Shark Bay Marine Reserves

Management Plan 1996-2006

Management Plan No 34

Department of Conservation and Land Management

National Parks and Nature Conservation Authority

World Heritage

SHARK BAY MARINE RESERVES

MANAGEMENT PLAN

1996 - 2006

28 August 1996 setting to match that sent to printers previously

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Department of Conservation and Land Management
for the
National Parks and Nature Conservation Authority
Perth, Western Australia, 1996

PREFACE

All marine parks and marine nature reserves in Western Australia are vested in the National Parks and Nature Conservation Authority (NPNCA). The management of these parks and reserves is carried out by the Department of Conservation and Land Management (CALM).

The NPNCA is responsible for the preparation of management plans for all lands and waters which are vested in it. These are prepared on a regional or area basis. Area plans for individual marine parks and marine nature reserves are being prepared on a priority basis.

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

(a) a statement of the policies or guidelines proposed to be followed, and

(b) a summary of operations proposed to be undertaken

for a specified period, not exceeding 10 years.

A draft management plan for the Shark Bay Marine Reserves was prepared by CALM and released for public comment by the NPNCA in December 1994. After considering public comment and proposed changes to the draft, the NPNCA approved this plan. The Ministers for the Environment, Fisheries and Mines subsequently approved this document as the Shark Bay Marine Reserves Management Plan (1996-2006). This management plan is closely integrated with the Shark Bay World Heritage Property Management ~~Plan~~ Paper for Fish Resources prepared by the Fisheries Department of Western Australia which was released concurrently.

ACKNOWLEDGEMENTS

CALM's planning team for the Shark Bay Marine Reserves comprised Andrew Hill (coordinator), Ron Shepherd, Greg Leaman, Sue Hancock and Dave Clayton (Fisheries Department).

The planning team was greatly assisted by the Shark Bay Marine Reserves Advisory Committee who contributed considerable time and effort to the production of this plan. The Committee comprised Mr G Leaman (Chairman), Mr B Bellottie, Cr T Day, Ms J Shankland, Mr G Rundle, Mr P Woods, Dr D Walker, Mr J Hill, Mr S van Houwelingen, Mr D Steadman, Mr B Leahy, Mr N Stafford, Cr M Lee, Ms B Churchward and Cr R Purcell.

Thanks also to staff from the Shires of Carnarvon and Shark Bay who provided assistance in the organisation of the Advisory Committee meetings.

The assistance of the Fisheries Department staff, particularly Sandy van Houwelingen and Ken O'Reilly, and the use of the *P.V. Abel Tasman* in field investigations and information gathering is gratefully acknowledged. Staff from the Departments of Transport, Minerals and Energy, Environmental Protection and the WA Museum provided useful technical information.

Valuable assistance was also provided by other CALM staff, particularly Aminya Koch (technical assistance), Gascoyne District Staff, planning officers Allan Padgett and Kate Orr, Marmion Marine Park staff (field investigation), Hugh Chevis, Peter Hutchinson, Keiran McNamara and CALM's Land Information Branch (map production).

Thanks also to the Shark Bay community, particularly commercial fishermen, pastoralists and charter boat and other tourism operators who provided valuable information and feedback on various issues.

NOMENCLATURE

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

CONTENTS

1.0 INTRODUCTION

1.1 OVERVIEW

Shark Bay is of international significance, having been inscribed on the World Heritage List in 1991 in recognition of the area's outstanding universal natural values (Section 1.2). Australia is required to protect and conserve these values for future generations.

It is the role of the Western Australian Government to manage the Shark Bay World Heritage Area to fulfil obligations under the Convention concerning the Protection of the World Cultural and Natural Heritage (World Heritage Convention). The Shark Bay Marine Park and the Hamelin Pool Marine Nature Reserve lie within the World Heritage Area, and it is a requirement under the Conservation and Land Management Act 1984 that management plans be prepared for the marine park and the marine nature reserve. This management plan for the Shark Bay Marine Park and the Hamelin Pool Marine Nature Reserve (see Figure 1) has been prepared by the Department of Conservation and Land Management (CALM) in close liaison with the Fisheries Department, on behalf of the National Parks and Nature Conservation Authority (NPNCA).

The planning team worked closely with the Shark Bay Marine Reserves Advisory Committee (see membership list in Acknowledgments) in the preparation of this plan. The committee provided feedback on all components of the plan and communicated with the broader community on the preparation of the plan. The public has been involved at all stages in providing comment and advice, particularly the local community. The social and economic values of Shark Bay have also been considered in preparation of the plan.

Adjoining the marine park at the high water mark is the Monkey Mia Reserve (No. 1686) which covers 477 ha and is jointly vested with the Shire of Shark Bay and the Executive Director of CALM for the purpose of "Recreation" (the *Monkey Mia Reserve Draft Management Plan*[1] recommends the purpose be extended to "Recreation and Conservation of Flora and Fauna"). This reserve contains all public facilities in the area and surrounds an additional Shire Reserve on which the Monkey Mia Resort is located (see Figure 2). Because of the strong interaction between the management of the coastal strip and the marine park, it is crucial that management and planning be integrated to ensure the objectives of the two are achieved. Monkey Mia presents a complex range of specific issues such as dolphin feeding and interaction procedures, beach access and usage and the public use of the Information Centre. Because of this complexity a separate draft management plan has been jointly prepared by the Shire of Shark Bay and CALM which specifically addresses these issues. The marine reserves plan will detail the strategies required within the marine park to enable the Monkey Mia Reserve Management Plan to be implemented.

1.2 WORLD HERITAGE LISTING

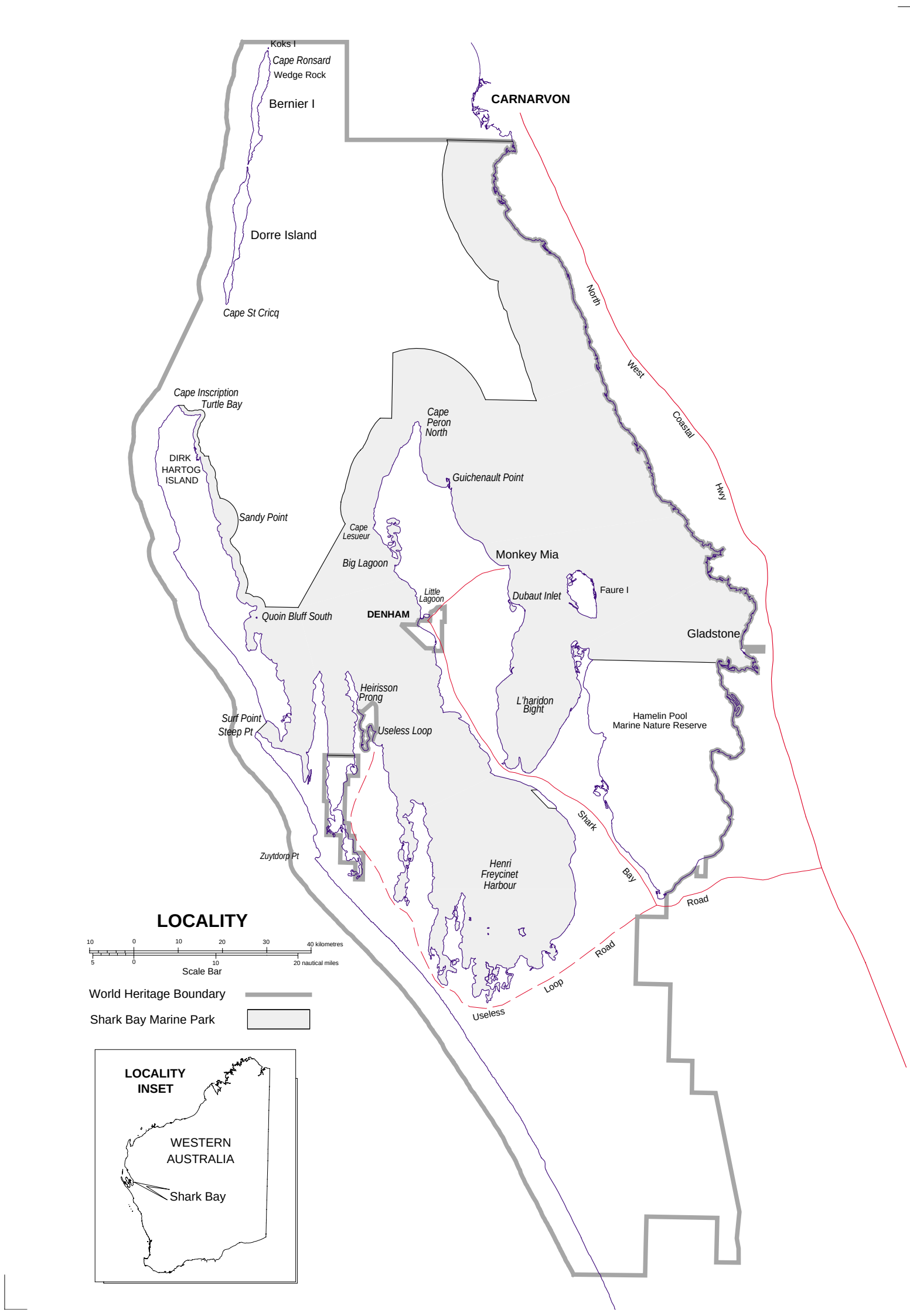
Shark Bay was nominated in October 1990 and included on the World Heritage List in December 1991 (see Figure 1). It was nominated on the basis of its natural values and when listed, was one of only 11 places on the World Heritage List to satisfy all four natural criteria. These criteria are that the area contains:

- *outstanding examples representing the major stages of Earth's evolutionary history;*
- *outstanding examples representing significant ongoing geological processes, biological evolution and human interaction with the natural environment;*
- *certain unique, rare or superlative natural phenomena, formations or features of exceptional natural beauty;*
- *the most important and significant habitats where threatened species of plants and animals of outstanding universal value from the point of view of science and conservation still survive.*

The Shark Bay World Heritage Area covers approximately 2.2 million ha, of which about 71 per cent is marine. The following information is a summarised description of the values in relation to the marine reserves. The marine environment is a complex and interlinked system and many of the features of Shark Bay encompass more than one criterion.

The region contains an outstanding example of Earth's evolutionary history in the stromatolites and hypersaline environment of Hamelin Pool. There are significant ongoing geological and biological processes in both the marine and terrestrial environments of Shark Bay. The Faure Sill and Wooramel Seagrass Bank are examples of the many superlative natural phenomena or features to be found in the World Heritage Area. The World Heritage Area provides the habitat of a number of rare and threatened species with many others at the limit of their range. Shark Bay is also noted for its natural beauty and in particular the diversity of its land and seascapes.

[1] Department of Conservation and Land Management and the Shire of Shark Bay (1993). Monkey Mia Reserve Draft Management Plan.


Koks I
Cape Ronsard
Wedge Rock
Bernier I
CARNARVON
Dorre Island
Cape St Cricq
North West Coastal Hwy
Cape Inscription
Turtle Bay
DIRK HARTOG ISLAND
Sandy Point
Cape Peron North
Guichenault Point
Cape Lesueur
Big Lagoon
Monkey Mia
Little Lagoon
Dubaut Inlet
Faure I
DENHAM
Quoin Bluff South
Gladstone
Heirisson Prong
L'haridon Bight
Surf Point
Steep Pt
Useless Loop
Hamelin Pool Marine Nature Reserve
Shark Bay Road
Zuytdorp Pt
Henri Freycinet Harbour
Useless Loop Road
LOCALITY
10 0 10 20 30 40 kilometres
5 0 10 20 nautical miles
Scale Bar
World Heritage Boundary
Shark Bay Marine Park
LOCALITY INSET
WESTERN AUSTRALIA
Shark Bay

Seagrass covers over 4000 square kilometres of the Bay, with the 1030 km^2 Wooramel Seagrass Bank being the largest known structure of its type in the world. The 12 species of seagrass in Shark Bay make it one of the most diverse seagrass assemblages in the world. Seagrass has significantly contributed to the evolution of Shark Bay as it has modified the physical, chemical and biological environment as well as the geology and led to the development of major marine features, such as Faure Sill. The barrier banks associated with the growth of seagrass over the last 5000 years have, with low rainfall, high evaporation and low tidal flushing, produced the hypersaline Hamelin Pool and Lharidon Bight. This hypersaline condition is conducive to the growth of cyanobacteria. The cyanobacteria trap and bind the sediment to produce a variety of mats and structures including laminated types known as stromatolites.

Hamelin Pool contains the most diverse and abundant examples of stromatolites found in the world. These are living representatives of stromatolites that existed some 3500 million years ago.

Also found at Hamelin Pool are ooid shoals which are limestone sands caused by precipitation of calcium carbonate from hypersaline waters. These are common in ancient geological sequences, but rare in modern seas.

Shark Bay is renowned for its marine fauna. The dugong population, estimated at 10000 ($\pm$ 1665 standard error), for example, is one of the largest in the world. Humpback whales use the Bay as a staging post in their migration along the coast. Green and loggerhead turtles occur in the Bay with Dirk Hartog Island providing the most important nesting site for loggerheads in Western Australia (R.I.T. Prince, pers. comm.).

The Bay is located near the northern limit of a transition region between temperate and tropical marine fauna. Of the 323 fish species recorded from Shark Bay, 83% are tropical species with 11% warm temperate and 6% cool temperate species (Hutchins, 1990). Similarly, of the 218 species of bivalves recorded in Shark Bay, 75% have a tropical range and 10% a southern Australian range, with 15% being endemic to the west coast (Slack-Smith, 1990).

Accumulations of bivalve shells have, over a long period of time, resulted in spectacular white beaches and ridges such as Shell Beach and coquinas or sedimentary rocks made from the shells.

The steep environmental gradients have also produced genetic variability among populations of marine species. Shark Bay is a focal point for genetic divergence; for example, there is variation between snapper populations inside Shark Bay and those outside, and between the eastern and western gulfs of the inner portion of the Bay (Johnson *et al*. 1986). Venerid clams in Shark Bay also exhibit genetic differences (Johnson and Black, 1990).

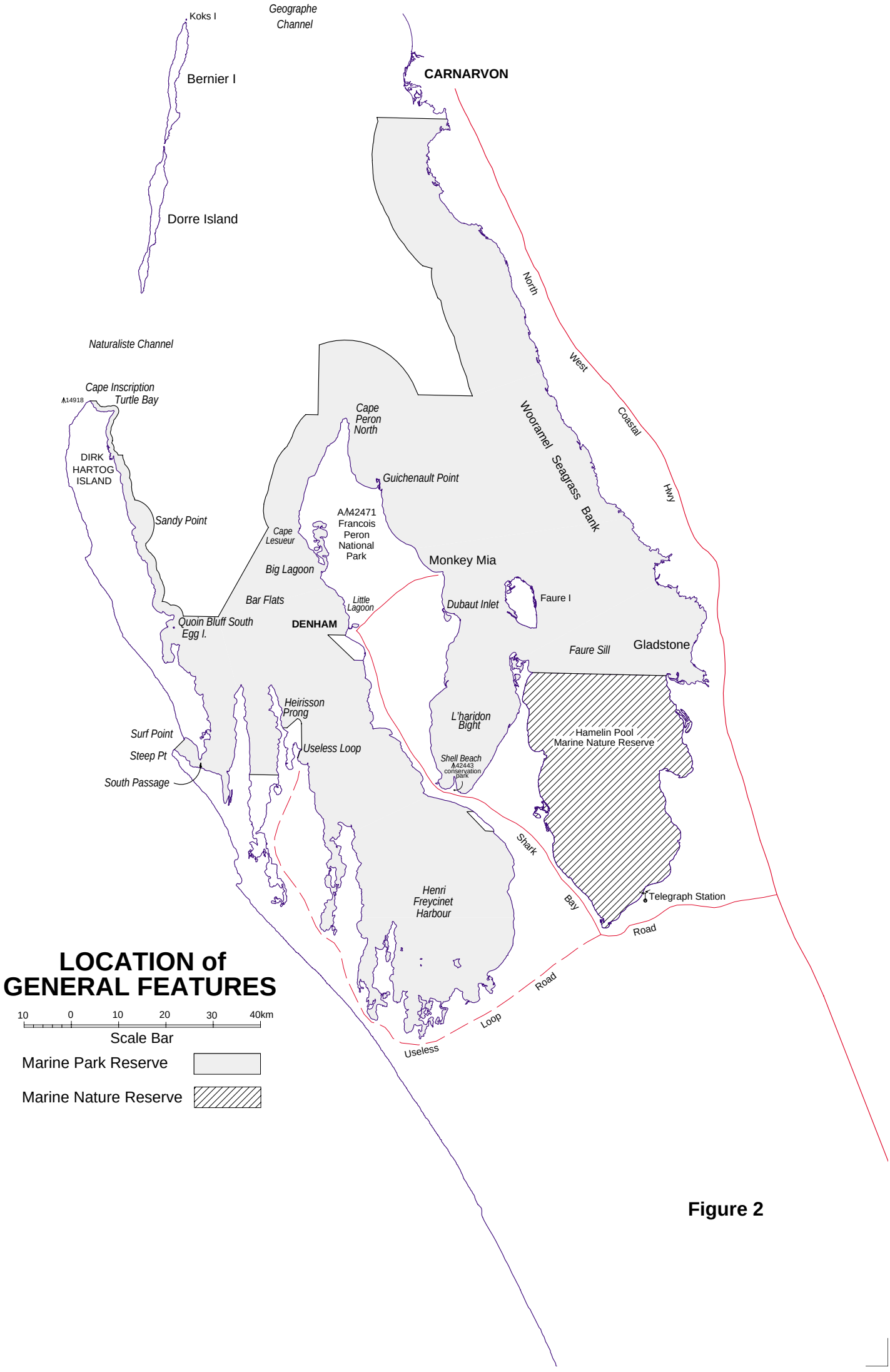

Koks I
Geographe Channel
Bernier I
CARNARVON
Dorre Island
North West Coastal Hwy
Naturaliste Channel
Cape Inscription
Turtle Bay
A14918
Cape Peron North
Wooramel Seagrass Bank
DIRK HARTOG ISLAND
Guichenault Point
Sandy Point
A42471 Francois Peron National Park
Cape Lesueur
Monkey Mia
Big Lagoon
Bar Flats
Little Lagoon
Dubaut Inlet
Faure I
Quoin Bluff South
Egg I.
DENHAM
Faure Sill
Gladstone
Heirisson Prong
L'haridon Bight
Surf Point
Steep Pt
Useless Loop
Hamelin Pool Marine Nature Reserve
Shell Beach
A42443 conservation park
South Passage
Shark Bay
Henri Freycinet Harbour
Telegraph Station
Road
Road
Loop
Useless
LOCATION of GENERAL FEATURES
10 0 10 20 30 40km
Scale Bar
Marine Park Reserve
Marine Nature Reserve

Figure 2

1.3 VALUES

Conservation Values

- Shark Bay is an example of a relatively undisturbed ecosystem which displays significant geological and biological processes in its functioning.
- Shark Bay is Australia's largest enclosed marine embayment and its unusual geomorphology has produced a diverse range of marine communities including coral communities, seagrass meadows, mangroves and hypersaline communities. Assemblages of marine fauna and flora are rich and diverse, often with an overlap of tropical and temperate species.
- The largest seagrass meadows in the world occur at Shark Bay and the diversity of seagrass species is unusually high (12 species). Seagrass is the foundation and dominant organism of Shark Bay. It has modified the physical, chemical and biological characteristics of the Bay and provides food, habitat and nursery grounds for many species.
- Shark Bay represents a modern example of ecosystem types which were dominant early in Earth's history (for example, the development of oil shales).
- Shark Bay has a secure population of about 10 000 dugongs (*Dugong dugon*) which is one of the largest populations in the world.
- The marine system is a major nursery area for commercially important fish resources.
- The wide sheltered bays provide habitat for a diverse and as yet little studied mollusc, crustacean and other invertebrate fauna.
- Shark Bay is the most important loggerhead turtle (*Caretta caretta*) nesting area in Western Australia and is a minor nesting ground for the green turtle (*Chelonia mydas*).
- Shark Bay is utilised by at least 12 species of marine mammals and is a gathering site for migrating humpback whales.
- Shark Bay supports significant populations of sharks, rays, manta rays and sea-snakes.
- The waters of Shark Bay are differentiated into three quite distinctive ecosystems according to salinity; that is, oceanic, metahaline and hypersaline (Section 1.2).
- The hypersaline embayments are characterised by unique microbial communities (including those which form stromatolites) and massive deposits of coquina shell (*Fragum erugatum*) which are not found elsewhere.
- Shark Bay has a rich birdlife with a high occurrence of migratory and breeding seabirds.
- Hamelin Pool is the most significant known occurrence of shallow marine and intertidal benthic microbial ecosystems living on Earth.
- The biota inhabiting hypersaline waters are of special interest to marine biologists because of physiological adaptations necessary for life in waters of these high salt concentrations.

