foreshore management plan, which should define management responsibilities to ensure:

a. signage, bollards, rubbish bins and small structures, water tanks or toilet blocks within the foreshore reserve have a very low visual impact and are of a form (colour, materials and size) consistent with the amenity and character of the area;
b. coastal access roads and car parks are sensitively designed and located to address environmental constraints, minimising cut and fill and vegetation removal, follow natural contours, and direct traffic away from environmentally sensitive areas;
c. pedestrian access is the principal form of access through the coastal foreshore reserves where one exists or coastal setback and clearly defined paths direct people away from environmentally sensitive areas;
d. four-wheel drive, off-road vehicles and motorbikes are not be permitted on the beach, within the coastal foreshore reserve (unless beach access has been identified), or the coastal setback except for approved boat-launching facilities or in accordance with a tourist operator licence from either the Marine Parks and Reserves Authority or Conservation Commission of Western Australia; and
e. stabilisation, rehabilitation, revegetation and landscape treatment of the foreshore area is undertaken

using locally plant species.

1.4.6 Marine infrastructure

Direct marine impacts arise due mainly to water-based activities (e.g. boating) and generally have a localised impact, such as damage caused by anchor chains. Indirect marine impacts (e.g. increased turbidity, habitat disturbance and bilge discharge) usually are more difficult to control where large numbers of recreational boat enthusiasts have access to coral reefs. There also is an increased risk of contamination due to fuel spills and inappropriate sullage and rubbish disposal.

Marinas and canals have the potential to cause significant environmental impact, at the time of construction and on an ongoing basis. This infrastructure is not considered to be consistent with the environmental values of the area and the intent of small-scale low-key environmentally sensitive tourism developments.

Management is required to prevent uncontrolled access by vehicles and the accumulation of boats on the beach in the vicinity of informal beach boat-launching sites.

Policies

P.11 Marina and canal developments will be considered only in the designated townsites of Exmouth and Carnarvon.

P.12 Small jetties and boat-launching facilities may be allowed provided they are consistent with the *Ningaloo Marine Park management plan*, Ningaloo Coast Regional Strategy Carnarvon to Exmouth, have a strategic facilities plan and have been referred to the Environmental Protection Authority.

P.13 Coastal engineering structures such as groynes and seawalls will not be permitted adjacent to the Ningaloo Reef, outside the already approved structures in Carnarvon, Exmouth and Coral Bay, other than for a public purpose.

1.4.7 Water availability

Water availability has been recognised as one of the most significant constraints to the development of the region. The climate of the Ningaloo coast ranges from hot, arid conditions at the tip of Cape Range in the north to warm semi-arid conditions around Carnarvon in the south. During January and February each year, the maximum daily temperature regularly reaches 45°C.

Rainfall in the region averages 300 mm annually with peak falls in summer and winter. The sources of rain include tropical cyclones, the incursion of warm moist air from the Kimberley Region and mid-latitude depressions.

Groundwater occurs either as superficial or confined groundwater. Supplies of fresh, unconfined groundwater generally are restricted to the vicinity of the major rivers or in elevated areas such as Cape Range. In the case of Cape Range, fresh or brackish groundwater usually overlies very saline groundwater. Confined or artesian groundwater is under pressure and rises when intercepted by a bore or may naturally flow to the surface via springs.

Artesian groundwater occurs throughout most of the region and may be as much as 900 m below the surface in coastal areas such as Coral Bay where alternative sources of groundwater generally are not available. Artesian groundwater is brackish to very saline, varies in temperature from 10°C to 100°C and is corrosive. It requires substantial treatment usually involving desalination, cooling, softening and removal of iron to attain potable water quality.

Water availability also constitutes a significant environmental constraint. Pumping of fresh or brackish water which overlies saline water can cause saltwater intrusion to the surface. Recharge of the shallow aquifer may occur only after intense or long rainfall and in some years, this may not occur at all. Subterranean fauna, particularly stygofauna, also may be affected by changes in groundwater levels, quality and salinity due to groundwater extraction. Wastewater from the desalinisation and/or treatment of saline groundwater, corrosive artesian groundwater or sea water may be highly saline, alkaline, acidic or contain heavy metals and minerals, and therefore cause impacts to the environment if discharged. Evaporation or infiltration ponds and ocean outfall pipes, if visible, are likely to affect remote values and may also have a negative environmental impact.

Clearly, the issue of water availability needs to be considered in the context of the water required by a specific

development proposal, the available water resources, proposed effluent treatment and recycling and specific site circumstances.