Cultural Values

- Aboriginal occupation has been dated to 30 000 years ago and there is evidence of reliance on the marine resources at Shark Bay in more recent sites investigated.
- Shark Bay was the site of the first recorded European landing in Australia in 1616 by Dirk Hartog. Other explorers followed and several scientific expeditions by the British and French during the 1800s are significant for their observations and collections.
- Ten shipwrecks are believed to have occurred in Shark Bay between 1841 and 1909 and some associated land camps have been located.
- The coastline contains many remnant camp sites associated with the pearling and guano industries.
- Historical artefacts exist within the marine reserves as a result of past pastoral, fishing and sandalwood activities.
- The marine reserves' stunning and diverse visual resources include sea cliffs, headlands, dunes, shell beaches, sandy shallows, tidal flats, mangroves, seagrass beds, lagoons, channels and reefs.

Recreational Values

- Shark Bay is a recreation destination of local, state, national and international significance. The attractions and recreation opportunities focus on the marine environment, eg. Monkey Mia.
- Recreational fishing is one of the most popular pursuits and includes boat, net and shore based fishing. Shark Bay is one of Western Australia's major recreational fishing grounds.
- The coastline adjoining the marine park is used extensively for camping and day use.
- Activities such as diving and sightseeing tours are becoming increasingly popular.
- The protected waters of the marine reserves provide relatively safe boat access for recreational users.
- Other attractions include wilderness qualities, visual resources and abundant wildlife.

Educational and Scientific Values

- The unusual geomorphology and range of fauna, flora and ecosystems provide extensive opportunities for public education.
- The occurrence of dugongs, whales and bottlenose dolphins provide an ideal opportunity for informing the public about marine mammals and their conservation. Monkey Mia is particularly well suited for this purpose.
- The protected waters of the marine reserves are ideal for educational tours.
- The dolphins at Monkey Mia provide a special opportunity to study the social behaviour and social structure of wild dolphins.
- The eastern Bay includes the only site where dugongs have been observed to establish breeding territories. The phenomenon is of great scientific significance and has yet to be fully investigated.
- The marine reserves contain a diverse range of ecosystems which exhibit interesting fauna, flora and ecological processes.

Commercial Values

- Shark Bay supports the State's major fisheries for prawns, scallops, snapper and western sand whiting. Other fisheries target rock lobster, rock oysters, crabs and a variety of fin fish.
- Aquaculture is expanding in the marine park and includes pearling, fish cages and production of oysters.
- Tourism is a major component of the local economy. This is largely based on the marine attractions.
- Commercial charter tour boats operate within the marine park for fishing and diving charters plus sightseeing and natural interest tours, for example dugong and dolphin watching.
- Both tourism and fishing depend totally on the maintenance of the quality of this marine environment.

2.0 PRINCIPAL MANAGEMENT DIRECTIONS

2.1 GOALS

Marine parks are reserved under the Conservation and Land Management Act 1984 (CALM Act) to fulfil:

> *So much of the demand for recreation by members of the public as is consistent with the proper conservation 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.*

Sustainable commercial and recreational fishing can occur within marine parks.

Marine nature reserves are reserved under the CALM Act for the:

- *conservation and restoration of the natural environment;*
- *protection, care, and study of indigenous flora and fauna; and*
- *preservation of any feature of archaeological, historic or scientific interest.*

The principal aim of management is to provide for conservation of the marine environment while providing for compatible recreational and commercial uses. Commercial fishing operations, including aquaculture, are provided for in designated areas of the Shark Bay Marine Park and regulated under the Fish Resources Management Act 1994. The Hamelin Pool Marine Nature Reserve is closed to fishing and other extractive activities.

The six principal goals for the management of Shark Bay Marine Park and Hamelin Pool Marine Nature Reserve are:

Conservation
Conserve ecological, cultural and scenic values.

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

Community Relations
Involve the community in management of the marine reserves and promote appreciation of their values and management through education and information.

Commercial and Other Uses
Maintain commercial fishing on an ecologically sustainable basis in the marine park and ensure that other commercial uses are managed in a manner that minimises impacts on the marine reserves' values.

Knowledge
Seek a better understanding of the natural and cultural environments, and the effects of users and management activities.

Interaction with Nearby Lands and Waters
Promote cooperation, and minimise conflicts, in matters associated with the use of nearby lands and waters.

Objectives designed to achieve these goals have been set in the relevant sections of this plan.

2.2 PURPOSE, VESTING AND TENURE

The objective is to ensure that the values of Shark Bay Marine Park and Hamelin Pool Marine Nature Reserve are adequately protected by their gazetted purpose, vesting and tenure.

2.2.1 History of Reservation

The Conservation Through Reserves Committee (CTRC) first proposed a reserve to protect the waters and flora and fauna of Shark Bay in 1974 in its report to the Environmental Protection Authority (EPA) (EPA, 1975a).

After public comment the CTRC recommendations were reviewed by the EPA which then made its recommendations in a report to State Cabinet (EPA, 1975b). The EPA report recommended that the Wooramel seagrass bank along the eastern shore of Shark Bay be "reserved in a manner which will protect the seagrass and its environment.... for the purpose of fisheries management and recreation...." and managed "as though it were a National Park." The report also recommended that Denham Sound, Freycinet Harbour and Estuary, Hopeless Reach and Lharidon Bight "be set aside for fisheries management and aquatic recreation".

In 1986 the State Government established a land-use planning project for Shark Bay, jointly run by the then State Planning Commission and the Department of Conservation and Land Management, in collaboration with the Shires of Shark Bay and Carnarvon. The Government also established a "Shark Bay Consultative Committee" to ensure participation by local citizens. This project culminated in the *Shark*

Bay Region Plan, adopted by Cabinet in June 1988 (State Planning Commission and CALM, 1988).
The *Shark Bay Region Plan* reaffirmed the EPA recommendations for marine reserves, recommending that a multiple-use marine park should be declared.

2.2.2 Shark Bay Marine Reserves

The Shark Bay Marine Reserves addressed in this plan comprise the Shark Bay Marine Park and the Hamelin Pool Marine Nature Reserve. The Shark Bay Marine Park was gazetted on 30 November 1990 as *A Class Marine Park Reserve No. 7* and vested in the National Park and Nature Conservation Authority (NPNCA) under the CALM Act. The boundaries are as shown in Figure 1, encompassing an area of 748 725 ha.

The marine park boundary excludes areas adjacent to Denham, Nanga and Useless Loop. These areas were not included in the marine park in order to allow for commercial development and activities to occur which may not be wholly compatible with the purpose of the marine park, for example, ship loading, water skiing or marina development.

The *Shark Bay Region Plan* proposed that the waters east of Bernier and Dorre Islands be included in the marine park. The area was not included, however, in the Notice of Intent because of a lack of information on the area's values, difficulties with defining a manageable boundary and the need to address the inclusion of the west side of the islands simultaneously. The shallow waters east of Bernier and Dorre Islands provide rich seagrass and coral habitats for numerous species including turtles and dugongs and many commercially fished species. These waters are also favoured for recreational uses. The Shark Bay Region Plan also proposed that the high energy marine environments along the western oceanic shores of Bernier, Dorre and Dirk Hartog Islands and Edel Land be investigated for possible marine park status. Submissions to the Notice of Intent supported this proposal which would enhance the range of ecological units represented in the marine park and complement management of recreational use. The report of the Marine Parks and Reserves Selection Working Group (CALM, 1994) endorsed the recommendations of the Shark Bay Region Plan in relation to these areas. A biological survey was conducted in May 1995 to ascertain the values of the waters around Bernier and Dorre Islands (Hutchins et al., 1995). On review of the results of this survey, consideration will be given to determining what areas should be reserved as marine park in consultation with relevant groups.

The Hamelin Pool Marine Nature Reserve (Marine Reserve No 6) was gazetted on 25 May 1990 and vested in the NPNCA under the CALM Act. The 'A' Class Marine Reserve totals 132 000 ha.

Reserve 30885 is an *A Class Reserve* for the Preservation of Sedimentary Deposits. It adjoins the marine park in the vicinity of Gladstone and the eastern shores of Faure Island and Petit Point. It also adjoins the boundary of the marine nature reserve. Reserve 30885 extends between low water mark and high water mark and is vested with the NPNCA. The low water mark boundary adjoining the marine reserves is awkward to define due to extensive tidal flats. The management of activities occurring above low water mark in these areas should be consistent with the management of the rest of the reserves. The purpose for which Reserve 30885 was set aside can be achieved if it was marine park or marine nature reserve. Therefore Reserve 30885 will be incorporated into the marine park and marine nature reserve.

A 40m wide strip of vacant Crown land (VCL) exists along much of the Shark Bay shoreline between the existing marine reserve boundaries at high water mark and the pastoral lease boundaries. It is necessary for visitors to cross this 40m strip of VCL to access the marine park and this area is subject to increasing pressure and degradation from recreational use. With the exception of Faure Island this strip where adjacent to the marine reserves will be vested in the NPNCA as marine park or marine nature reserve to ensure appropriate management of this coastal land. This does not include vacant Crown land currently leased for other purposes. The gazettal process, and management of these areas, will be done in close liaison with the adjoining pastoralists, local authorities and other relevant groups.

The seaward boundary of the marine park was gazetted utilising a distance from high or low water mark, or arcs from certain points in specific areas such as along the Wooramel Bank. Unfortunately this makes it extremely difficult to accurately locate the boundary in a vessel because of the difficulties in accurately defining high/low water marks due to extensive tidal areas, and also difficulty in determining distance from these water marks. Most commercial vessels have Global Positioning System (GPS) technology which allows them to accurately determine their location and it would be more effective to have defined coordinates for the boundary. To clarify any uncertainty regarding the boundary (and corresponding regulations), the boundary will be redefined using straight lines and coordinates. This will be done to approximate the existing boundary and in liaison with the fishing industry to take into account commercial use and, where applicable, utilise existing management boundaries, such as trawl closures (see also Section 7.1.1).

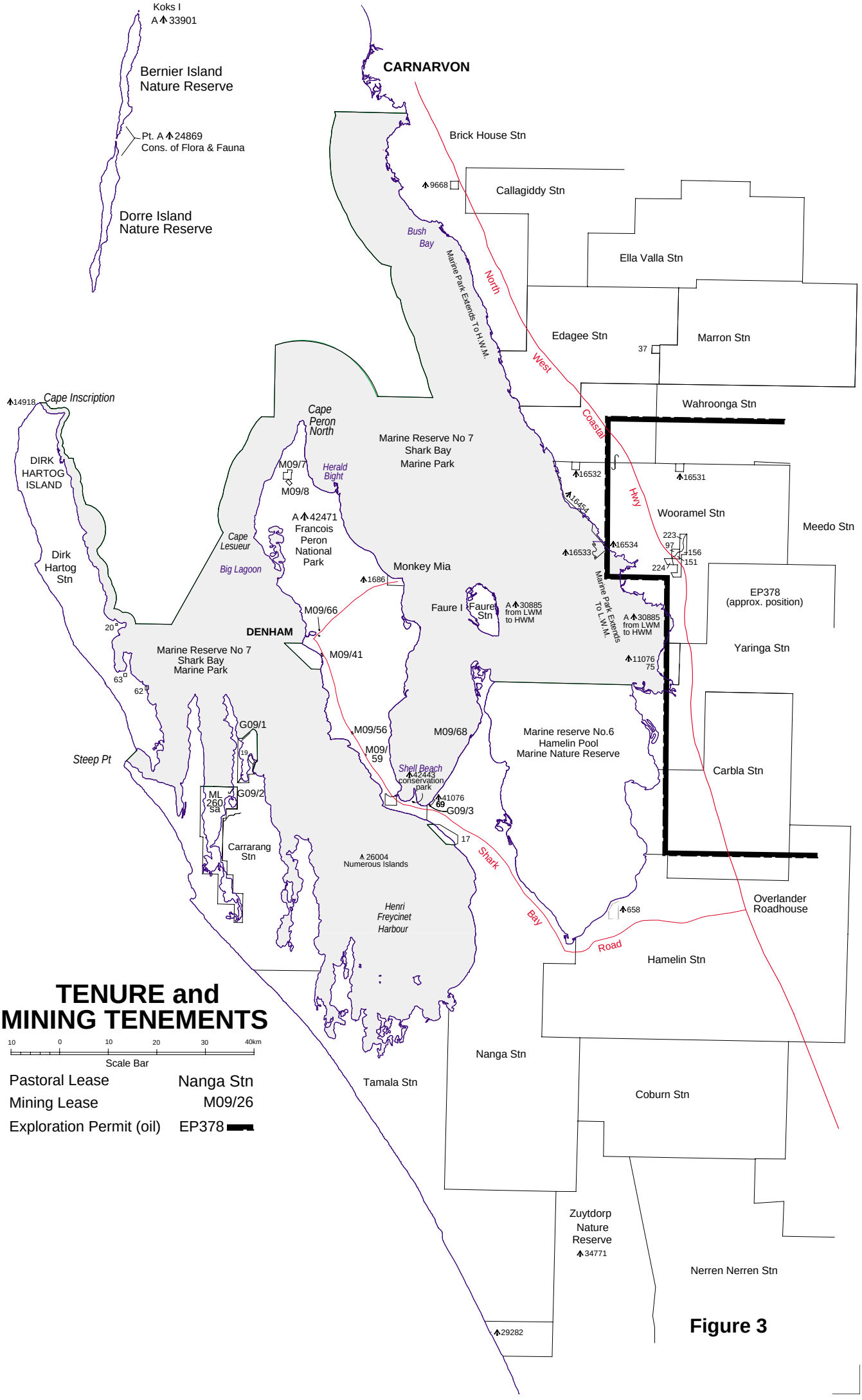

Koks I
A 33901
Bernier Island
Nature Reserve
Pt. A 24869
Cons. of Flora & Fauna
Dorre Island
Nature Reserve
CARNARVON
Brick House Stn
9668
Callagiddy Stn
Bush
Bay
Marine Park Extends To H.W.M.
North
Ella Valla Stn
Edagee Stn
Marron Stn
37
West
Coastal
Hwy
Wahroonga Stn
14918
Cape Inscription
Cape
Peron
North
Marine Reserve No 7
Shark Bay
Marine Park
DIRK
HARTOG
ISLAND
M09/7
M09/8
Herald
Bight
16532
16531
16454
Wooramel Stn
Meedo Stn
A 42471
Francois
Peron
National
Park
Cape
Lesueur
Big Lagoon
16534
16533
223
97
156
151
224
Dirk
Hartog
Stn
Monkey Mia
1686
Marine Park Extends To L.W.M.
EP378
(approx. position)
Faure I
Faure
Stn
A 30885
from LWM
to HWM
M09/66
DENHAM
20
A 30885
from LWM
to HWM
Yaringa Stn
Marine Reserve No 7
Shark Bay
Marine Park
M09/41
11076
75
63
62
G09/1
M09/56
M09/68
Marine reserve No.6
Hamelin Pool
Marine Nature Reserve
M09/
59
19
Steep Pt
Shell Beach
42443
conservation
park
Carbla Stn
ML
260
Sa
G09/2
41076
69
G09/3
17
Carrarang
Stn
26004
Numerous Islands
Shark
Bay
658
Overlander
Roadhouse
Henri
Freycinet
Harbour
Road
Hamelin Stn
Nanga Stn
Tamala Stn
Coburn Stn
Zuytdorp
Nature
Reserve
34771
Nerren Nerren Stn
29282
TENURE and
MINING TENEMENTS
10 0 10 20 30 40km
Scale Bar
Pastoral Lease Nanga Stn
Mining Lease M09/26
Exploration Permit (oil) EP378

Figure 3

STRATEGIES

Short Term

1. **Cancel Reserve 30885 for the Protection of Sedimentary Deposits and incorporate the area into the adjoining marine park or marine nature reserve.**

2. **Vest the 40m strip of VCL adjoining the marine park with the NPNCA as marine park (excluding Faure Island and VCL leased for other purposes).**

3. **Vest the 40m strip of VCL adjoining the marine nature reserve with the NPNCA as marine nature reserve.**

4. **Consider including the waters adjoining Bernier and Dorre Islands and the waters west of Dirk Hartog Island and Edel Land in the marine park on the basis of their biological values and existing and proposed use.**

5. **Define the marine park boundary using coordinates and straight lines which closely approximate the existing boundary, in liaison with relevant organisations. Gazette this redefined boundary.**

3.0 LEGISLATIVE AND ADMINISTRATIVE ARRANGEMENTS

3.1 DEPARTMENT OF CONSERVATION AND LAND MANAGEMENT

The Department of Conservation and Land Management (CALM) was established under the Conservation and Land Management Act 1984 (CALM Act). Its functions include the management of lands and waters vested in the National Parks and Nature Conservation Authority (NPNCA) and their associated flora and fauna. The NPNCA is the controlling body established under the CALM Act. It is responsible for the preparation of plans for management of all lands and waters vested in it. Plans are prepared and implemented by CALM. CALM is subject to the direction and control of the Minister for the Environment and its administrative structure is headed by an Executive Director.

CALM operates under two principal Acts, the CALM Act and Wildlife Conservation Act. With regard to the marine reserves the CALM Act:

- provides the legislative basis for declaring marine parks and marine nature reserves;
- provides the legislative basis for the gazettal of regulations covering use of marine reserves;
- requires CALM to prepare management plans with a statutory public involvement process and manage those reserves in accordance with approved plans;
- provides that where there is any conflict between the CALM Act and the Fish Resources Management Act in relation to fishing, the Fish Resources Management Act will prevail.

With regard to the marine reserves the Wildlife Conservation Act:

- provides for the protection of flora and fauna (including invertebrate species);
- enables the gazettal of specific notices placing restrictions on the taking of flora or fauna.

CALM and NPNCA policies are documented as policy statements and are available to the public on request.

The scope of CALM's responsibilities is represented by its mission statement:

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

In keeping with this mission, the Department's objectives include (CALM, 1995):

Conservation: to conserve indigenous plants, animals and ecological processes in natural habitats throughout the State.

Value and Use of Resources: to optimise the value and economic return to the community of wildlife, lands, waters and resources entrusted to the Department without compromising conservation and other management objectives.

Tourism and Recreation: to identify and provide opportunities and services to the community which allows them to enjoy the wildlife, lands, waters and resources entrusted to the Department without compromising conservation and other management objectives.

Knowledge: to seek and provide an up-to-date and sound scientific and information basis for the Department's conservation and land management activities.

Community Support: to promote community awareness and appreciation of the values of the wildlife, lands, waters and resources entrusted to the Department, and to develop community understanding and support for the Department's conservation and land management activities.

Corporate Efficiency: to optimise the efficiency, effectiveness and responsiveness of the Department in the achievement of conservation and other management objectives.

3.2 FISHERIES DEPARTMENT OF WESTERN AUSTRALIA

The Fisheries Department is responsible for the management of commercial and recreational fishing and aquaculture in the waters that extend to the 200 nautical mile (370 km) outer limit of the Australian Fishing Zone.

The Fisheries Department is subject to the direction and control of the Minister for Fisheries and is administered by an Executive Director.

The Fisheries Department operates under the Fish Resources Management Act 1994.

The Fisheries Department of Western Australia's Mission Statement is:

> *To manage the use and harvesting of fisheries resources at ecologically sustainable levels, and manage the development of aquaculture, in order to maximise economic benefits to the State, while conserving and protecting the State's aquatic ecosystems for the benefit of the present and future West Australian community.*

This mission statement is supported by six key Departmental objectives.

Ecologically Sustainable Resource Use: to harvest fisheries resources at ecologically sustainable levels.

Social and Economic Benefits to the Community: to maximise the economic, social and other benefits derived from the State's aquatic biological resources.

Education of Resource Users: to increase the level of understanding of, and support for, departmental strategies for the management of fisheries resources.

Human Impacts on the Aquatic Environment: to minimise adverse human impacts on the aquatic environment.

Resource Sharing: to assign access to aquatic biological resources in accordance with community priorities.

Maintenance of Aquatic Biodiversity

3.3 INTERAGENCY RESPONSIBILITIES

The objective is to integrate management programs between CALM and other agencies with management responsibilities in and adjacent to the marine park and the marine nature reserve.

Under the CALM Act, CALM is responsible for management of marine parks and marine nature reserves. Other agencies also have management responsibilities, in particular the Fisheries Department and Department of Transport.

The Fish Resources Management Act and Regulations apply in marine parks. Control of fishing methods, size and bag limits, and fishing zones are regulated under the Act and are managed by the Fisheries Department.

Protection of flora and fauna within the marine reserves is provided by the Wildlife Conservation Act. This Act is administered by CALM.

The Department of Transport is responsible for boating in navigable waters. It is also responsible for the general safety of coastal marine traffic. Restrictions on water skiing, boating and anchoring are enforced by the Department of Transport. The Port of Carnarvon waters extend into the marine park. Other agencies such as the WA Museum and Department of Minerals and Energy have specific responsibilities within the marine reserves.

Close consultation between all agencies with responsibilities relating to the marine reserves is required to ensure effective and efficient management.

The following Acts of Parliament directly affect the marine park and marine nature reserve:

Conservation and Land Management Act 1984 - provides for conservation of flora and fauna and for management of certain land and waters. The CALM Act also enables proclamation of marine nature reserves and marine parks.

Fish Resources Management Act 1994 - provides for the management of fish resources and for related purposes.

Aboriginal Heritage Act 1972 - provides for the protection of all Aboriginal sites and Aboriginal cultural objects in Western Australia.

Marine Act 1982 (State) - provides for the regulation of navigation and shipping.

Shark Bay Solar Salt Industry Agreement Act 1983 - sets out agreement between the State and industry with respect to the establishment and carrying on of a solar salt industry and other allied mining and ancillary industries.

Commonwealth World Heritage Properties Conservation Act 1983 - provides for the protection and conservation of those properties in Australia and its external territories that are of outstanding natural or cultural value. Such properties include those which are inscribed on the World Heritage List.

Marine and Harbours Act 1981 - provides for the advancement of efficient and safe shipping and effective boating and port administration through the provision of certain facilities and services, and for incidental and connected purposes.

Wildlife Conservation Act 1950 - provides protection of native flora and fauna on all land and in all waters within State boundaries. CALM is responsible for the administration of this Act.

Maritime Archaeology Act 1973 - provides protection for shipwrecks and associated land camps in the reserves for all wrecks pre 1900.

Local Government Act 1960 - The Shires of Shark Bay and Carnarvon have By-Laws which prohibit or restrict certain activities in specific areas of the coast.

Jetties Act 1926 - provides for the regulation, location and structure of jetties.

Land Act 1933 - deals with the allocation, tenure and lease of Crown land.

Commonwealth Petroleum (Submerged Lands) Act 1967 - provides for shared control between the Commonwealth and State for exploiting offshore petroleum resources. The **State Petroleum (Submerged Lands) Act 1982** allows petroleum permits to be granted in the State Territorial sea. The **State Petroleum Act 1967** provides for the granting of petroleum permits on land and internal waters. The CALM Act does not derogate from the operations of the Petroleum (Submerged Lands) Act 1982 or the Petroleum Act 1967.

Mining Act 1978 - enables exploration and mining to proceed in appropriate locations. The CALM Act does not derogate from the operations of the Mining Act 1978.

STRATEGIES

Ongoing

1. **Liaise with relevant agencies and individuals to ensure management of the coast and the marine reserves is integrated and in accord with appropriate legislation.**

Short Term

2. **Develop Memoranda of Understanding between CALM and the Fisheries Department, Department of Transport and other relevant organisations which detail management arrangements and maximise Government efficiency through coordination of staff, equipment, vessels and provision of information.**

3.4 INTERNATIONAL TREATIES

The objective is to ensure that obligations under international treaties to which Australia is a signatory are met in the management and protection of natural and cultural values of the marine reserves.

The international treaty of direct relevance to management of the marine reserves is the *Convention concerning the Protection of the World Cultural and Natural Heritage*. Other treaties of relevance are the Agreement between the Government of Japan and the Government of Australia for the *Protection of Migratory Birds and Birds in Danger of Extinction and their Environment* (JAMBA) and the Agreement between the Government of Australia and the Government of the People's Republic of China for the *Protection of Migratory Birds and their Environment* (CAMBA).

Shark Bay is inscribed on the World Heritage List. The marine park and marine nature reserve fall entirely within the Shark Bay World Heritage Area. Complementary legislation may be introduced into the Commonwealth and Western Australian Parliaments to give statutory recognition of the planning procedures and management plans adopted by CALM.

The JAMBA and CAMBA agreements cover specific migratory birds to ensure these birds and associated habitats are protected.

STRATEGIES

Ongoing

1. **Ensure management of the marine reserves meets obligations under the World Heritage Convention.**

2. **Ensure that management of the marine reserves conforms with the obligations of all other applicable international treaties.**

3. **Seek Commonwealth cooperation and assistance for management to satisfy national and international obligations.**

Short Term

4. **Identify and protect areas within the marine reserves that are important for migratory birds covered by the JAMBA and CAMBA agreements.**

4.0 ZONING

The objective is to implement a system of management zones in the marine park that ensures the maintenance of conservation values and provides for a variety of recreational and commercial uses.

4.1 PRINCIPLES OF ZONING

Zoning separates a park into discrete management units which reflect the characteristics of natural habitats and resources and prescribe priorities for their use. Zoning schemes are designed to meet the needs of all park users in an equitable way, providing for the fullest possible range of activities while minimising conflicts between people seeking to use the park's resources for different purposes. Zoning schemes also seek to protect inherent values of the park. Particular activities harmful to special properties of particular areas may be excluded from those areas by means of appropriate zone designation.

The zones may be changed at intervals in order to meet changes in user requirements. For example, if an area currently used for recreational fishing becomes very popular for diving and photography, the zoning of that area may change to reflect demand for a new priority use. Zoning schemes can however only be changed during a review of the management plan or through a full public consultative process.

A system of zoning has been developed for the management of marine parks:

- General Use Zone: Provides for commercial and recreational uses consistent with the conservation of natural resources. In this context, conservation includes fishing within the sustainable limits of fish stocks and habitat. Permissible activities are specified by regulations under the Fish Resources Management Act (governing all forms of fishing) and the CALM Act (governing other activities).

- Recreation Zone: Provides for recreational use consistent with conservation of natural resources. Recreational fishing is regulated under the Fish Resources Management Act. Commercial operations for recreation activities are regulated under the CALM Act and are permitted where they are compatible with other uses, however commercial fishing is not permitted.

- Sanctuary Zone: Provides for the total protection of environmental values and allows recreational uses consistent with the protection of these values. Fishing and the extraction of any other organisms are not permitted. Non-extractive commercial operations are regulated under the CALM Act and may be permitted where they do not conflict with other uses or values.

- Special Purpose Zone: Can be specified for any purpose if the General Use, Recreation or Sanctuary zones are not appropriate. Uses consistent with the stated zone purpose will be permitted. These may include a combination of commercial and/or recreational uses.

Sanctuary zones will usually cover areas containing vulnerable or special interest biota, which require the highest possible level of protection. Sanctuary zones should preserve representative areas of the park's marine ecosystems free from disturbance. Sanctuary zones may also be selected to provide visitors or research workers with opportunities to see and study marine life in an undisturbed state.

Activities are defined and regulated within each zone. Regulations which apply to the management of each zone will be promulgated from time to time under the Wildlife Conservation Act, the CALM Act, the Fish Resources Management Act and other relevant legislation. Tables 1 and 2 detail the permitted uses and activities for each zoning category.

Mining is not included in this table as proposals for mining, if they occur, will be reviewed with respect to Government policy at the time and after a comprehensive assessment of any proposal.

In all zones, the occurrence of particular natural events (eg. breeding) or incidents (eg. shipwrecks) may require access or use to be restricted for a specified period of time or limited to specified means. These limitations may be declared by the Minister from time to time after appropriate consultation, under Section 62 of the CALM Act.

This zoning plan refers to the Shark Bay Marine Park only. The Hamelin Pool Marine Nature Reserve will not be zoned, however under the CALM Act all flora and fauna are protected in marine nature reserves. It will therefore be in essence very similar to a sanctuary zone as no recreational or commercial fishing or taking of any organisms will be permitted.

Figure 4 shows the zoning plan for the marine park. Individual maps showing greater detail are contained within the text.

TABLE 1 - USES AND ACTIVITIES IN EACH ZONE

ACTIVITIES	GENERAL USE ZONE	SPECIAL PURPOSE ZONE *for details refer to Table 2*	RECREATION ZONE	SANCTUARY ZONE, HAMELIN POOL MNR
COMMERCIAL				
Netting	Licence (FD)	Licence (FD)	No	No
Line Fishing	Licence (FD)	Licence (FD)	No	No
Trawling	Licence (FD)	Special	No	No
Fish Trapping	No	No	No	No
Lobster Potting	Licence (FD)	Licence (FD)	No	No
Crab Trapping	Licence (FD)	Special	No	No
Aquarium & Invertebrate spp.	Licence (FD)	No	No	No
Oyster	Licence (FD)	No	No	No
Marine Flora	Assess	No	No	No
Aquaculture	Assess	Assess	No	No
Petroleum drilling/production	Assess	Assess	No	No
RECREATIONAL				
Line Fishing	Yes	Yes	Yes*	No
Spearfishing - compressed air	No	No	No	No
- snorkel	Yes	Special	No	No
Crabbing - drop netting	Yes	Yes	No	No
- compressed air	Yes	Yes	Yes	No
- snorkel	Yes	Yes	Yes	No
Lobster - pot	Yes	Yes	Yes	No
(licence FD) - compressed air	Yes	Yes	Yes	No
- snorkel	Yes	Yes	Yes	No
Netting (licence FD)	Yes	Special	No	No
Collecting - collectable spp	Yes	Yes	Yes	No
- protected spp.	No	No	No	No
- research, study	CALM Permit	CALM Permit	CALM Permit	CALM Permit
Diving	Yes	Yes	Yes*	Yes
Boating and Non-Motorised Water Sport	Yes	Special	Yes*	Yes
Motorised Water Sport	Yes	Special	No	No
Driving-Intertidal zone	Defined Areas	Defined Areas	No	No
Tourism Concessions				
Wildlife Interaction, Dive, Yachts and Hire Operations	Licence (CALM)	Licence (CALM)	Licence (CALM)	Licence (CALM)
Fishing Charter	Yes	Special	No	No
OTHER ACTIVITIES				
Research - fish	Licence (FD)	Licence (FD)	Licence (FD)	Licence (FD)
- other	Licence (CALM)	Licence (CALM)	Licence (CALM)	Licence (CALM)
Anchoring	Yes	Yes	Yes*	Yes
Moorings, Structures and Platforms	Assess	Assess	Assess	Assess
Jetties	Assess	Assess	Assess	Assess
Boat Ramps	Assess	Assess	No (except M/Mia)	No
Groynes and Marinas	Assess	Special	No	No
FAD's	Assess	Assess	Assess	Assess
Markers	Yes	Yes	Yes	Yes

Licence (FD) - These activities are considered compatible but require a Fisheries Department licence

Licence (CALM) - These commercial tourism activities may or may not be compatible. The activity requires a CALM licence. CALM will assess the suitability of each application in liaison with relevant bodies.

Special - Refer to Table 2 for individual special purpose zones.

Assess - Assessed on application.

* - Except in Dolphin Interaction Area at Monkey Mia.

CALM Permit - Applications for the collection of flora or fauna for research or study purposes will be assessed by CALM and where acceptable a permit will be issued.

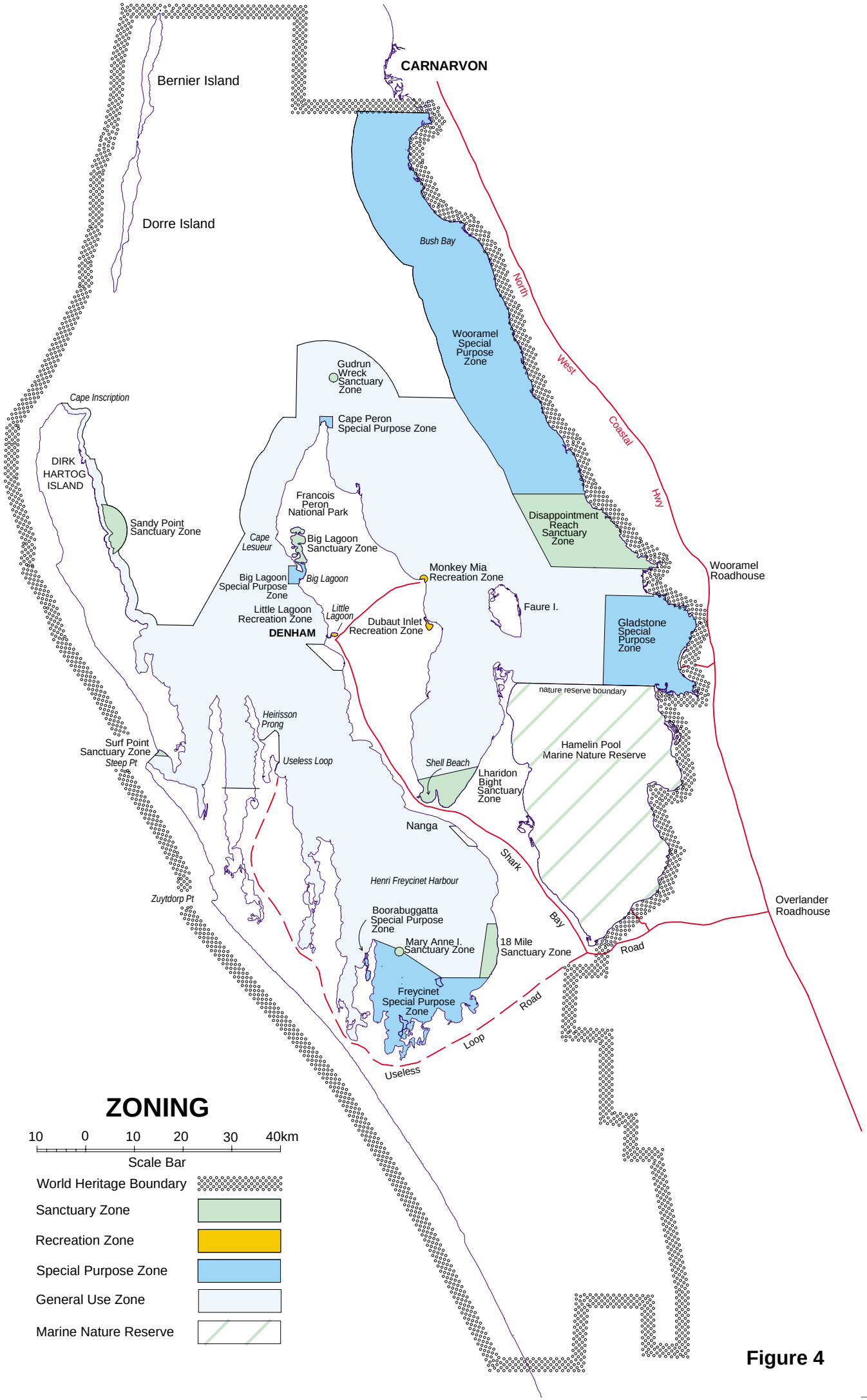

CARNARVON
Bernier Island
Dorre Island
Bush Bay
North West Coastal Hwy
Wooramel Special Purpose Zone
Gudrun Wreck Sanctuary Zone
Cape Inscription
Cape Peron Special Purpose Zone
DIRK HARTOG ISLAND
Francois Peron National Park
Sandy Point Sanctuary Zone
Cape Lesueur
Big Lagoon Sanctuary Zone
Disappointment Reach Sanctuary Zone
Wooramel Roadhouse
Big Lagoon Special Purpose Zone
Big Lagoon
Monkey Mia Recreation Zone
Little Lagoon Recreation Zone
Little Lagoon
DENHAM
Dubaut Inlet Recreation Zone
Faure I.
Gladstone Special Purpose Zone
nature reserve boundary
Heirisson Prong
Surf Point Sanctuary Zone
Steep Pt
Useless Loop
Hamelin Pool Marine Nature Reserve
Shell Beach
Lharidon Bight Sanctuary Zone
Nanga
Shark Bay Road
Henri Freycinet Harbour
Zuytdorp Pt
Boorabuggatta Special Purpose Zone
Mary Anne I. Sanctuary Zone
18 Mile Sanctuary Zone
Overlander Roadhouse
Freycinet Special Purpose Zone
Useless Loop Road
ZONING
10 0 10 20 30 40km
Scale Bar
World Heritage Boundary
Sanctuary Zone
Recreation Zone
Special Purpose Zone
General Use Zone
Marine Nature Reserve

Figure 4

4.2 ZONING PLAN

4.2.1 Sanctuary Zones

Sanctuary Zones may serve as:

- special protection areas for vulnerable or special interest biota;
- representative areas of the Park's marine communities;
- nursery or replenishment areas;
- reference areas for scientific study;
- special viewing areas where flora and fauna may be observed free of interference.

No extractive recreational or commercial activities may occur within Sanctuary Zones, however non-extractive activities may occur where these are compatible with the particular zone in question.

Eight Sanctuary Zones will be gazetted in the Shark Bay Marine Park. They are:

Disappointment Reach
Lharidon Bight
Gudrun Wreck (extension of existing zone)
Big Lagoon
Mary Anne Island
Eighteen Mile
Sandy Point
Surf Point

These are described below and Table 1 details the uses and activities that are permitted in these zones.

- **Disappointment Reach Sanctuary Zone**

The objective of this zone is to conserve a representative section of the Wooramel Seagrass Bank and associated mangroves free from exploitation to assist research and monitoring programs, protect nursery values and conserve mangrove communities.

Boundary Description

Includes all the waters enclosed within a line from the point 25˚38'00"S, 113˚53'04"E to 25˚46'00"S, 113˚58'16"E, then due east to HWM, then generally northward along the HWM to 25˚38'00"S, then due west to the point of commencement (Area - 27951 ha).

The area is part of the Wooramel Seagrass Bank which is a dominant feature of Shark Bay and essential to the maintenance of the productivity and health of the marine ecosystem. Research into dugong distribution (Anderson, 1982; Marsh, 1994; Preen *et al.,* in press) showed that this area is often frequented by dugongs. It contains a diverse assemblage of seagrass species and has important nursery value.

This will set aside a portion of the Wooramel Bank free from extractive activities as a benchmark for monitoring impacts and for research.

- **Lharidon Bight Sanctuary Zone**

The objective of this zone is to provide protection for the coquinite processes associated with Fragum erugatum and for the algal mat structures that are found in this area. It will also provide a representative area of this hypersaline environment free from extractive activities.

Boundary Description

Includes all the waters enclosed within a line from HWM at 26˚10'00"S, 113˚42'55"E to HWM at 26˚08'25"S, 113˚50'00"E, then generally southwards along the HWM to the point of origin (Area - 5450 ha).

Lharidon Bight contains habitats and processes that are not found elsewhere in the marine reserves. The bivalve, *Fragum erugatum* thrives in this area. Some believe this success is due to an ability to live in such a hypersaline environment whilst their predators cannot. This has resulted in the massive deposition of millions of shells on the shores of the Bight and formation of a unique ecosystem. These processes are responsible for the formation of coquinite. Microbial communities are also present as algal mats and stromatolite structures in the hypersaline sections of Lharidon Bight.

- **Gudrun Wreck Sanctuary Zone (already gazetted)**

The objective of this zone is to protect historic artefacts and resident and pelagic fish occupying the wreck site.

Boundary Description

Includes all the waters enclosed by a line 0.5 NM radius from the point 25˚25'30"S, 113˚31'31"E (approximately 250 ha).