Policies

P.14 The disposal of wastewater produced by desalinisation or the treatment of artesian water to the marine environment may only be considered where the site selection for infrastructure minimises impact on the environment and visual amenity, and there is no suitable alternative or complementary water source. Disposal to the terrestrial environment may be considered, provided groundwater and surface water quality and quantity are maintained such that existing and potential uses, including ecosystem functioning, are protected.

P.15 The location, scale of development and future expansion should be consistent with availability and sustainability of safe and reliable water sources.

P.16 Extraction of shallow, unconfined groundwater must be sustainable, without affecting dependent ecosystems or physical processes.

P.17 Development proponents should endeavour to obtain water from a variety of sustainable sources, with collection of rainwater being a priority.

P.18 Development proponents should locate visible water supply and storage facilities so as to minimise environmental and visual impact upon landscape.

Guideline

G.7 Water conservation strategies (e.g. including composting toilets, grey water and stormwater reuse and low-flow shower roses) should be incorporated in development proposals.

1.4.8 Cyclones, flooding and drainage

The Ningaloo coast is subject to cyclones, which cause strong winds, storm surge, and tsunamis, which can lead to inundation of the coastal zone. More frequently, flooding of the coastal plain occurs as a result of the combination of rain, high tides and low-lying land. If sea levels rise, as predicted, the coastal zone may be subject to additional and increasing inundation. Therefore, development sites will require careful selection to avoid adverse impacts from cyclones and flooding and should be consistent with *State coastal planning statement of planning policy 2.6*. Decision-making authorities must assess and respond to development proposals carefully to avoid liability for loss or damage.

Policies

P.19 Landforms and topography should not be altered substantially to deal with potential flooding.

P.20 Tourism development within the nominated storm surge lines will be limited to:

a. those structures necessary for public facilities which are coastally dependent or those which are temporary within the 3 m AHD contour line (which represents a 1 in 100 year flooding event from both terrestrial and marine sources); and
b. no permanent or semi permanent structures within the 4 m AHD contour line (which represents a cyclone category 5 worst case track) unless the proponent accepts that the structure is expendable or the proposal is designed to acceptable site levels to reduce the impact of potential storm surge.

P.21 Permanent tourist accommodation developments shall be constructed to Australian Standard AS/NZS 1170.2:2002 (or its replacement) to withstand the wind effects of cyclones, and semi-permanent structures should be easily removable in the event of a cyclone warning being issued.

Guideline

G.8 Development proposals shall:

a. consider innovative pavement solutions as an alternative to bitumen and concrete to decrease the amount of stormwater run-off;
b. use historical terrestrial and marine flooding data or best estimates based on adjacent lands, and a precautionary principle safety factor to determine areas subject to 1 in 100 year inundation events; and
c. incorporate water-sensitive design principles and features into overall design of buildings, hard

surfaces, landscaped areas and stormwater drainage.

1.4.9 Sewage treatment

Sewage treatment presents a considerable environmental constraint to development. Conventional septic systems involve the leaching of nutrients and other pollutants which may affect subterranean fauna, marine water and groundwater quality and coral ecosystems. Unlike freshwater wetlands, the marine environment is sensitive to nitrogen rather than phosphorus. In addition, coral reef systems are very low in nutrients and small increases can result in a significant ecosystem response (Grigg and Dollar, 1993). Alternative treatment units (e.g. Ecomax or Biocycle) for secondary and postsecondary treatment still produce effluent containing nutrients, metals and sludge, which require disposal. Evaporative or digestion ponds may produce odour, be highly visible and represent a risk to the environment if containment mechanisms (e.g. plastic or clay lining) fail. Tertiary treatment of sewage is likely to be uneconomic, given the anticipated scale of development and current technology (Baker, pers. comm).

Policies

P.22 Appropriate management and monitoring should be established to ensure criteria are met and there are contingency plans for cases of infrastructure failure or where minimum criteria are not met.

P.23 Sewage treatment infrastructure should produce minimal odour and be appropriately separated from permanent tourist accommodation developments.

Guidelines

G.9 Best practice enclosed treatment plants will be considered for approval where:

a. an integrated and sustainable approach is adopted to minimize water use and maximize recycling;
b. treated sewage will contain a maximum of 2.5 g/m3 total nitrogen, 1 g/m3 total phosphorus, 5 g/m3 biological oxygen demand, 5 g/m3 suspended solids and 100 thermo tolerant coliforms; and
c. treated sewage will be disposed via trickle irrigation to natural vegetation (not within 100 m of beaches or wetlands) or evaporation ponds rather than disposal to the marine environment or groundwater aquifer via injection.

G.10 Screened solids and sludge should be transported to an appropriate licensed landfill.

G.11 Organic fertilisers may be used when derived from the development proposal itself (e.g. toilet compost) rather than inorganic fertiliser, subject to Health Department requirements.