The Gudrun wreck is reported to be the largest wooden sailing vessel wreck in the waters of Western Australia. It sank in 1901 en route from Bunbury to England. The wreck site now offers habitat to a good diversity of resident and pelagic fish species including large Queensland Groper, coral trout, cods and mackerel.

The wreck is located in relatively shallow water and is susceptible to over-fishing from both line and spear fishing methods. Diving, for observation purposes, is considered a compatible activity for this area. State and Commonwealth legislation provide protection for the wreck and any artefacts associated with it.

The area was gazetted as a Sanctuary Zone under the CALM Act on 6 January 1993, and Fisheries Notice No. 590 of 26 January 1993 prohibits the taking of any fish by any means from the wreck site and within a radius of 500m of the site. The boundary will be extended to 0.5 NM because artefacts are spread over a large area and the existing area is insufficient to provide the necessary protection.

- **Big Lagoon Sanctuary Zone**

The objective is to maintain the nursery values of the Lagoon through the control of activities and protection of habitat.

Boundary Description

Includes all of the waters to HWM north of a line from 25˚46'00"S, 113˚27'10"E to 25˚46'10"S, 113˚28'00"E (Area - 1374 ha). This zone adjoins the Big Lagoon Special Purpose Zone.

Anecdotal evidence suggests the Lagoon is an important nursery for species such as mullet and whiting. Protecting these values is important for the maintenance of localised fish stocks which are important for commercial and recreational fishers. Dolphins and green turtles also venture into the upper reaches of the Lagoon. The mouth and remaining waters of Big Lagoon will be zoned special purpose (see Section 4.2.3).

- **Eighteen Mile Sanctuary Zone**

The objective of this zone is to protect nursery habitat occurring on the coastline of Freycinet Harbour.

Boundary Description

Includes all the waters enclosed by a line from a point 1 NM due west of HWM at latitude 26˚26'00"S, then southwards to a point 1 NM due west of HWM at latitude 26˚32'00"S, then due east to HWM, then following HWM in a generally northerly direction to latitude 26˚26'00"S, then due west to the point of commencement (Area - 2 906 ha).

The Eighteen Mile beach area contains a mix of shell spits, saltbush, tidal creeks, intertidal flats and shallow waters.

Anecdotal evidence suggests this is an important nursery area due to the high concentrations of juvenile mullet and whiting observed. It is located in a remote area with no coastal access and is in a relatively pristine state. Sanctuary zoning will ensure this area is maintained in this unaltered condition to protect nursery values.

- **Mary Anne Island Sanctuary Zone**

The objective is to provide an area free from fishing activities in reef communities in the Freycinet Harbour to assist in the monitoring of the impacts of fishing and to provide viewing opportunities for divers.

Boundary Description

Includes all the waters enclosed by a line 0.5 NM from HWM around Mary Anne Island (Area - 260 ha).

The Freycinet Harbour is used extensively for recreational fishing. The waters surrounding the islands within the Harbour are particularly targeted by both line and spearfishers. The main target species around the islands are baldchin groper (*Choerodon*

rubescens), bluespotted tuskfish (*Choerodon cauteroma*) and pink snapper (*Pagrus auratus*). The first two species are resident fish requiring the limestone reef/rubble around the islands. They are not found away from the islands as this habitat is not present where seagrass is the dominant feature.

This zone will provide a baseline to monitor the impacts of fishing on these communities in the Harbour. It will also provide a viewing site for divers free from fishing.

- **Sandy Point Sanctuary Zone**

The objective of this zone is to preserve fragile benthic communities, including coral and fish, while providing an area free from exploitation to assist research and monitoring programs. This area will also provide an interesting observation site for divers free from fishing.

Boundary Description

Includes all the waters within a 2.5 NM radius extending eastwards from Sandy Point, excluding those waters extending eastwards from HWM for a distance of 0.5 NM (Area - 2775 ha).

This is an area of relatively shallow water which is protected from oceanic swells by Dirk Hartog Island and incorporates sand, coral and seagrass communities. Both hard and soft coral communities can be found in this area though extensive surveys have not been carried out. Marsh (1990) surveyed the east coast of Dirk Hartog for corals but did not survey the Sandy Point coral. Surveys of hermatypic corals at Louisa Bay, to the south, found nine species of six genera dominated by *Turbinaria* spp. While this is not a diverse coral community, it is an important habitat that is relatively uncommon in Shark Bay. Relatively high diversities of fish, molluscs, echinoderms and crustaceans have also been observed though formal surveys have yet to be completed. Some large specimens of resident reef fish including coral trout, baldchin groper and potato cods have been observed, however low numbers of large fish indicate that this area may be experiencing pressure from fishing activities such as spearfishing. The area east of Dirk Hartog Island is also frequented by dugongs in the winter months. The zone will provide protection for important dugong habitat.

The protection of this area will provide two major benefits. Firstly, this provides an area free from fishing that will provide an opportunity for dive charter operators and private divers to view a coral community free from fishing. As tourism increases in Shark Bay and on the adjacent Dirk Hartog Island this will be an important asset. Secondly, it provides a representative area of this type of reef community which could be used as a baseline to monitor impacts on similar communities elsewhere in the marine park. There is a need to investigate requirements for moorings and navigation markers given the potential for visitation to this area.

• Surf Point Sanctuary Zone

The objective of this zone is to protect the fragile benthic communities, including coral and fish. It will provide an area of deep and shallow water coral reef and an area of deep oceanic waters free from exploitation to assist research and monitoring programs. This area will also provide an interesting observation site for divers free from fishing pressures.

Boundary Description

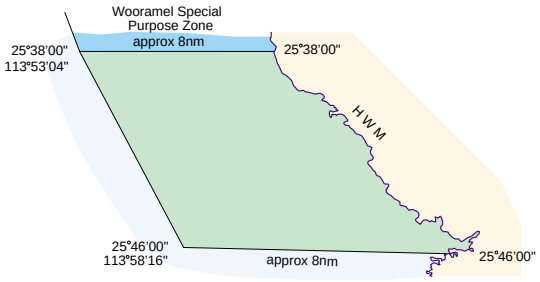
Includes all the waters enclosed by a line commencing at HWM at Surf Point, then following the marine park boundary for 0.5 NM in a south-westerly direction to 26˚07'48"S, 113˚10'25"E, then at a bearing of 95.6˚ to HWM at 26˚07'55"S, 113˚12'10"E, then following HWM in a generally north-easterly direction to the point of commencement (Area - 186 ha).

This area consists of relatively shallow water (<3m) which is protected from oceanic swells by the rocky reef known as Surf Point plus a small wedge of deep water seaward of this reef. The sea floor is covered by sand, some seagrass and corals. A good assemblage of both hard and soft coral communities can be found in this area. Surveys (Marsh, 1990) have recorded 42 species of hermatypic corals within South Passage comprising 23 genera. A further 11 species have been recorded outside the Outer Bar at 15-20 m (Marsh, 1990). From Cape Ransonnet to Surf Point *Turbinaria* dominated communities give way to a more diverse coral community towards the Point which contains *Acropora* species. This is the most diverse coral community in the marine park, probably due to more favourable hydrological conditions for coral growth at South Passage. The zone will also include a small wedge of the deep water outside the reef edge. This will provide a representative area of deep oceanic waters in a Sanctuary Zone.

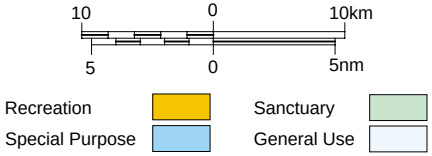
323 species of fish have been recorded at South Passage (Hutchins, 1990) which is particularly diverse when compared to other major coral reef communities such as the Abrolhos Islands area. Specific fish diversity of the Sanctuary Zone is not known, however it is assumed to be high due to the diversity of deep and shallow water habitat types. There also appear to be high densities of some invertebrates, especially sea cucumbers (*Holothurians*) and the egg cowrie (*Ovula ovum*).

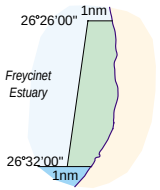
Sanctuary status will preserve the marine community of this area while providing an interesting site for activities such as diving and snorkelling. It may also provide replenishment for surrounding waters of the passage which are fished heavily. The impacts of anchoring on the coral communities will need to be monitored. Education of users will be necessary to protect these values.

SANCTUARY ZONES

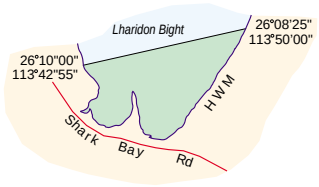


Disappointment Reach Sanctuary Zone

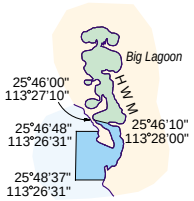




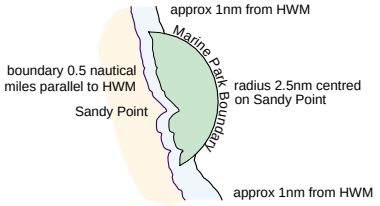
18 Mile Sanctuary Zone



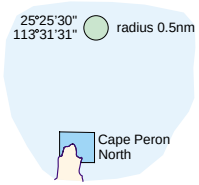
Lharidon Bight Sanctuary Zone



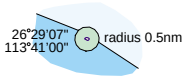
Big Lagoon Sanctuary Zone



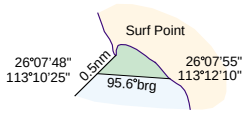
Sandy Point Sanctuary Zone



Gudrun Wreck Sanctuary Zone



Mary Anne Island Sanctuary Zone



Surf Point Sanctuary Zone

Figure 4.1

4.2.2 Recreation Zones

Much of the park is utilised for recreational purposes, but some areas are more accessible and popular for recreation than others. Such areas are designated as Recreation Zones, where recreational use has priority. Commercial extraction of fish is not permitted.

Recreation Zones provide for a range of compatible recreational activities, non-extractive commercial uses and may provide for servicing or access for commercial fishing vessels.

Three Recreation Zones will be gazetted in the Shark Bay Marine Park. They are:

Monkey Mia
Little Lagoon
Dubaut Inlet

These are described below and Table 1 details the uses and activities that are permitted in these zones.

Monkey Mia Recreation Zone

The objective of this zone is to provide for a wide variety of recreation uses compatible with the protection of dolphins and the maintenance of the dolphin interaction experience.

Boundary Description

Includes all waters up to HWM within a radius of 800m of the north west corner of the jetty at Monkey Mia (this coincides with the current 800m ban on netting) (Area - 200 ha).

Monkey Mia is a major tourist focal point in Shark Bay. Approximately 100 000 visitors per year travel to this area to experience and interact with dolphins which regularly swim into the shallows.

A draft management plan has been produced for the Monkey Mia Reserve which adjoins the marine park. This plan has addressed issues such as dolphin feeding and interaction, recreational activities and use of the jetty. The plan provides detailed strategies on these aspects, however relevant strategies have been included in this plan.

Visitors are also attracted to Monkey Mia as it is the only deep water access point on the east coast of the Peron Peninsula and for its attractive environment and relaxed atmosphere. These factors focus a range of recreational activities on this site (see Section 6.7).

No netting (including crab drop nets) or spearfishing will be permitted. Fisheries Notice No 204 of 8/11/1985 prohibits the use of set, haul and throw nets. In addition no jet skis, skiing or other high speed motorised water sports will be permitted and speed limits for other vessels will be reviewed in liaison with the Department of Transport. The designated dolphin interaction area (between the jetty and 150m west of the jetty) will be gazetted as closed waters to all watercraft and all extractive activities will be prohibited. Moorings and anchoring will also be controlled (see Section 9.3).

• Little Lagoon Recreation Zone

The objective of this zone is to provide recreational opportunities compatible with the maintenance of the fish nursery values.

Boundary Description

Includes all waters of the lagoon up to the HWM plus all waters within 275m seaward radius extending from the centre point of the lagoon mouth (Area - 108 ha). This coincides with Fisheries Notice No 204 of 8/11/1985.

Little Lagoon is readily accessible to visitors and locals and popular due to its sheltered waters and high scenic values. Its values also include nursery habitat for fin fish and invertebrate species. The presence of mangroves further increases the nursery value of this area.

Recreational fishing occurs in the Lagoon, however Fisheries Notice No 204 prohibits the use of all nets in Little Lagoon. This notice will be retained to safeguard fish stocks.

Section 6.7 details recreational boating and watersport activities that will be permitted in Little Lagoon. The focus will be to provide for a broad range of activities that maintain the Lagoon's special attributes.

• Dubaut Inlet Recreation Zone

The objective of this zone is to protect nursery habitat and local fish stocks.

Boundary Description

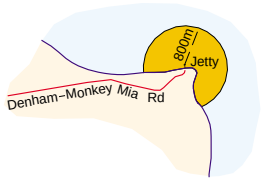
Includes all tidal waters of the Inlet up to the HWM from a north-south line across the inlet mouth at longitude 113˚43'25"E (Area - 185 ha).

This inlet is a rare example of a mangrove lined eastern facing inlet of the Peron Peninsula. Mangroves are recognised as important nursery areas for many fish and invertebrate species. The Inlet has a narrow mouth and channel and is in a relatively pristine state. Recreational use has the potential to damage this habitat through uncontrolled access along its banks and netting of the narrow channel.

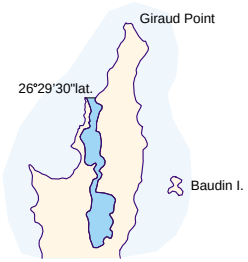
Recreational line fishing will be permitted, however netting will be prohibited. The control of visitor access along the banks will be required to protect the fringing mangroves.

RECREATION and SPECIAL PURPOSE ZONES

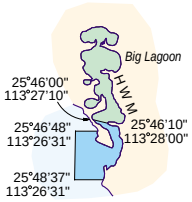
Recreation
Special Purpose
Sanctuary
General Use



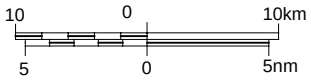
Monkey Mia Recreation Zone

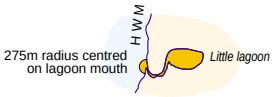


Boorabuggatta Special Purpose Zone

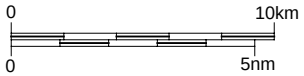


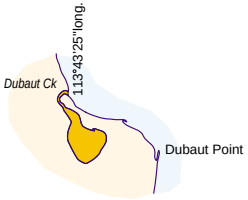
Big Lagoon Special Purpose Zone



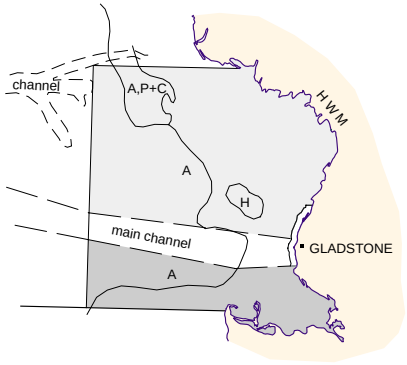


Little Lagoon Recreation Zone





Dubaut Inlet Recreation Zone



Gladstone - Seagrass Distribution & Boat Closures

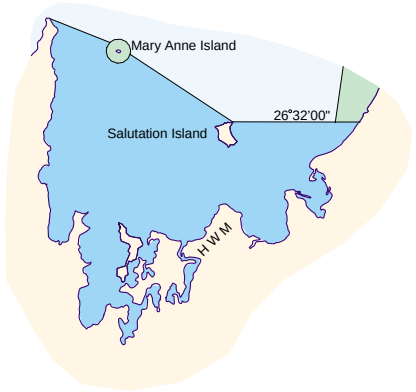
H = Halodule uninervis seagrass bed

A,P+C = Amphibolis antarctica, Posidonia australis + Cymodocea sp.

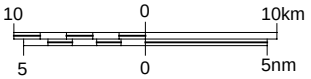
A = Amphibolis antarctica

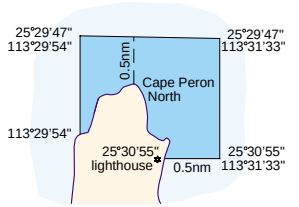
Waters closed to boating 1 Sept - 15 Jan

Waters closed to boating 1 Dec - 31 Mar

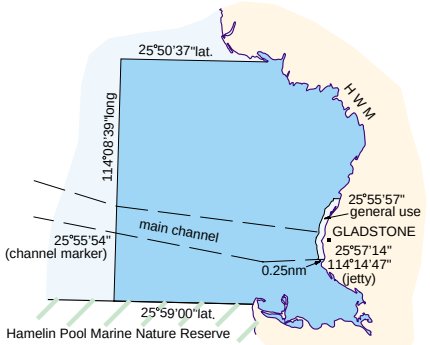


Freycinet Special Purpose Zone





Cape Peron Special Purpose Zone



Gladstone Special Purpose Zone

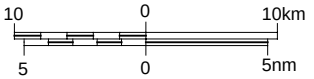


Figure 4.2

4.2.3 Special Purpose Zones

Special Purpose Zones are utilised when the categories of General Use, Recreation or Sanctuary are not appropriate. They will have a particular stated purpose, eg. seagrass protection. Activities compatible with achieving this purpose will be permitted. These may include a combination of commercial and recreational uses.

Six Special Purpose Zones will be gazetted in the Shark Bay Marine Park. They are:

Cape Peron (Wildlife Viewing and Protection)
Wooramel (Seagrass Protection)
Gladstone (Dugong Protection)
Big Lagoon (Nursery Protection)
Boorabuggatta (Habitat Protection)
Freycinet (Habitat Protection)

These are described below and Table 2 details the uses and activities that are permitted in these zones.

- **Cape Peron Special Purpose Zone (Wildlife Viewing and Protection)**

The objective is to provide marine wildlife viewing opportunities for visitors to the Cape and to preserve the biological components and diversity of this productive area.

Boundary Description

Includes all the waters enclosed by a line commencing from a point at HWM due east of the lighthouse at latitude 25˚30'55"S, then extending 0.5 NM from HWM to 25˚30'55"S, 113˚31'33"E, then due north to 25˚29'47"S, 113˚31'33"E, then due east to the point 25˚29'47"S, 113˚29'54"E, then due south to the HWM at latitude 113˚29'54"S, then following HWM to the point of commencement (Area - 456 ha).

The waters adjacent to Cape Peron contain a diverse assemblage of marine life. At the Cape water currents of different salinities and temperatures from the eastern bay converge with oceanic waters. This may explain the unusual abundance of marine life. Animals reported in this area include humpback whales, dugongs, manta rays, dolphins, large cod, sharks and an abundance of smaller fish species. Dolphins in particular are abundant and commonly beach themselves whilst hunting and herding fish in shallows.

Visitor use of this area is increasing due to its scenic qualities, fishing opportunities and for viewing marine life from the cliffs. The viewing opportunities are a use which is becoming very popular with visitors and could surpass other uses.

Commercial and recreational haul net fishing, line fishing, boating, diving and non-motorised water sports will be allowed in this zone. Spearfishing, recreational set netting, motorised water sports, aquaculture and structures (eg. jetties, boat ramps) will not be permitted.

- **Wooramel Special Purpose Zone (Seagrass Protection)**

The objective of this zone is to conserve the Wooramel seagrass bank. Only those activities which do not threaten the seagrass or associated conservation values of this area will be permitted.

Boundary Description

Includes all the waters enclosed by a line commencing at the north-east corner of the marine park (HWM at the prolongation westerly of the southern boundary of Gascoyne location 343), then due west following the marine park boundary to a point 6 NM from HWM, then southwards following the marine park boundary at a constant span of approximately 6 NM from HWM to 25˚13'00"S, 113˚41'00"E and approximately 8 NM from HWM to latitude 25˚27'30"S, then continuing southwards at a constant span of 8 NM from HWM to 25˚38'00"S, 113˚53'04"E, the due east to HWM, then following HWM in a generally northerly direction to the point of commencement (Area - 123 384 ha).

Note: The north-eastern boundary of this zone follows the marine park boundary. This section of the boundary may be subject to review (see Sections 2.2.2 and 7.1.1). In the event that this section of the marine park boundary is altered, the zone boundary will also be altered accordingly.

The Wooramel seagrass bank covers about 1 030 square kilometres and is the largest reported structure of its kind in the world. The bank structure is a major part of the Shark Bay ecosystem and is recognised as an essential nursery area for recreationally and commercially important fish and invertebrates. It is also an important area for dugongs. The bank contains a variety of habitats for seagrass, molluscan fauna and mangrove and microbial mat communities in the inter-tidal and supra-tidal zones. The seagrass is vital to the nutrient cycles of the Bay.

The area is used for recreational line, spear and crab fishing in the deep channels which dissect the seagrass bank. Commercial beach seine fishers utilise the area from HWM to 2 NM offshore. In addition commercial crab fishers have expressed an interest in fishing this area. These uses are not considered a threat to the seagrass and will be permitted, however dugongs and turtles utilise these areas and as such use should be monitored to ensure these values are not threatened. Aquaculture proposals will undergo stringent assessment and will only be permitted where compatible with the maintenance of the values of the zone. Seacage operations will generally not be permitted in an area which has extensive seagrass beds.

- **Gladstone Special Purpose Zone (Dugong Protection)**

The objective of this zone is to conserve important dugong habitat and protect dugongs from disturbance while allowing compatible uses to continue.

Boundary Description

Includes all waters enclosed by a line commencing at 25˚50'37"S, 114˚08'39"E, then due south to 25˚59'00"S, 114˚08'39"E, then due east to HWM at latitude 25˚59'00"S, then following HWM in a generally northerly direction to latitude 25˚50'37"S, then due west to the point of commencement, but excluding the waters extending 0.25 NM from HWM between latitudes 25˚55'57"S and 25˚57'14"S (Area - 27 500 ha)

This area is an important part of the Wooramel seagrass bank. During the summer months dugongs are believed to use the area for mating - an activity which has not been observed elsewhere in the marine park or in the world. The northern part of the zone contains *Halodule* seagrass which is highly nutritious for dugongs. This may be the reason for high numbers of cow/calf groups in the summer months indicating that it may be an important nursery area for dugongs. The area is used, mostly during the winter months, by recreational line and net fishers who camp in the Gladstone area. During the summer months windy hot conditions in this exposed area make camping unpleasant and visitor use is generally restricted to local users who fish in the channels outside this zone.

Boating closures will be instigated to provide protection for dugongs at specific times of the year, however, the channel will be open at all times. The waters of this zone, south of the channel, will be closed to vessels from 1 September to 15 January. The waters north of the channel will be closed to vessels from 1 December to 31 March. These restrictions will be reviewed and refined as information becomes available on dugong use of the area. Netting will be prohibited throughout this zone during these months.

Access will be permitted through the channel at all times to allow fishers to travel to areas west of this zone in the summer months. The zone will be open for recreational and commercial fishing and general access throughout the area when vessel restrictions are not in place. To minimise impacts on recreational fishers an area extending 0.25 NM off the shore has been excluded from the zone to allow for fishing all year round adjacent to the Gladstone camping area.

- **Big Lagoon Special Purpose Zone (Nursery Protection)**

The objective of this zone is to protect seagrass and mangrove habitat important as a fish nursery and to provide for recreational and commercial opportunities compatible with this protection.

Boundary Description

Includes all waters enclosed by a line from 25˚46'48"S, 113˚26'31"E due east to HWM, then along HWM to 25˚46'00"S, 113˚27'10"E then to 25˚46'10"S, 113˚28'00"E then along HWM to 25˚48'37"S latitude then due west to 25˚48'37"S, 113˚26'31"E then due north to the point of commencement.

Big Lagoon is the largest tidal inlet on the Peron Peninsula. It is considered to provide good nursery habitat for fin fish and crustacean species and is in a relatively pristine condition. Vigorous seagrass meadows (*Posidonia australis)* and mangroves (*Avicennia marina)* exist which must be protected to maintain the nursery values of this area.

Its sheltered waters and banks are used by campers who mostly line fish from small boats and the shore. Set netting is considered a potential impact on fish stocks due to the potential for fishers to run a net from bank to bank and catch a large proportion of fish present.

The special purpose zone contains areas important for commercial fishers who have traditionally fished the lagoon using haul netting. There are no obvious impacts of these traditional activities. There is concern that recreational use will increase in the future resulting in increased recreational set netting in the area. This increased boat and fishing activity could result in degradation of important habitats and fish stocks.

For these reasons set netting will not be permitted and boat use may need to be managed to protect seagrass banks. Recreational and commercial haul netting will be permitted, however, spearfishing will be prohibited in this zone.

- **Boorabuggatta Special Purpose Zone (Habitat Protection)**

The objective of this zone is to protect fish stocks using the area for nursery purposes from overexploitation.

Boundary Description

Includes all tidal waters of the inlet up to the HWM south of latitude 26˚29'30"S (Area - 317 ha).

This inlet is considered to provide good nursery habitat for fin fish and invertebrate species and is in a relatively pristine condition. It includes some of the southernmost waters of the marine park which are of metahaline salinity.

Its sheltered waters and banks are used by campers utilising Tamala Station coastal areas. Set netting is considered a potential impact on fish stocks due to the potential for fishers to run a net from bank to bank and catch a large proportion of fish present. Haul netting is not believed to pose a threat.

Commercial and recreational line and haul net fishing will be allowed. Set nets will not be permitted. Activities which threaten nursery values will also be prohibited.

- **Freycinet Special Purpose Zone (Habitat Protection)**

The objective is to provide protection for important seagrass habitat and for dugongs in the summer months.

Boundary Description

All waters (excluding the area known as Mary Anne Island Sanctuary Zone) within a line from Giraud Point to the northern tip of Mary Anne Island, then to the north east tip of Salutation Island, then due east at latitude 26˚32'00"S to HWM, then following HWM in a generally southerly, westerly then northerly direction to Giraud Point (Area - 26 357 ha).

The Freycinet Harbour is an enclosed metahaline water body forming a significant proportion of the marine park. It contains a diverse array of seagrass and algal species which commonly occur together in mixed species seagrass meadows. Most seagrass banks in Shark Bay consist of only one or two species, however in the Harbour there are often 8-9 species of seagrass found in close proximity (D. Walker, pers. comm.). The Harbour is also unusual in that there is a number of limestone islands located within it. These islands generally have a shelf of limestone and rubble surrounding them which provides a totally different habitat to the surrounding sand and seagrass benthos. This provides habitat for a different range of fish, invertebrate and algal species.

The southern end of the Harbour is seasonally utilised by dugongs which are believed to migrate to the area in summer when the water is warm. Sightings of dugongs appear to focus on the area bounded by Giraud Point, Mary Anne, North Guano and Three Bays Islands, however the area around Salutation Island may also be frequented (P Anderson, pers. comm.).

The area also contains *Halodule* and *Halophila* seagrass species which are thought to provide an important source of nutrition for dugongs. Given the seasonal abundance of dugongs, responsible boat use will be encouraged to minimise the likelihood of collisions. It is not possible to determine exactly the period of dugong use, however it is likely to be between September and March.

The islands have high scenic values and provide ideal conditions for safe recreational boating. In addition to the high conservation and scenic values of the area it is heavily used for recreational fishing where fishers target pink snapper and tuskfish. Visitors to Nanga and Tamala Station fish from boats in the harbour with the fishing occurring mainly around the islands in the zone. A field survey of Freycinet in June 1993 found that approximately 75% of boats within the entire area were found in the vicinity of North/South Guano, Mary Anne, Baudin and Three Bays Islands.

Recreational line, net and spearfishing occurs in the area. Of concern is the high incidence of illegal net fishing (ie. unattended nets, day time set netting) that occurs in this area which has the capacity to damage stocks of important recreational and commercial species. Enforcement is hindered through the remoteness of the area and insufficient staff to patrol the area.

Spearfishing targets the blue spotted tuskfish (*Choerodon cauteroma*) and baldchin groper (*C. rubescens*) which live in the limestone rubble/shelf that surrounds the islands. Given the limited extent of this benthic habitat and the shallow nature of the area populations of these resident species can ~~easily~~ be ~~severely~~ depleted. ~~The Fisheries Department has reduced bag limits which should protect these localised fish populations~~.

The shallow waters adjoining the shore are used extensively by commercial beach seine fishers. This activity does not conflict with the purpose of the zone and will continue.

Aquaculture may be permitted, however stringent assessment will be necessary due to limited flushing, extensive recreational boating and high conservation values associated with this area. Seacage operations will generally not be permitted in an area which has extensive seagrass beds.

TABLE 2 - PERMITTED USES AND ACTIVITIES IN SPECIAL PURPOSE ZONES

ACTIVITIES	BIG LAGOON, BOORABUGGATTA CAPE PERON	GLADSTONE *NB Summer boat closure apply***	FREYCINET WOORAMEL
COMMERCIAL			
Netting	Licence (FD)	Licence (FD)	Licence (FD)
Line Fishing	Licence (FD)	Licence (FD)	Licence (FD)
Trawling	No	No	No*
Fish Trapping	No	No	No
Lobster Potting	Not applicable	Not applicable	Not applicable
Crab Trapping	No	Licence (FD)	Licence (FD)
Aquarium & Invertebrate Spp.	No	No	No
Oyster	No	No	No
Marine Flora	No	No	No
Aquaculture	No	No	Assess
Petroleum drilling/production	Assess	Assess	Assess
RECREATIONAL			
Line Fishing	Yes	Yes	Yes
Spearfishing - compressed air	No	No	No
- snorkel	No	Yes	Yes
Crabbing - drop netting	Yes	Yes	Yes
- compressed air	Yes	Yes	Yes
- snorkel	Yes	Yes	Yes
Lobster - pot	Yes	Yes	Yes
Licence FD) - compressed air	Yes	Yes	Yes
- snorkel	Yes	Yes	Yes
Netting - set	No	Only when areas are	Yes
Licence (FD) - haul	Yes	open for boating	Yes
Collecting - collectable spp.	Yes	Yes	Yes
- protected spp.	No	No	No
- research, study purposes	CALM Permit	CALM Permit	CALM Permit
Diving	Yes	Yes	Yes
Boating, Yachts and	Yes	Yes (except summer	Yes
Non-Motorised Water Sport		closed areas)	
Motorised Water Sport	No	Winter only	Yes
Driving-Intertidal zone	Defined Areas	Defined Areas	Defined Areas
Tourism Concessions			
Dive, Hire, Yachts, Wildlife Interaction	Licence (CALM)	Licence (CALM)	Licence (CALM)
Fishing Charter	No	No	Yes
OTHER ACTIVITIES			
Research - fish	Licence (FD)	Licence (FD)	Licence (FD)
- other	Licence (CALM)	Licence (CALM)	Licence (CALM)
Anchoring	Yes	Yes	Yes
Moorings, Structures and Platforms	Assess	Assess	Assess
Jetties	Assess	Assess	Assess
Boat Ramp	Assess	Assess	Assess
Groynes and Marinas	No	Assess	Assess
Markers	Yes	Yes	Yes

Licence (FD) - These activities are considered compatible but require a Fisheries Department licence.

Licence (CALM) - These commercial tourism activities may or may not be compatible. The activity requires a CALM licence. CALM will assess the suitability of each application in liaison with relevant bodies.

Assess - Assessed on application.

CALM Permit - Applications for the collection of flora or fauna for research or study purposes will be assessed and where acceptable a permit will be issued.

* - One small area of trawling will be permitted in the Wooramel Special Purpose Zone (see Figure 9).

** - For Gladstone Special Purpose Zone waters south of the channel will be closed from 1 September to 15 January and north of the channel from 1 December to 31 March each year.

4.2.4 General Use Zones

The remainder of the marine park not specified as Sanctuary, Recreation or Special Purpose Zone will be designated General Use Zone.

Some areas have been identified which have high conservation values, however given existing use it has not been considered necessary to create a zone to protect these areas. These areas include Guichenault Point, Broadhurst coral, Peron sand flats, Monkey Rock and areas adjacent to Dirk Hartog Island such as Turtle Bay and Sunday Island. These areas will be monitored and considered for zoning during the life of this plan if necessary to maintain their values or to provide for special use.

The zoning plan has been developed on the best available biological information and takes account of current commercial and recreational use of the marine reserves. As new information becomes available and use of the area changes amendments to the zoning plan may be required. Should the need arise, a review of the zoning plan will occur within the 10 year life of this plan.

STRATEGIES

Short Term

1. **Implement the zoning plan as described above and illustrated in Figure 4.**

2. **Proclaim regulations and notices under the appropriate legislation to enable the management of uses and activities in the marine reserves, consistent with the zoning plan.**

Medium Term

3. **Review the zoning plan if a need is identified within the life of this plan and make changes where appropriate after public consultation.**

5.0 NATURAL AND CULTURAL RESOURCE MANAGEMENT

5.1 CLIMATE AND OCEANOGRAPHY

The objective is to consider the effects of climate and oceanographic patterns in management of the marine reserves.

Shark Bay has a semi-arid to arid climate, experiencing hot, dry summers and mild winters. Summer minimum and maximum temperatures average between about 20˚C and 35˚C respectively and winter temperatures between about 10˚C and 20˚C. Annual rainfall is low, ranging from 200 mm to 400 mm across the Shark Bay area. Annual evaporation is high, ranging from 2000 mm in the west to 3000 mm in the east. The area is influenced by southerly winds for most of the year. During summer, southerlies commonly blow for extended periods at over 25 km/hr. The Bay also experiences infrequent summer cyclones. During winter, winds are lighter (10-15 km/hr) and more variable.

Shark Bay is a large embayment, approximately 13000 square kilometres in area, with the majority of the marine reserves being less than 15m deep. There is a series of broad gulfs, narrow inlets and basins within the Bay, which are partly cut off from the Indian Ocean. Influx of oceanic water is through the northern Geographe Channel, the Naturaliste Channel between Dorre and Dirk Hartog Islands and South Passage between Dirk Hartog Island and Steep Point.

The area is served by the southward flowing Leeuwin Current, which brings in warm low-salinity tropical water from the Western Australian continental slope and shelf. The current is variable but mainly flows in autumn and winter. This current influences the distribution of marine fauna and can transport tropical species into the Bay.

The presence of extensive meadows of large seagrasses has influenced the water current regimes of the Bay, as the seagrasses slow the rate of water flow over the substratum. Rates of sediment accretion associated with seagrass meadows in Shark Bay are greater than those associated with coral reefs. Over time, these processes have led to the development of large sedimentary banks, such as the Faure Sill. A key element in the maintenance of the hypersaline environment of Hamelin Pool has been the development of the Faure Sill which has created a landlocked marine basin partially separated from Shark Bay. This forms a reversed estuary where outflow of dense saline waters is prevented by the barrier of the sill.

Tides are the major cause of water movement in Shark Bay, varying between a spring range of 1.70m and a neap range of 0.61m at Carnarvon (Logan and Cebulski, 1970). Tides vary in different embayments. For example, those in the Hamelin Pool Marine Nature Reserve have an average range of 0.5m.

Shark Bay has a unique hydrologic structure, resulting from the restriction imposed by banks and sills, that has led to increased salinity in the southern parts of the Bay. This feature is characterised by three major water types, ie; oceanic (36-40%), metahaline (40-56%) and hypersaline (56-70%). These zones create three biotic zones corresponding to the distribution of water types (Figure 5) which impact on species distribution and therefore directly on the distribution of major habitats.

Sea surface water and bottom temperatures within Shark Bay have a greater range than the open sea. The inner parts of the Bay, including Freycinet Reach, fall to 17-18˚C in August and to 19-22˚C in the zone of oceanic salinity. In February a maximum of 27˚C has been recorded in Hamelin Pool, 24-26˚C in Freycinet Reach and 22-24˚C in the oceanic salinity zone. There is little summer or winter difference between bottom and surface temperatures.

The Gascoyne and Wooramel rivers drain into Shark Bay, but their flow is intermittent and runoff small. There is very little surface runoff into Shark Bay because of low rainfall, high evaporation and permeable soils. However there is active regional groundwater flow. Most groundwaters are saline, with some freshwater springs, such as in the intertidal zone north of Monkey Mia which may be locally significant. Marine environments of the Bay are principally influenced by internal processes.

Water temperature, circulation pattern and salinities have a major impact on the distribution of habitats and the biology of individual species. A comprehensive understanding of these variables is essential for effective management of the marine park.

STRATEGY

Short Term

Encourage research into water circulation, salinity and temperature fluctuations in Shark Bay and utilise this information in marine reserve management and assessment

of proposed developments in, and affecting, the marine reserves.

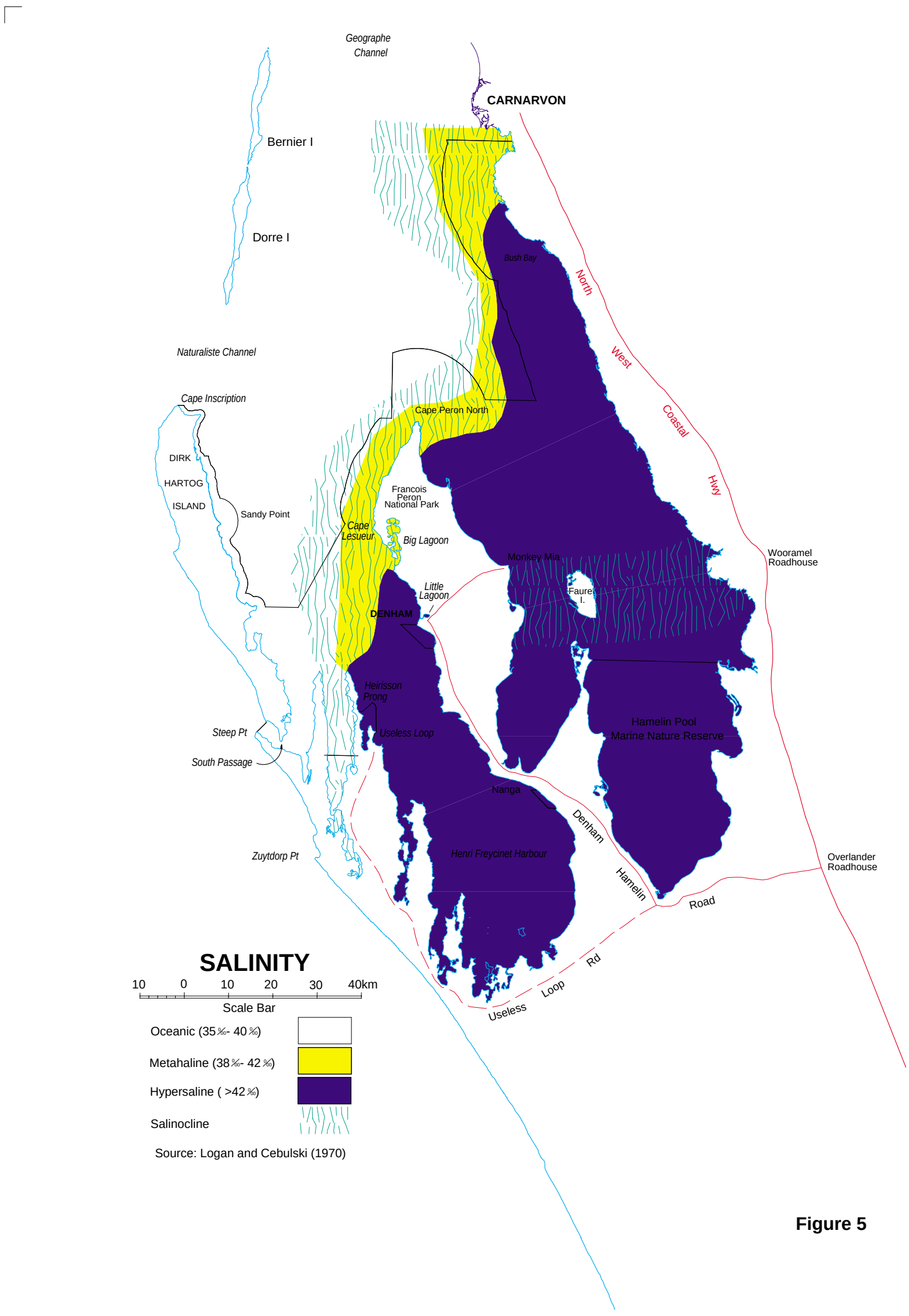

Geographe Channel
CARNARVON
Bernier I
Dorre I
Bush Bay
North West Coastal Hwy
Naturaliste Channel
Cape Inscription
Cape Peron North
DIRK
HARTOG
ISLAND
Sandy Point
Francois Peron National Park
Cape Lesueur
Big Lagoon
Monkey Mia
Wooramel Roadhouse
Little Lagoon
Faure I.
DENHAM
Heirisson Prong
Useless Loop
Steep Pt
South Passage
Hamelin Pool Marine Nature Reserve
Nanga
Denham Hamelin Road
Zuytdorp Pt
Henri Freycinet Harbour
Overlander Roadhouse
Useless Loop Rd
SALINITY
10 0 10 20 30 40km
Scale Bar
Oceanic (35‰- 40‰)
Metahaline (38‰- 42‰)
Hypersaline (>42‰)
Salinocline
Source: Logan and Cebulski (1970)

Figure 5

5.2 GEOLOGY AND GEOMORPHOLOGY

The objective is to protect and conserve geological and geomorphological values of the marine reserves.