G.12 Sewage treatment and disposal systems should incorporate fauna exclusion strategies or make provision for fauna management.

1.4.10 Waste disposal

Landfill sites in remote areas normally are unlined, uncovered and infrequently maintained (Mantle, pers. comm.). This may result in odour, pollutants leaching into groundwater and rubbish dispersal from strong onshore winds. The location of a landfill site adjacent to tourism development reduces remote values and tourism amenity and should have a site management plan prepared.

Policies

P.24 Organic and green waste should be collected, composted and appropriately stored for use as mulch if appropriate, soil improver or fertiliser. Organic waste not used for this purpose and all inorganic waste should be transported to a licensed landfill facility.

Guidelines

G.13 Development proposals should prepare and implement a waste management program which minimises waste production and maximises use and recycling.

1.4.11 Access

Most of the Ningaloo coast is frequently accessed by locals and visitors travelling in four-wheel drive vehicles and caravans seeking a coastal holiday experience, adventure and/or solitude. The establishment of indiscriminate tracks to the coast leading to recreation sites for fishing, diving or camping, as well as many campsites themselves are causing loss of vegetation and subsequent dune destabilisation. This is compounded by historically inappropriate rubbish disposal, increased fire risk from campfires and degradation to native

vegetation from coastal use. In recent years visitor numbers have increased markedly, such that urgent management is required to prevent long-term or irreversible damage to the environment.

The main tourist access network should remain the North West Coastal Highway, Minilya - Exmouth and Burkett roads. The main north-south coastal access roads (Blowholes - Gnaraloo Road and Coral Bay-Yardie Creek Road) should be located in accordance with setback requirements away from the coast, with spur roads providing access to appropriate destinations. This strategy has been highly successful in Cape Range National Park by minimising indiscreet and uncontrolled beach access, usually by four-wheel drive vehicles. The spur roads also would need to be formed and maintained to remove the necessity for vehicle operators to create new tracks when existing ones become boggy, rough or impassable.

Providing access to a particular tourism site may have significant environmental implications beyond its direct construction impacts. It would be irresponsible to subject the coastal zone to increased use prior to development of supporting infrastructure and management arrangements.

Yardie Creek is one of the main features of the Cape Range National Park, for its wildlife conservation, aesthetic, cultural and nature-based tourism values. The issue of a crossing for Yardie Creek has been discussed for some time. The provision of a permanent crossing of Yardie Creek would detract significantly from the environmental values, amenity of the area and the current visitor experience. On balance, the existing natural sandbar crossing near the mouth of the creek is more aesthetically and environmentally acceptable. It is consistent with the maintenance of the areas environmental values and Commonwealth Department of Defence operational requirements south of Yardie Creek.

Policies

P.25 Access to and from tourist developments on the Ningaloo coast should be via formed spur roads.

P.26 The planning and construction of access roads, supporting management (e.g. car parks, signage, track closures, spur roads and rubbish collection) and proposed tourism nodes should be integrated and coordinated by the Ningaloo Sustainable Development Committee.

P.27 The crossing at Yardie Creek should remain in its natural state with no built structure supported.

P.28 Development proposals should encourage walking, hiking and organised tour experiences, rather than individual vehicle transport.

Guidelines

G.14 Roads, tracks and paths should be aligned and constructed to minimise disruption of native fauna movement patterns.

G.15 In fragile environments, boardwalks and fenced walkways should be provided.

1.4.12 Energy supply and building energy efficiency

Proposed tourism developments may require energy for water heating, air-conditioning, refrigeration, lighting, general electrical appliances, vehicles and water pumps. The Office of Energy has provided information which suggests that viable alternative energy sources are available (e.g. passive solar, solar, wind, gas, geo-thermal). Noise produced by conventional power generators may affect the quality of visitor experience.

Policies

P.29 Proposed low impact tourism developments should employ alternative/ renewable energy sources where possible.

P.30 Fuel or gas-powered generators should be used only as a backup to alternative energy sources or in emergency situations.

P.31 All new development should maximise energy efficiency through climate sensitive, passive solar and energy efficient design.

Guideline

G.16Proponents should ensure that development proposals:

a. have the capacity to generate their own power;
b. use northern solar orientation for passive heating and cooling;
c. minimise solid enclosure and thermal mass;
d. maximise roof ventilation;
e. use elongated or segmented floor plans to minimise internal heat gain and maximise exposure for ventilation;
f. separate rooms and functions with covered breezeways to maximize wall shading and induce ventilation;
g. isolate heat-generating functions such as kitchens and laundries from living areas;
h. control exposure to wind through building orientation and configuration, number and position of wall and roof openings and relationship to gradient and vegetation;
i. provide shaded outdoor living areas such as porches and decks;
j. use suitable microclimates for warm winter sites and cool summer sites;
k. orientate to take advantage of cooling breezes;
l. incorporate features to minimise energy use; and
m. avoid the use of energy-intensive, environmentally damaging, waste producing and/or hazardous materials.