The superficial geology of the Shark Bay World Heritage Area consists of a series of Quaternary aeolian and marine sedimentary units deposited on an eroded surface of the Cretaceous Toolonga Calcilutite. The Toolonga Calcilutite, a fossiliferous chalky limestone, forms the top layers in the marine sedimentary rocks known as the Carnarvon Basin. With the exception of the Toolonga Calcilutite, exposed along the cliffs on the eastern side of Hamelin Pool, the surface geology is dominated by exposures of Quaternary rocks. These rocks can generally be separated into four geomorphological provinces known as the Edel, Peron, Yaringa and Gascoyne-Wooramel provinces (Logan *et al*. 1970).

The Edel Province (covering Edel Land, Dirk Hartog Island, Bernier Island and Dorre Island) comprises Holocene calcareous dunes overlaying Tamala Limestone. These calcareous dunes are the result of a Holocene marine transgression, of the last 10 000 years, which brought the sea level to within a few metres of the high Pleistocene sea-level stands. The Tamala Limestone forms the steep Zuytdorp Cliffs along the south-western border of this province. Within the Edel Province, numerous gypsiferous pans or "birridas" are present as elliptical or circular depressions. It is believed that the central raised platforms of these formations correspond to the level of water present during the Late Pleistocene.

The Peron Province (covering the Peron Peninsula, Nanga Peninsula and Faure Island) is characterised by the presence of relict terrestrial Pleistocene dunes (Peron Sandstone). These deposits occur as sets of large terrestrial transverse dunes composed of red and yellow quartz sand (Peron Dunes) which have been preserved through the development of calcrete cores. Minor reworking of the overlying unconsolidated sands has produced broad undulating red sand dunes (Nilemah Dunes) which are superimposed upon the Peron Dunes. Interdunal depressions within this formation are commonly occupied by birridas or, when adjacent to the coast, marine lagoons. The western margin of the Peron Province is characterised by the presence of the Tamala Limestone which overlies the Peron Dunes along the western coast of the Peron Peninsula. A well-lithified coquina (cemented shell) deposit is present as a palaeo-beach ridge adjacent to the shoreline of Lharidon Bight. Within the coquina mining area, north east of the Shell Beach Conservation Park, the paleo-beach ridge has been mined. A series of lithified coquina (shell) beach ridges and benches is present within the Peron Province. The beach ridges and benches are palaeo-indicators of former high sea level stands which occurred during the last 10 000 years.

The Yaringa Province comprises the eastern shoreline and hinterland of Hamelin Pool. This area is represented primarily by a dissected plateau (Toolonga Plateau) of calcrete duricrust and minor Pleistocene limestone units overlying Cretaceous Toolonga Calcilutite which is separated from Hamelin Pool by the Toolonga Scarp. The Toolonga Scarp appears as a series of low undulating cliffs of Toolonga Calcilutite with minor exposures of Tertiary limestone and sandstone and Pleistocene limestone. The shoreline deposits fringing Hamelin Pool consist of an association of modern (Holocene) beach, beach ridge and dune deposits, supratidal and tidal flat deposits, and the Hamelin Coquina deposits which consist of shells of the small bivalve *Fragum erugatum.* Hamelin Pool is a hypersaline basin, less than 10 metres deep, which is barred on the north side by the Faure Sill, a seagrass and lime sand bank which extends from the northern tip of the Nanga Peninsula east to Yaringa Point. Algal mats dominate the tidal flats and shallow subtidal areas, and stromatolites extend around Hamelin Pool in the tidal and shallow subtidal zones.

The Gascoyne - Wooramel Province is the coastal strip along the eastern margin of the reserves, lying between the Gascoyne and Wooramel Rivers. This province is represented by a series of coastal transverse dunes overlying Cretaceous and Pleistocene limestone. Wide supratidal flats and modern beach and beach ridge are present seaward of the coastal dunes. The Wooramel River has formed a small delta composed of red silty sediments. A small abandoned subdelta lies north of the present mouth of the Wooramel River.

STRATEGY

Ongoing

Control recreational or commercial activities which have the potential to cause significant disturbance to the seafloor or coastal landforms.

5.3 MARINE HABITATS

The objective is to develop a comprehensive knowledge of habitat distribution and community structure to facilitate management of the marine reserves.

The Shark Bay marine reserves have an outstanding diversity of marine habitats as a result of the diversity of benthic substrate, salinity and the broad geographical features which influence depth, water movement and turbidity. Seagrass predominates in oceanic and metahaline waters at suitable depths (Figure 6). These habitats can be arranged into three broad groups based on water salinity - oceanic, metahaline and hypersaline.

Habitats of the oceanic environment include:-
Deep open water, beaches, rocky reefs, coral communities, seagrass, tidal creeks and inlets, rocky ledges, caves, sand gutters, boulder and coral rubble floors, intertidal rock pools and platforms, areas exposed to high impact oceanic swells and sheltered low wave energy areas.

Habitats of the metahaline environment include:-
Extensive seagrass, mangroves, sand flats, mud flats, salt marsh, limestone reefs, tidal creeks and inlets, mud flats, intertidal pools, limestone platforms, patchy coral communities, rubble floors, caves and beaches.

Habitats of the hypersaline environment include:-
Limited seagrass, stromatolitic microbial communities, shell (coquina) beaches, sandy beaches, intertidal pools, sand flats and limestone platforms, mud flats, salt marsh, tidal creeks and tidal inlets.

With the exception of seagrass and microbial communities, little is known of the distribution of the various habitat types and community structure within each habitat. To enable comprehensive management and monitoring of the marine environment it is essential that an accurate habitat map is prepared for the marine reserves. Research into community structures within these habitats would enable a better appreciation of the biological values and enable a monitoring program to be developed.

STRATEGIES

Short Term

1. **Develop a comprehensive habitat map for the marine reserves.**

2. **Encourage research into the community structure of each habitat to facilitate monitoring programs (see Section 11).**

3. **Determine the condition of habitats to enable determination of priorities for management.**

5.4 MARINE FLORA

The objective is to protect and conserve indigenous flora communities.

5.4.1 Microbial Communities

Microbial communities flourish as algal mats in the inter-tidal and sub-tidal zones of the marine reserves' most saline embayments, particularly Hamelin Pool and to a lesser extent Lharidon Bight and Petit Point (Figure 6). The Faure Sill maintains these distinctive hypersaline conditions. Any alteration to the morphology of the Sill could jeopardise conservation values of the marine park and Hamelin Pool.

Hypersaline conditions in Hamelin Pool and sections of Lharidon Bight have led to the development of a number of significant geological and biological features. Outstanding among these are stromatolites which are "living fossils" built mainly by cyanobacteria. They are of great scientific importance and rarity and offer an extensive living analogue for study of the nature and evolution of Earth's biosphere up until the early Cambrian. These areas also contain restricted marine species tolerant of hypersalinity.

Algal mats are fragile and extremely slow to recover after being disturbed. Vehicles can cause extensive damage, particularly around the shores of Lharidon Bight and Gladstone. Vehicle tracks may persist for decades, and can contribute to erosion and hence further damage. A report to CALM (Playford, 1993) examined the provision of tourism access and facilities at Hamelin Pool. It made a series of recommendations which included focussing visitor use at the Telegraph Station site and not opening up access to other sites in Hamelin Pool. Subsequent to this report a boardwalk was constructed in 1994 at the Telegraph Station to facilitate public viewing and appreciation of stromatolites.

STRATEGIES

Ongoing

1. **Control human activities that would result in the loss or movement of sediments on the Faure Sill.**

2. **Ensure site developments avoid or minimise damage to microbial structures.**

Short Term

3. **Implement education programs to increase public awareness of the nature, sensitivity and importance of microbial communities.**

5.4.2 Seagrass Communities

Shark Bay contains the largest reported seagrass meadows in the world (approximately 4000 km^2), as well as some of the most species-rich seagrass assemblages (Walker, 1989). Twelve species of seagrass are found in the Bay with the most dominant species being *Amphibolis antarctica*. Seagrass is the dominant organism of Shark Bay, playing a major role in the construction and maintenance of this unique marine environment. The high biomass and productivity of seagrass, coupled with the large accumulation of nutrients present in seagrass meadows, make them of great significance to the food chains of Shark Bay. They also are important habitat and nursery areas for fish and invertebrates, providing protection and food. Dugongs and green turtles also feed on certain species of seagrass and loss of seagrass habitat would have significant impacts. Dugongs, in particular, rely on specific areas at certain times of the year. These include *Halodule* beds in Gladstone, *Halophila* beds in Freycinet and west of the Wooramel Bank and the *Amphibolis* beds on the eastern shore of Dirk Hartog Island. It is crucial these important habitats are protected.

Little is known about the impacts of commercial and recreational activities on seagrass communities. Potentially the greatest threats to the health of seagrasses would emanate from changes in water quality or sedimentation patterns. Mining and shipping have the greatest potential for causing major damage to seagrass communities through accidental or badly managed discharge. Trawling alters natural sedimentation patterns though its effects on seagrass have not been investigated.

Whilst most boaters avoid seagrass beds, there is visible damage to seagrasses from propellers and anchors, particularly adjacent to launching sites. Seagrasses are protected under the Wildlife Conservation Act, and penalties exist for damaging seagrass. The large monospecific seagrass meadows of the marine park are composed mainly of southern Australian species. These species have very slow rates of rhizome growth, thus recolonisation is a very slow process.

STRATEGIES

Ongoing

1. **Minimise actual or potential damage to seagrass communities.**

2. **Encourage research into the diversity and habitat dynamics of seagrass communities.**

Short Term

3. **Promote public awareness of the significance of seagrass to Shark Bay and the consequences of damaging seagrass beds.**

4. **Provide information on responsible boating for seagrass protection, with particular regard to navigation, anchoring and speed.**

Medium Term

5. **Identify aspects of existing and proposed activities, including commercial operations, which are damaging or which risk damaging the health of seagrass communities.**

5.4.3 Mangrove Communities

Mangrove communities provide rich feeding and breeding habitats for birds, bats and marine animals. The distribution of mangroves in the marine reserves has not been documented, but varies from isolated trees in the southern reaches to thickets along the Wooramel coast. Mangroves are protected under the Wildlife Conservation Act and penalties exist for damaging them.

Seven northern birds wholly or largely dependent on mangroves have their southern limit in the area: Mangrove Heron, Brahminy Kite, White-breasted Whistler, Mangrove Grey Fantail, Dusky Flyeater, Yellow White-eye and White-breasted Woodswallow (Storr, 1990). The maintenance of the reserves' mangrove communities is therefore important for the conservation of these species.

The most prevalent human activities amongst mangroves are camping and recreational fishing. Some concern has been expressed that netting of mangrove creeks is depleting fish stocks, however there have been no scientific studies into these activities. Given the importance of these mangrove areas as nursery habitats, the extent of netting activities and associated impacts should be investigated.

Public access to, and use of, these areas has led in some cases to degradation of the communities. Access should be focused on particular sites suitable for public use and other sites closed. Activities need to be controlled to reduce this degradation.

Sewage deriving from recreational developments including camping areas and toilets also has the potential to impact on adjacent mangrove communities.

Aquaculture industries sometimes utilise protected mangrove creeks as production sites. Existing industries including pearl farms should be monitored for possible impact on mangrove communities.

STRATEGIES

Ongoing

1. **Assess potential impacts of aquaculture activities, coastal development and recreation and other proposals likely to impact on mangrove communities, and act to minimise these impacts.**

Short Term

2. **Investigate the impacts of netting within mangrove creeks and act to minimise any adverse impacts.**

3. **Determine acceptable access points, prepare site development plans and prioritise works for recreation sites adjacent to mangrove areas. All inappropriately positioned sites will be closed to public access.**

Medium Term

4. **Collate data on the distribution of mangroves in the marine reserves.**

5. **Develop education programs to promote public understanding of mangrove communities and the regulations which apply to protection of these sensitive areas.**

5.5 MARINE FAUNA

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

5.5.1 Coral Communities

119 locations in Shark Bay have been sampled for corals with coral being found at 30 of these (Figure 6). This sampling has yielded 80 species of hermatypic (reef building) corals (Marsh, 1990) and several ahermatypic corals. There is a single southern endemic species with its northern limit at Shark Bay and 14% of the tropical species recorded have their southern limit in Shark Bay. The study determined that salinity and seasonal temperature gradients either directly or indirectly restrict the distribution of corals to areas which have normal salinity in the western half of the Bay, a few species occur in the metahaline waters but none in the hypersaline areas (Marsh, 1990) as shown in Figure 6. The corals at Sandy Point and Bar Flats were not sampled, however these are likely to contain similar species to those areas sampled (Marsh, pers. comm.).

The eastern shores of Bernier, Dorre and Dirk Hartog Islands provide the most favourable habitats for coral growth due to shelter, and water with relatively small salinity and temperature fluctuations. Some sections of these islands support prolific coral growth (up to 100% cover) both in the sheltered leeward and exposed areas.

The occurrence of coral and associated reef communities in the more sheltered oceanic to metahaline waters of the inshore areas of Shark Bay appear to be unusual to Australian waters. Outcrops of these communities occur within sand and seagrass dominated habitats. The choppy often turbid waters would normally be detrimental to corals. However, in some places, such as the coral patch at Sandy Point, Bar Flats and Egg Island, coral growth is prolific. Other coral communities can be found in more exposed areas. These inshore communities are generally small (<4 ha) and patchy with the healthier corals occurring on the northern or leeward sections of the outcrops. The southern or windward edges generally consist of coral rubble.

The most popular recreational coral sites in the marine reserves occur in the more sheltered waters of Dirk Hartog Island (eg. Sandy Point and South Passage) and at isolated coral outcrops such as those at Broadhurst Bight and Bar Flats. It is essential that disturbance of coral communities be minimised to maintain conservation, recreation and commercial values. Research indicates that damage to corals can initiate substantial changes in the ecology of a site.

Collection of corals is not compatible with conservation and should be prohibited in the marine reserves. The use of anchors and moorings also needs to be managed as damage can often outstrip regrowth.

STRATEGIES

Short Term

1. **Prohibit the collection of live corals within the marine reserves except by permit for research purposes.**

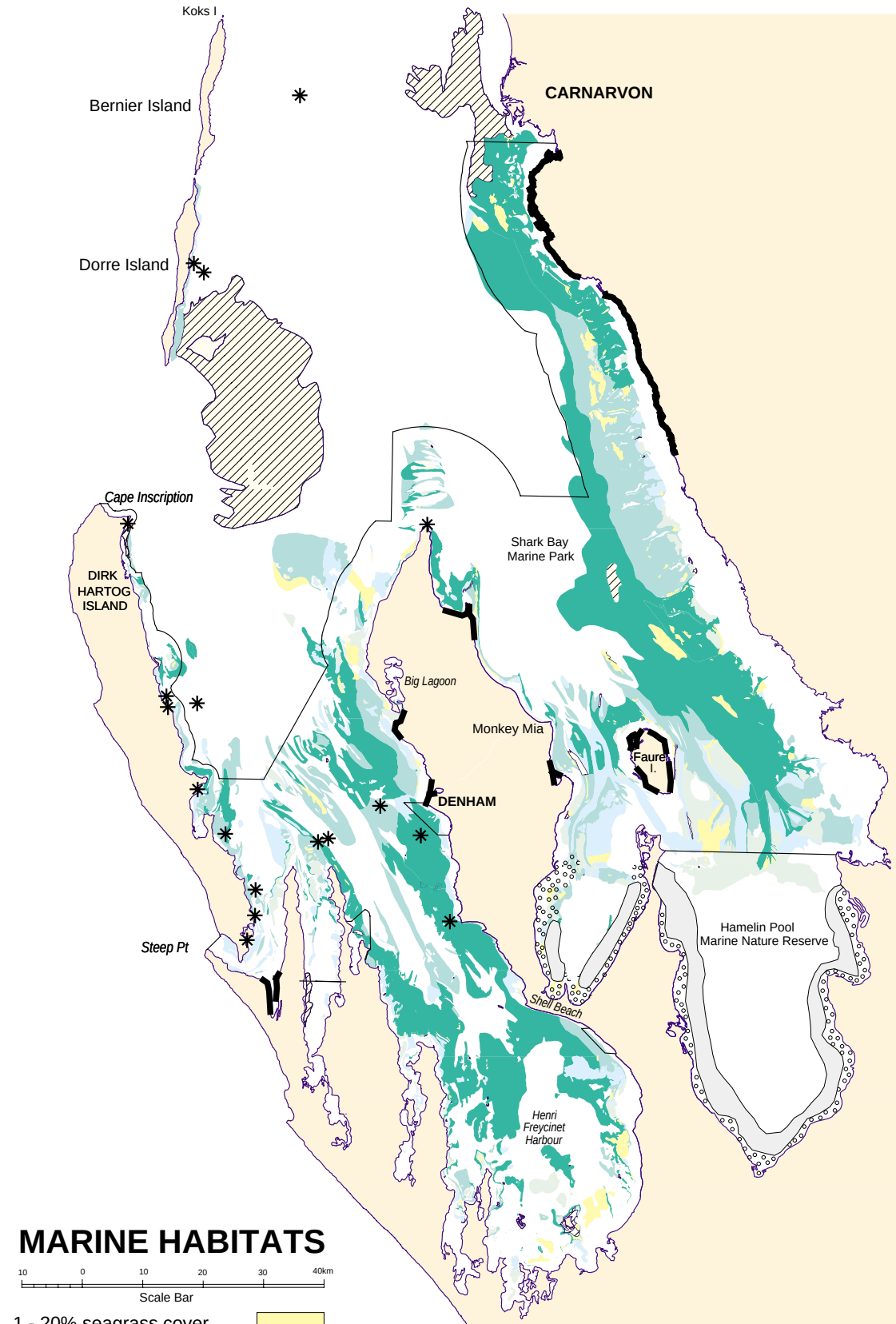
2. **Survey and assess coral distribution, diversity and conditions within the marine reserves.**

3. **Consult with relevant groups on the management of coral sites and implement management strategies as necessary.**

4. **Prepare a mooring strategy in liaison with the Department of Transport that considers the requirements of both present and future boat users, the need for permanent moorings and the protection of the marine environment and its natural inhabitants.**

5. **Educate boat users to anchor in sand clear of coral and seagrass.**

6. **Assess current impacts on coral communities and take action to prevent further damage.**



MARINE HABITATS

10 0 10 20 30 40km

Scale Bar

- 1 - 20% seagrass cover
- 21 - 40% seagrass cover
- 41 - 60% seagrass cover
- 61 - 80% seagrass cover
- 81 - 100% seagrass cover
- Unknown seagrass cover
- Sand
- Algal Mat communities
- Shell and Coquinite deposits
- Mangroves
- Coral presence

Figure 6

5.5.2 Other Invertebrates

Marine invertebrates are those animals without a backbone and incorporate the majority of marine animals with the exception of fish, mammals and reptiles. This group includes the sponges, cnidarians (jelly fish, anemones), worms, Bryozoans (sea mosses), crustaceans, molluscs (cuttlefish, baler, conch shells etc.), echinoderms (starfish, sea urchins) and sea squirts.

Commercially important invertebrate species utilised in the marine reserves include scallops, prawns, crabs, lobsters, oysters and cultured pearl oysters (see Section 7.1). Recreationally important species include shell fish such as cockles and pipis, cephalopods such as squid and crustaceans such as crabs and lobsters. Recreational collecting of invertebrates is discussed in detail in Section 6.5.

Because of the spatial isolation, high organic productivity and development of extensive seagrass beds and carbonate sand flats, the shallows of Shark Bay support a benthic invertebrate fauna of exceptional abundance, diversity and biogeographical significance. Studies to date have revealed 218 species of bivalve molluscs in the region with 75% of these coming from a tropical range, 10% from a southern Australian range and 15% being west coast endemics (Slack-Smith, 1990). The distribution and abundance of a number of marine invertebrates is related to the salinity gradient.

The WA Museum contains extensive collections of invertebrates from Shark Bay, however a large proportion of these have not been identified (Marsh, pers. comm.). Significant advances in knowledge on the distribution and diversity of invertebrates could be obtained through such work.

The extraction of the shell deposits of the heart cockle (*Fragum erugatum*) occurs adjacent to the marine reserves. There is a need for research on the biology of this species to ensure that extractive activities are sustainable.

It is important to ensure protection of invertebrates from damage by either direct or indirect means. Protection of these groups includes the prevention of habitat destruction, sedimentation, pollution and physical damage or removal.

STRATEGIES

Ongoing

1. **Manage recreational collecting of invertebrates as detailed in the strategies in Section 6.5.**

2. **Manage commercially collected invertebrate species within the marine reserves according to the strategies in Section 7.1.**

3. **Consider the effects on invertebrate communities when assessing the impacts of developments, visitor use and marine pollution.**

Short Term

4. **Encourage research into the biology of *Fragum erugatum*.**

Medium Term

5. **Encourage research into the diversity and distribution of invertebrates within the marine reserves.**

5.5.3Fish

The fish fauna of the marine reserves is not well documented. Comprehensive surveys of South Passage (Hutchins, 1990) and at Monkey Mia (Black *et al*. 1990) have been carried out which provide a guide to the fish fauna of the marine reserves. The South Passage survey showed that this area contains the highest species diversity in the marine reserves with a total of 323 species of fish recorded. The majority of these were tropical species (83%), with smaller numbers of warm temperate (11%) and cool temperate (6%) species. This area is considered to be the most southern area of mainland Australia which supports a predominantly tropical fish fauna. Of particular note is that the fish fauna of South Passage is even more diverse than that of the Houtman Abrolhos Islands, a much larger area of offshore islands and coral reefs to the west of Geraldton (Hutchins, 1990). Within South Passage, a large percentage of the species recorded were found in a small area near Monkey Rock (Hutchins, pers comm.). It is very unusual to have such high fish diversity in such a small area. This area therefore has special values and should be monitored to ensure that activities on and adjacent to Monkey Rock are not detrimental to fish diversity.

The survey at Monkey Mia focussed on intertidal seagrass and adjacent sand flats and recorded 58 species of fish. This is a large number of species compared to similar habitats elsewhere in the State and is probably due to the mix of tropical and temperate species. The fauna of Hamelin Pool is clearly less diverse with only six species of fish recorded (Lenanton, 1977).

The marine reserves have a particularly diverse range of species. This diversity is clearly related to the diversity of habitats and salinity, however the actual distributions of individual species have not been documented.

The Fisheries Department has responsibility for managing species which are fished in the marine reserves. Many fish species are important to commercial and recreational fishers; of particular note are pink snapper, mullet, whiting and bream, sharks and rays, resident reef fish such as coral trout, cod and tusk fish and pelagic fish such as mackerel and mulloway. Implications of recreational and commercial collecting of fish and proposals to protect

some vulnerable species are discussed in Sections 7.1 and 6.5.
Sharks, the namesake of the marine park, occur in abundance, ranging from small school sharks to Tiger, Hammerhead and Whalers. Small sharks are caught in normal commercial and recreational fishing activities subject to the Fish Resources Management Act. The capture of large sharks requires the use of heavy tackle and gear. Currently there is no commercial fishing for large sharks in the park. Large sharks have a significant predatory role in the marine ecosystem, and require protection from recreational fishers.

Sharks could present a danger to the public or create problems for aquaculture operations. Sharks presenting a danger to the public will be dealt with by CALM in liaison with the Fisheries Department. With respect to aquaculture operations the culling of sharks should be a last resort if predator nets or other methods of deterrence have not been successful.

STRATEGIES

Ongoing

1. **The licensing of new sustainable commercial fisheries which are compatible with the park will be controlled by the Fisheries Department in consultation with CALM.**

2. **License commercial fish feeding activities where compatible with the park in liaison with the Fisheries Department.**

Short Term

3. **Provide legislative protection for species not fished (eg. Manta Rays) and liaise with the Fisheries Department to give special protection to species in need of it (eg. Queensland Groper).**

5.5.4 Reptiles

Two species of turtle inhabit the reserves, the green turtle (*Chelonia mydas*) and the loggerhead turtle (*Caretta caretta*). Two other species, the hawksbill (*Eretmochelys imbricta*) and the leatherback turtle (*Dermochelys coriacea*) have been seen in the reserves but are not common. The green turtle is abundant along the northern coast of Western Australia with numerous nesting sites. It is common throughout Shark Bay, however nesting is only believed to occur at Turtle Bay (Dirk Hartog Island) and infrequently on Peron Peninsula.

The loggerhead turtle is less prevalent than the green turtle, however Shark Bay is believed to provide the most important breeding site in the State. Loggerhead turtles are known to have only two major nesting areas in WA - the Muiron Islands and Turtle Bay. A survey in 1994 of Turtle Bay tagged 411 animals over 11 nights which was far in excess of animals nesting at the Muiron Islands (R.I.T. Prince, pers. comm.). The nesting season is believed to occur between November - January with hatchlings appearing in April/May. The 1994 survey highlighted the importance of the Turtle Bay nesting site, however information is required on the extent and exact length of the nesting season. Research is also required on the biology of the species, particularly their migratory and foraging patterns. The use of Turtle Bay by the public needs to be monitored to ensure activities are not affecting this important nesting site.

The State of the Marine Environment Report (DEST, 1995) states "The main human impacts occurring while turtles are in Australian waters are: mortality of adults in prawn trawl, shark nets and gill nets, and in collision with speed boats; subsistence hunting by indigenous communities; habitat degradation; and predation on eggs by feral animals." There is insufficient evidence to show that these activities are having a significant impact in Shark Bay. It does however identify a need for research into the turtle populations in Shark Bay to ensure that they are not at risk from these activities. Research on these activities should be conducted in liaison with relevant industry groups and agencies, and remedial action should be taken if necessary.

Seasnakes are widespread throughout Shark Bay. Twenty two species of seasnakes occur in Western Australia and of these 6 species occur in Shark Bay waters (Storr *et al*. 1986). The Shark Bay Sea Snake (*Aipysurus pooleorum*) is unique to Shark Bay. Seasnakes are protected under the Wildlife Conservation Act.

STRATEGIES

Ongoing

1. **Monitor recreational use of turtle nesting sites and control this where it is impacting on nesting activities.**

Short Term

2. **Conduct further research into turtle nesting in the marine reserves and utilise volunteers to monitor these activities.**

3. **Conduct research into the turtle population with respect to population trends, biology, foraging patterns and interaction with commercial and recreational use, and take action to reduce or eliminate any adverse impacts.**

Medium Term

4. **Provide information to users on interaction with nesting turtles and on seasnake biology and behaviour.**

5.5.5 Birds

Seabirds are a significant component of Shark Bay's fauna, with 14 species breeding in the area and another 50 species visiting the area (A.A. Burbidge, pers. comm.). Shark Bay has the largest population of Pied Cormorants in Western Australia.

Most islands in the area are used for breeding by seabirds at some time of the year. Breeding and roosting areas are susceptible to disturbance and could be affected by recreational and commercial uses. For example Fairy Terns can nest on the mainland beaches and spits. Potential disturbance would include impacts from 4WD vehicles and dogs. The Pied Cormorant is also susceptible to disturbance, particularly when chicks are large. Information and interpretation on important breeding and roosting locations for seabirds, potential impacts on the birds and ways of avoiding such impacts should be provided to users.

Pelican Island is an important winter breeding area for pelicans and would be one of the most sensitive pelican breeding areas in Western Australia. There are only 9 or 10 pelican breeding sites in Western Australia. Pelican Island has 50 to 100 breeding pairs which are extremely sensitive to disturbance. Boats approaching within one kilometre of the island can disturb the birds. Information on pelican breeding times and potential impacts needs to be provided to boaters.

Little research has been conducted to determine the impacts of fishing on seabird food resources. Other priorities for managing seabirds are to prevent human disturbances, protect sites from the introduction of feral animals and weeds and investigate the effects of bycatches on seabird food resources.

Information on shorebirds in the Shark Bay area is not extensive, however a survey of shorebirds was conducted by the Royal Australasian Ornithologists Union (RAOU) in October 1987. This survey recorded an estimated 50 000 birds comprising 53 species (Jaensch and Vervest, 1990) which makes Shark Bay 12th nationally in significance as a shorebird site.

The Shark Bay area is internationally important for two species of shorebirds (the Banded Stilt and the Eastern Curlew), and is nationally important for five species of shorebirds; the Wood Sandpiper, the Greenshank, the Grey Plover, the Banded Stilt and the Eastern Curlew (Watkins, 1993). The Eastern Curlew is the largest of the shorebirds that migrate to Australia and is considered to be a rare species in Western Australia[2] (Garnett, 1992). Shark Bay's Eastern Curlew population is significant considering that numbers have declined elsewhere in Australia. Thirty four species listed in international treaties occur in Shark Bay (out of fifty four species in WA).

Further surveys need to be carried out in the area to improve the knowledge of shorebirds in Shark Bay.

Areas in Shark Bay that are particularly important for seabirds and shorebirds include Faure Island, the eastern side of Dirk Hartog Island, Pelican Island and the spit on Salutation Island. Faure and Pelican Islands and flats around them may constitute the most important area for migratory shorebirds in the Bay (Jaensch and Vervest, 1990). The 1987 survey also identified other key roosting areas, being near the mouth of the Gascoyne River, a number of marshes and beaches near Bush Bay and Guichenault Point.

STRATEGIES

Ongoing

1. **Manage recreational and commercial activities to minimise disturbance to birdlife.**

Medium Term

2. **Assess the reserves' birdlife distribution, susceptibility to disturbance and identify sources of disturbance.**

3. **Provide information and interpretation to the public on important breeding and roosting areas for birds in and adjacent to the marine reserves and on possible impacts of disturbance to birdlife.**

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[2] An unofficial category adopted by the International Council for Bird Preservation (ICBP) for taxa that are often treated as threatened but, at this stage, do not appear to warrant classification as Endangered, Vulnerable, Rare or Insufficiently Known.

5.5.6 Dugongs

The dugong (*Dugong dugon*) is declared as specially protected fauna under the Wildlife Conservation Act. Shark Bay is a nationally and internationally significant dugong habitat that supports an estimated 10 000 (± 1665 standard error) dugongs at higher densities than have been recorded elsewhere (Marsh *et al.* 1994). The key dugong management issues are habitat protection, recreational "watching", aboriginal hunting and research. Aboriginal hunting and dugong watching are addressed elsewhere in this plan (see Section 5.7 and Section 5.5.9 respectively).

Habitat protection is required in areas utilised for dugong feeding and reproduction. Research indicates that dugong migrate seasonally within the Bay to find optimum water temperatures and consequently their habitat usage varies extensively from summer to winter (Anderson, 1986, 1991; Prince *et al*.. 1981). There is a major seasonal difference between summer and winter habitats in terms of seagrass production and nutritional value of forage species that is also important in determining dugong distribution and behaviour.

A dugong survey (Marsh *et al*. 1994) carried out in the winter of 1989 provided a standard benchmark for population estimates in Shark Bay. This can be used on a comparative basis with subsequent surveys to ascertain the stability of the dugong population. The survey was repeated in the winter of 1994. Some differences in distribution were found but the population estimate was similar to that for 1989 (Preen *et al*., in press).

The 1989 survey identified significant use of deep water areas north of Peron Peninsula in winter months. Investigations in 1992 (Anderson, 1994) identified extensive deep water seagrass meadows (*Halophila spinulosa*) adjacent to the western edge of the Wooramel Seagrass Bank. These seagrass habitats occur mainly outside the marine park boundary. Dugong habitat use and distribution during summer are not well understood as there has been no comprehensive summer survey.

There is anecdotal evidence (P Anderson, pers. comm.) that the waters in the southern end of Freycinet Harbour may be the site of significant concentrations of dugongs in summer. Dugongs have also been observed feeding on invertebrates in this area (P Anderson, pers. comm.), a phenomenon not previously documented. The habitat significance of this area needs to be investigated.

Large numbers of dugongs including neonates (young calves) can be found on the Faure Sill and Wooramel Seagrass Bank between Faure Island and Gladstone during the summer. Observations in 1988 and 1989 (Anderson, 1991) indicate that the waters offshore of Gladstone are important for mating activity and the rearing of calves during this period. This has been addressed in the zoning for Gladstone (Section 4.2.3).

Behavioural observations suggest that breeding occurs between September and January at Gladstone, however it is not known whether this is representative of all sites (Anderson, 1994). No observations of a female dugong giving birth have been reported.

There is a need for further research on dugong biology, habitats and behaviour in Shark Bay. Research priorities should be to:

(i) Conduct summer and winter dugong distribution surveys at a minimum of 5 year intervals (there is an urgent need for a summer survey).
(ii) Investigate the forage resources and importance of the deep water seagrass habitats, and map the distribution of *Halophila* and *Halodule* seagrass that are favoured by dugongs.
(iii) Investigate the importance of the Freycinet Harbour for dugongs.
(iv) Encourage further research on dugong reproductive behaviour in the waters adjacent to Gladstone.

STRATEGIES

Ongoing

1. Control activities which may adversely impact on dugongs.

Short Term

2. Encourage further research on dugong distribution, abundance, biology and behaviour in the reserves.

3. Implement a long-term population monitoring program for dugongs.

Medium Term

4. Investigate and report on any observed cases of dugong breeding or calving in the reserves.

5. Encourage the wise management of important dugong habitats outside the reserves.

5.5.7 Bottlenose Dolphins

A survey in 1989 (Marsh *et al.* 1994) indicated that approximately 2700 bottlenose dolphins occur within the park. Of these, a small group of dolphins that have been coming to the shore of Monkey Mia for the last three decades are the most popular tourism attraction in the marine park. The presence of over 100 000 visitors per annum in recent years has necessitated careful management of the dolphin-human interaction to ensure dolphin wellbeing and public safety. A feeding regime has been designed to avoid dolphins becoming dependent on handouts and so maintain their natural foraging and social habits. A draft management plan for the Monkey Mia Reserve has been produced which specifically addresses dolphin interaction and management of the adjoining reserves.

A review of dolphin management at Monkey Mia (Wilson, 1994) recommended a range of measures to ensure that management strategies were capable of ensuring the interaction at Monkey Mia was sustainable. This included significant changes to feeding strategies and overall management. In response to the report the feeding strategy has been amended. These changes include: no feeding of juvenile dolphins (up to four years old) after which only female calves will be provided with fish; feeding at regular hours (to encourage dolphins to move offshore and feed and interact); and a review of the feed fish management (eg. handling, purchasing).

It is essential that the feeding and interaction strategies are regularly reviewed using updated research, observations of behaviour and trends to ensure management is effective and flexible to the need for changes if they are required.

The quantity of fish provided to the dolphins by recreational boat fishers has risen sharply in recent years. Experience from similar situations in other areas of the world and more recently in Western Australia, suggests that uncontrolled feeding provides the greatest potential threat to dolphin wellbeing and could lead to the discontinuation of the dolphin interaction at Monkey Mia. Feeding from boats can result in a behavioural change in dolphins from "hunting" to "scavenging", exposing the animals to a wider range of health risks. There has been an example where a male dolphin has become totally dependent on handouts.

It is unlikely today that feeding the dolphins from boats is necessary to stimulate their beach visits or that visitation patterns would alter markedly if boat feeding ceased. Continuation of uncontrolled boat feeding is considered a major threat to the dolphin health in the circumstances that exist at Monkey Mia. This activity was prohibited in the marine park by means of a notice under the Wildlife Conservation Act in March 1995. Effective information will be provided to gain public understanding and support for this initiative.

The Monkey Mia phenomenon is of significant scientific value. The opportunity to be in close proximity to wild dolphins with minimal disturbance to their social dynamics has allowed researchers to study the complex social behaviour of this species. Research is conducted under permit from CALM and results are provided to assist with managing the human-dolphin interaction. This research has enabled the home range of dolphins in the area to be defined. It is important that activities that occur within the home range of the Monkey Mia dolphins do not have adverse impacts on their natural feeding patterns and social dynamics. The health and welfare of the dolphins is dependent on management of the whole home range and activities which may impact the dolphins should not be permitted.

At Cape Peron dolphins herd and hunt fish in the coastal shallows. This hunting method can necessitate dolphins semi-beaching themselves to obtain their prey. Human presence can disturb this activity, therefore shore and boating activity should be minimised where this behaviour is practised. Management strategies addressing this concern are presented in the zoning plan (Section 4.2). It is possible that this dolphin beaching phenomenon may occur in other shallow bays in the marine park.

STRATEGIES

Ongoing

1. **Regularly review interaction procedures and the feeding strategy for the dolphins and recommend changes to the Monkey Mia Management Committee as required.**

2. **Monitor visitor numbers and control if necessary to preserve the quality of the interaction experience and to protect the dolphins.**

Short Term

3. **Instigate an education program to increase public awareness of the potential threat to dolphin health from the unrestricted feeding of dolphins and inappropriate interaction.**

4. **Encourage dolphin research with priority given to studies that assist the management of the dolphin-human interaction phenomenon or that increase knowledge of dolphin ecology.**

Medium Term

5. **Encourage research on the inshore hunting behaviours of dolphins at Cape Peron, and control human activities that may disturb this behaviour.**

6. **Investigate and document reports of dolphin beaching behaviour for locations other than Cape Peron within the marine park.**

5.5.8 Whales

Humpback whales were common visitors to Shark Bay prior to commercial whaling in the early 1900s. In recent decades, humpback whales have been regularly sighted off the western shores of Dirk Hartog Island and the Zuytdorp Cliffs on their annual migration along the Western Australian coast. Southern right whales are sighted occasionally, however, their numbers are minimal compared to humpback whales. In the last few years, there has been an increase in reports of whales venturing into the embayments of Shark Bay. There is evidence of a significant increase in the whale population visiting the area in winter and this is likely to continue (Bannister et al., 1991 and Bannister, 1994). At the current rate the population could reach 10 000 within a decade or less. This would be equivalent to the levels of the late 1940's, prior to post World War II whaling. Humpback whales in the sheltered waters of Shark Bay provide potential for commercial whale watching tours (Section 5.5.9). Although the whales are generally found to the north of the marine park, aerial surveys in 1994 (Preen *et al.*, in press) have shown an increase in sightings in the Bay. Information on identification of individuals (eg. by tail fluke photography for humpback whales) would assist in Australia-wide research into the status of whale populations.

Killer whales have been reported in South Passage and at Sandy Point on the eastern coast of Dirk Hartog Island (Anderson and Prince, 1985). It appears that killer whales occasionally enter the marine park in winter months to prey on dugongs. Further information to determine the extent, nature and frequency of these activities would be of scientific interest.

Any activities in the marine park shown to be detrimental to whales should be controlled as necessary. This may include control of activities shown to create underwater 'noise' which is detrimental to whales.

STRATEGIES

Ongoing

1. **Manage whale watching activities as detailed in Section 5.5.9 (Wildlife Interaction).**

Medium Term

2. **Devise programs to encourage commercial boat operators and the public to report whale sightings within the marine park.**

3. **Develop a system to record information on whale identification, location, movement and activity.**

4. **Undertake surveys to determine and monitor whale populations.**

5.5.9 Wildlife Interaction

The objective is to manage wildlife interaction to protect wildlife from harm or distress while maximising opportunities for the public to view and enjoy the marine reserves' wildlife.

"Wildlife interaction" refers to any activity where people and wildlife interact in some way which does not involve recreational or commercial taking of a species. This may involve fish feeding, whale watching, swimming with wildlife, viewing wildlife events such as turtle nesting and viewing of any other wildlife. A wide array of interesting wildlife exists in Shark Bay which are of interest to the public and they are of potential commercial value for tourist operators. Dolphin activity can be watched from boats or the shore throughout the park. Dolphins may approach moving boats to ride in the bow wave. There have been occasional incidents of boat propeller injury to dolphins and to dugongs. Cliff tops, such as at Cape Peron, provide good vantage points to watch dolphin and other wildlife activity.