1.4.13 Construction and management

The following factors should be incorporated in the planning and implementation phases of the proposed development, through an environmental management system (International Organisation of Standardisation, 1997) to minimise impacts and achieve a more sustainable development.

Guidelines

G.17 Construction practices should ensure minimal site disruption.

G.18 Proponents should develop on-site guidelines or controls for contractors, specifying appropriate construction practices.

G.19 Proponents should provide briefing or training sessions for all contractors and their employees, specifying the desired practices and the consequences of non-compliance.

G.20 Contractors should provide a performance bond or deposit which can be used to repair any environmental damage inconsistent with an environmental management plan.

G.21 Environmental objectives and criteria should be documented.

G.22 Monitoring and evaluation systems should be prepared and implemented.

G.23 The proponent should undertake regular environmental audits.

G.24 Staff training and environmental education programs should be established.

G.25 Interaction between tourists and physical and/or cultural environments should be documented and managed (e.g. visitor information and education facilities).

G.26 Minimal use and disposal of chemical cleaning products should be encouraged. Where disposal is unavoidable, low-impact products should be sought.

G.27 Construction and decoration materials should not produce or release harmful chemicals during or after manufacture.

G.28 Proponents should prepare and adopt a product-purchasing policy which minimises life cycle costs and maximises use, re-use and recycling.

G.29 Proponents should provide information to visitors that encourage appropriate behaviour towards wildlife, cultural resources, historic and natural features.

1.4.14 Approvals process

The tenure, vesting and zoning of land, variations in planning schemes and management plans and the type of

development proposal will determine the development approval required. Despite variations, it is important that tourism developments are considered in a coordinated, orderly and consistent way thereby ensuring the objectives and intended outcomes of these guidelines and the Ningaloo Coast Regional Strategy Carnarvon to Exmouth are achieved. Currently under investigation is the length of tenure to be allowed on leasehold land vested in the Conservation Commission of Western Australia, and whether this should, in the appropriate circumstances, be longer than the currently allowed 21 plus 21 years.

Policy

P.32 Development approvals will be as required by the governance framework for the Ningaloo coast.

P.33 All development proposals, which could have a significant impact on the environment, will be referred to the Environmental Protection Authority (EPA).

P.34 Development of tourism sites will require approval under the *Western Australian Planning Commission Act 1985, Town Planning and Development Act 1928* and be consistent with the *State planning strategy*, the Ningaloo Coast Regional Strategy Carnarvon to Exmouth, the Ningaloo coast statement of planning policy 6.3, other relevant statements of planning policy, relevant schemes and consider Aboriginal heritage sites and/or surveys.

P.35 All development proposals within the conservation reserve system should be consistent with the *State planning strategy*, the Ningaloo Coast Regional Strategy Carnarvon to Exmouth, the Ningaloo coast statement of planning policy 6.3, other relevant statements of planning policy, relevant schemes and consider Aboriginal heritage sites and/or surveys and the approved management plan for that area.

Guideline

G.30 Prior to lodging an application for development, proponents should liaise with the Department of Conservation and Land Management, Department of Environment, Department for Planning and Infrastructure, local government and Department of Indigenous Affairs.

G.31 Proponents will be required to provide a high level of information to the EPA upfront, at the time of referral. This information should include:

a. a detailed description of the development proposal including site and landscape appraisal, ultimate development scenario, project design, access arrangements, construction, management and operation;
b. a detailed description of the existing, physical, biological, landscape and cultural environment, which include detailed field investigations of flora, fauna (terrestrial, marine and subterranean), declared rare and priority species, biodiversity, geology and geomorphology, hydrology, ecological processes and systems, land- and sea-scape, drainage, flooding and Aboriginal cultural heritage significance;
c. an assessment of coastal processes if the site abuts the coast;
d. an assessment of construction, visual, indirect, ongoing, off-site and cumulative impacts of the development proposal, and its supporting infrastructure;
e. an assessment of alternatives and justification of the development proposal selected;
f. information which demonstrates, with a high degree of scientific confidence, that anticipated environmental impacts can be managed;
g. a commitment to and description of an environmental management system which integrates the construction and operation of the development proposal with environmental management criteria and objectives, defined management responsibilities for implementation and demonstrates progressive improvement; and
h. a monitoring program, contingency and emergency response plans in case environmental criteria or objectives are not met.

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