Shark Bay is a good location to observe dugongs. Public awareness of this opportunity has increased following greater public interest in the dugong population. Little of the dugong body breaks the ocean surface and, thus, visitors are keen to snorkel to obtain an underwater view of a dugong. Dugongs avoid human contact and can become easily disturbed by noise or movement. It is important that dugongs are not chased to enable visitors to view them. Interaction guidelines need to consider this avoidance behaviour of dugongs. The waters along the Wooramel coast appear to be important for dugong reproduction in summer months. There is potential for human presence to disturb this activity and such interaction should be actively discouraged. The zoning scheme addresses these concerns (see Section 4.0).

Whales, manta rays, sharks, turtles and other large marine life are a spectacular sight viewed from the water, land or air. It is crucial that public activities and commercial activities do not adversely affect these animals.

Experience elsewhere in the state has shown that fish feeding activities by visitors have the potential to impact on species richness and distribution. These problems can develop where fish feeding becomes a continuous and established activity by visitors, providing an increased and unnatural source of food for marine fauna. Fish feeding at popular visitor sites will therefore be discouraged and permitted by commercial operators only with strict conditions.

The Wildlife Conservation Act provides protection for whales, dolphins, dugongs, turtles and any other fauna as defined in the Act. Species subject to extractive activities (fishing) are managed under the Fish Resources Management Act. Protection of species subject to non-extractive interactions, and management of those interactions, is provided for under the CALM and Wildlife Conservation Acts.

Manta rays and whale sharks are examples of species which are not targeted by extractive activities, however activities such as wildlife interaction may affect the animals directly or affect natural behaviour. Protection from, or management of, such activities can be achieved under the CALM and Wildlife Conservation Acts and should be considered if there is a need. A close season for whale sharks effected by a notice under the Wildlife Conservation Act was gazetted on 8 March 1996 to provide for control and management of whale shark interaction activities in all State waters. This notice provides for a continuing close season on whale sharks.

All commercial activities (excluding commercial fishing and recreational fishing charters) will be licensed under the CALM Act (Section 6.2). Where these operations involve wildlife interaction, conditions will be imposed to ensure these activities do not cause harm or injury to the animal. Standard guidelines developed for whale watching by the Australian National Conservation Agency (ANCA) suggest limits on approach distances for aircraft and boats and detail a code of behaviour for approaching and watching whales. The guidelines are applicable to whales in Shark Bay but require modification for other mammal species.

STRATEGIES

Ongoing

1. **License acceptable commercial operations involved with wildlife interaction and determine appropriate conditions.**

2. **Permit access to seasonal wildlife events only where human presence will not threaten the natural activity.**

3. **Monitor public visitation and impacts of interaction on wildlife events (for example, turtle nesting) and take action where adverse impacts are occurring.**

4. **Allow commercial operators to carry out fish feeding activities subject to licence by CALM and approval of the Fisheries Department.**

Short Term

5. **Discourage fish feeding by visitors at popular visitor sites within the reserves.**

6. **Develop interaction guidelines for each species of interest in the marine reserves.**

7. **Provide legislative protection for species targeted for non-extractive activities.**

8. **Provide information to the public on opportunities and guidelines for wildlife interaction in the marine park.**

9. **Prohibit commercial dugong watching tours in the Gladstone Special Purpose Zone.**

5.6 SEASCAPE AND LANDSCAPE

The objective is to conserve the visual seascape and landscape values of the marine reserves.

The marine reserves' seascapes and abutting arid landscapes contribute to a significant visual resource. This feature of Shark Bay is recognised in the World Heritage listing, with "features of exceptional natural beauty..." forming part of the natural criteria (Section 1.2).

The extensive seagrass meadows, coral, sandflats, mangroves, limestone reefs, lagoons and channels contribute to the scenic value. The broad expanses of water are a striking contrast to the adjacent lands. The coastline and diversity of landscape features, such as the white beaches, red cliffs and low lying vegetation define the area's landscape. The relatively uninterrupted views should be preserved wherever possible.

Visual seascape and landscape management in the marine reserves involves maintaining, restoring or enhancing the aesthetic values, and planning and designing activities and developments to provide diverse aesthetic experiences in a natural setting.

Human-imposed changes to the seascape and landscape should not detract from the natural visual character where possible. Some developments will have some impacts on the natural visual character, however, every effort should be made to minimise these adverse impacts. Visual seascape and landscape management ranges from broad scale to site specific analysis, and includes sensitive planning, design and construction.

STRATEGIES

Ongoing

1. **Assess potential impacts of developments, uses and management on visual seascape and landscape values and minimise these impacts where appropriate.**

Medium Term

2. **Classify and evaluate the visual seascapes and landscapes of the marine reserves.**

5.7 ABORIGINAL CULTURAL HERITAGE

The objective is to protect Aboriginal cultural heritage and provide for continuing traditional use of the marine reserves where this is compatible with other objectives.

Aboriginal sites including open shell middens, quarries, rock shelters, artefact shelters, burials and stone arrangements have been recorded at Shark Bay. Most of these sites directly overlook the shoreline or are very close to it (Bowdler, 1990a; Bowdler and McGaun, in prep).

Material dated from sites on the Peron Peninsula indicates human occupation of the area from 30 000 to 18 000 years ago. Between 18 000 and 7 000 years ago there is no recorded evidence of occupation. From 6000-7000 BP there is evidence of occupation, with sites indicating a predominant seafood diet being dated to around 6 000 years ago. Evidence of the utilisation of dugongs and marine turtles occurs from about 1000 years ago (Bowdler, 1990b; Bowdler, 1995; Bowdler and McGaun, in prep).

All Aboriginal sites in Western Australia are protected under the Aboriginal Heritage Act 1972, administered by the Aboriginal Affairs Department.

Coastal use and development at Shark Bay has the potential to impact on Aboriginal sites close to the shoreline. Planning for access, facilities and other developments associated with the marine reserves must ensure that these sites are protected.

The current level of utilisation of marine resources by Aboriginal people in the marine reserves is difficult to accurately determine. Small numbers of dugongs and green turtles are hunted. Both these species are protected and the dugong is declared as a species in need of special protection under the Wildlife Conservation Act. The taking of these fauna by Aboriginal people is subject to an exemption provision in the Wildlife Conservation Act and the Land (Titles and Traditional Usage) Act 1993.

To ensure that hunting does not impact on the viability of populations, this activity needs to be monitored and controlled. Areas such as Gladstone, which is known to be an important breeding and nursery area for dugongs, must be protected. Close liaison with Aboriginal communities at Denham and Carnarvon is required to determine appropriate management.

The proximity of Aboriginal sites and use of marine resources by Aboriginal people provide interpretive and educational opportunities for visitors to the marine reserves. These opportunities should be developed in liaison with local Aboriginal communities.

STRATEGIES

Ongoing

1. **Liaise with the WA Museum and the Aboriginal Affairs Department regarding activities associated with the marine reserves which may impact on Aboriginal sites.**

2. **Monitor Aboriginal hunting activities in the marine reserves in liaison with local Aboriginal communities.**

Short Term

3. **Determine suitable management arrangements for Aboriginal hunting activities in the marine reserves in consultation with Aboriginal groups in Denham and Carnarvon. Appropriate areas and catch levels should be determined.**

Medium Term

4. **Develop interpretive and educational opportunities for visitors relating to Aboriginal cultural heritage in liaison with local Aboriginal communities.**

5.8 OTHER CULTURAL HERITAGE

The objective is to protect and encourage a greater understanding and appreciation of other cultural heritage in the marine reserves.

Shark Bay has a long history of visits by European explorers. Dirk Hartog landed at Cape Inscription in the Dutch trading ship Eendracht in 1616, recording his visit by nailing a pewter plate onto a post. He was probably the first European to visit Australia. Dutch navigator William de Vlamingh visited Cape Inscription in 1697, removing Hartog's pewter plate and replacing it with his own. Englishman William Dampier subsequently explored the area for seven days in August 1699, naming the area 'Sharks Bay'.

Frenchman François de St. Allouarn landed at Cape Inscription in 1772, claiming the area for France by burying two French coins and a parchment in a bottle. Baudin's French expedition in 1801 explored Shark Bay in the corvettes Geographe and Naturaliste, while De Freycinet visited Peron Peninsula in the Uranie in 1818. Many of Shark Bay's islands, bays and landmarks are named after the French who explored the area in the 1801 and 1818 expeditions.

Commercial pearl shell collection started in the 1850s. By the 1870s, many small pearling settlements were scattered along the shores of Shark Bay, and the first pastoralists had arrived in the area. Guano mining on Shark Bay's islands also took place around 1850. A major pearling settlement, known locally as Freshwater Camp, was established at Lagoon Point in the 1870's. In 1895 it was officially named as the townsite of Denham, after Captain Henry Mangles Denham, who had charted the waters of Shark Bay in 1858 in HMS Herald.

The pearling industry collapsed in the Depression and fishing became Shark Bay's main industry. A cannery and processing works were established at Monkey Mia in 1912 and also at Herald Bight in the 1930s. Fishing reached its peak in the 1960s when four fish processing plants were operating in the area.

Historical sites of significance include wreck sites and associated land camps, pearling camps, guano establishments, military camps and sites where early explorers came ashore.

There are two known wreck sites in the marine reserves - the Gudrun (1901) and the Kormoran lifeboat (1941). The Macquarie (1878), Paul Pry (1839), Perserverant (1841) and possibly the Prince Charlie (1850) were believed to have been wrecked in Shark Bay, however they have not yet been located (Figure 7). The management of all pre-1900 wrecks and associated land camps is the responsibility of the WA Museum under the Maritime Archaeology Act 1973. All artefacts associated with the wrecks and land camps are protected by this Act.

All other historical sites are not protected from disturbance or removal of artefacts unless these sites have been registered under the Heritage Act. Before a site may be registered it must be nominated to the Heritage Council and an assessment carried out in regard to its historical value. There is an urgent need for detailing and assessing sites of historical importance in Shark Bay. From this assessment suitable sites could be nominated, and if accepted, legislative protection could be provided for the sites under the Heritage Act.

The greatest potential for damage of these sites is from unmanaged access, disturbance or physical removal of items of historical importance. It is vital that CALM liaise with the WA Maritime Museum and the Heritage Council in the planning and development of access and facilities on the coast. Information produced for the marine reserves should incorporate information on cultural heritage and its protection.

STRATEGIES

Ongoing

1. **Liaise with the WA Maritime Museum and the Heritage Council over marine and associated coastal activities which could impact on cultural heritage sites.**

Short Term

2. **Provide interpretive and educational materials and opportunities for visitors to appreciate the maritime cultural history in liaison with the WA Maritime Museum.**

Medium Term

3. **Encourage the identification and protection of sites in or adjacent to the marine reserves.**

5.9 MARINE POLLUTION

The objective is to control and monitor the input of pollutants to the marine reserves.

Shark Bay is a semi-enclosed embayment. The nature of the bay, combined with a low flushing rate, could result in pollutants being slow to dissipate and increase the impacts on the marine environment. Species such as seagrass are vulnerable to changes in water quality.

The impact of foreign ballast discharge on the marine environment is currently of great concern throughout the world. Ballast water taken on by ships in foreign ports can incorporate foreign organisms such as toxic dinoflagellates, molluscs, worms, fish and algae. On entering ports of destination, ballast off loaded from the ships can release these foreign organisms into the surrounding waters. If these foreign organisms are able to survive they may have catastrophic consequences on the marine environment. The impacts may range from algal blooms to predation or parasitic influences on shellfish.

At Shark Bay, the importation of foreign organisms could potentially impact on the important scallop and prawn fisheries or result in major environmental problems due to population explosions of exotic species. The limited flushing of the bays and inlets could increase this risk.

Ballast water discharge is managed by the Australian Quarantine and Inspection Service (AQIS). No legislation or regulations control ballast discharge, however voluntary guidelines have been introduced to encourage practices which would minimise the risks of introducing exotic organisms. The extent to which the shipping industry complies with these guidelines is unknown. In the marine reserves the major shipping activities that occur relate to the servicing of the Useless Loop Salt operation. Approximately 35 ships visit the port annually and discharge ballast at the Useless Loop jetty. Approximately 70% of these vessels originate from Japan with the remaining 30% coming from Korea, Thailand and Indonesia.

The AQIS guidelines recommend a range of measures, one of which is exchange of ballast en route in a different climatic zone, therefore minimising the foreign water being discharged at Useless Loop. This practice should be encouraged and the level of compliance monitored by AQIS in liaison with Shark Bay Salt and the Department of Transport. Research into the contents of ballast water unloaded at Useless Loop is also required to ascertain if organisms are being released, and if so, whether they are surviving. This research and monitoring would assist in identifying the risk, if any, to the Shark Bay marine environment.

Considerable boat traffic occurs within the marine park and some boating occurs within the marine nature reserve. Potential hazards associated with boating include fuel and oil spills and litter, especially plastics and fishing line. Disposal of fish waste within the marine park at specific locations, such as Monkey Mia, could cause localised pollution and attract problem non-residential species.

Activities adjacent to the marine reserves have the capacity to pollute them. This includes activities and developments which occur within the waters adjacent to Nanga, Denham and Useless Loop which are excluded from the marine park. Sources may include urban, industrial and agricultural run-off, contaminated groundwater, antifouling products and bitterns (a byproduct of salt production). The discharge of bitterns from the Shark Bay Salt operation has not occurred since 1987, however the company has approval to do so in accordance with the Environmental Management Program (EMP) approved for the operation. The EMP provides for monitoring of salinity and other parameters, with the data being reported to the State in annual and triennial environmental reports.

The release of sewage into marine waters, either directly or indirectly, is of particular concern as this can have adverse impacts on flora and fauna. Excessive algal growth resulting from an increase in nutrients can impede light penetration and retard the growth of seagrasses. Other effects are possible, including health risks resulting from the presence of faecal bacteria. At popular anchorages such as Monkey Mia the discharge of sewage is not acceptable and alternatives should be investigated.

Potential contaminants in waters adjoining the Monkey Mia Reserve include leachate from sewage systems, harmful chemicals, fertilisers and hydrocarbons. It is important that activities and developments at the reserve are managed to minimise any adverse impacts on water quality. Water quality monitoring should continue, with the aim of maintaining the health of the public, the dolphins and the ecosystem in general (CALM and the Shire of Shark Bay, 1993).

Guidelines and regulations are required to minimise pollution of the marine reserves. The discharge of wastes or chemicals directly into the marine reserves or from adjacent land or waters requires appropriate regulation. Bulk carrier traffic through the marine park requires monitoring and regulation. In regard to oil spills the Environmental Protection Authority affords the highest protection and sensitivity to marine parks and marine nature reserves (EPA, 1993). A statewide oil spill plan exists which broadly covers Shark Bay, however a plan specifically for the area should be prepared detailing how an incident would be handled to minimise impacts of such an event on the marine environment. This would specify facilities and resources available (eg. Shark Bay Salt, CALM, DOT), values at risk and strategies to be employed.

Under the Shark Bay Solar Salt Industry Agreement Act, Shark Bay Salt has an obligation to maintain the Denham channel and access to the wharf at Useless Loop. Proposals for dredging of these areas should consider the potential impacts of the operation and aim to minimise these impacts. This should be done in liaison with the DEP and CALM. There will be a need to define a suitable site for placement of dredge spoil. Shark Bay Salt should liaise with the DEP and CALM well in advance of any dredging operations to define a suitable spoil area.

STRATEGIES

Ongoing

1. **Continue to liaise with the DEP on marine pollution management. Ensure that new proposals to discharge toxic or hazardous substances are referred to the DEP.**

2. **Liaise with the DEP and Shark Bay Salt to ensure that dredging operations, including dredge spoil disposal in the marine park, are managed to minimise adverse impacts on the marine park.**

Short Term

3. **Conduct testing of specific sites to determine the presence of foreign organisms as a result of bilge and ballast discharge.**

4. **Liaise with the DEP, the Department of Transport, the Fisheries Department and AQIS to ensure there is adequate monitoring of compliance with guidelines for ballast and bilge discharge.**

5. **Develop and implement a long term water quality monitoring program with a focus on waters, including groundwater, adjacent to potential pollution sources.**

6. **Prepare a contingency plan for emergency pollution and oil spill situations.**

7. **Inform visitors and local residents of guidelines and regulations concerning marine pollution, including disposal of bilge, waste water, fish waste and litter and the implications of such pollution of the marine environment.**

8. **Liaise with the Department of Transport to ensure the careful use of antifouling products.**

9. **Require sullage tanks on all new or replacement commercial tourism concession vessels and encourage existing operators to fulfil this requirement.**

10. **Develop and implement regulations to prevent discharge of bilge and sullage in Sanctuary, Recreation and Special Purpose Zones.**

11. **Encourage local authorities to provide facilities for the removal and treatment of sullage from vessels at major ports and anchorages.**

12. **Encourage relevant authorities to ensure that coastal developments do not result in the release of effluent or pollution into the marine reserves.**

13. **Establish and maintain an inventory of significant sources of direct and indirect discharges into the marine reserves and monitor water quality at key locations, eg. Monkey Mia.**

14. **Liaise with relevant authorities to minimise the impacts of discharges into the marine reserves.**

15. **Encourage the provision of shore-based fish waste disposal systems for recreational and commercial fishers.**

5.10 AIRCRAFT

The objective is to minimise conflict with users of the marine reserves and reduce impact on wildlife while recognising the operational requirements of aircraft operators.

There is potential for an increase in scenic flights over the marine reserves due to increased visitation, spectacular views available from the air and the remoteness of many of the scenic attractions. Scenic flights will be popular and helicopters and seaplanes may be used. There will also be demand for helicopters and aircraft to land on the coast at suitable sites and seaplanes may wish to land within the marine reserves. Use of areas for landing aircraft will need to be monitored for potential impacts on the marine reserves, other users and safety considerations.

CALM has no legislative control of aircraft over marine reserves or national parks, however the Civil Aviation Authority (CAA) can set minimum operating heights in specific areas if considered necessary. If areas of concern are identified, CALM will liaise with the CAA to determine the most appropriate course of action to minimise impacts. Whale watching guidelines developed by the Australian Nature Conservation Agency state that aircraft, including helicopters, should not be operated less than 300 metres (1000 ft) above or near a whale. These guidelines are also relevant to dugongs and dolphins. The use of helicopters should be avoided or minimised as they can cause considerable distress to whales because of the loud noise and down draft. In addition there may be popular visitor sites where height restrictions may be necessary to protect the visitors' experience, eg. Monkey Mia.

STRATEGIES

Ongoing

1. **Liaise with the Civil Aviation Authority and the Royal Australian Air Force to avoid, wherever possible, disturbance to wildlife and users of the marine reserves as a result of aircraft use.**

Short Term

2. **Identify areas within the marine reserves where low flying may impact on wildlife or the visitor experience.**

6.0 RECREATION, TOURISM AND VISITOR USE

6.1 RECREATION, TOURISM AND VISITOR USE

The objective is to facilitate recreation and tourism in the marine reserves consistent with maintaining environmental and social values.

The marine environment is the major focus of tourism in Shark Bay. Most major attractions are adjacent to the marine reserves and management of the marine reserves is directly linked with tourism growth in Shark Bay. Tourism is therefore dependent on ensuring that these attractions and features are maintained or improved. To achieve this it is necessary to provide facilities, services and opportunities for tourism and recreation and to manage access, visitor numbers, activities and visitor behaviour to minimise impacts on the marine environment.

Management of the marine reserves' extensive coastline is a mix of responsibilities between CALM, the Shires, the Department of Land Administration and pastoralists. It is necessary that a cooperative approach be taken to the broad management of tourism and recreation use. Local authorities and pastoralists are both key players in managing coastal use and it is important that there is close cooperation between CALM, as managers of the marine reserves, and these groups (see Section 8.0). Other groups such as professional fishers, commercial concession operators, volunteers and local communities can assist in managing visitor use through encouraging appropriate behaviour and reporting information to CALM and the Fisheries Department.

When marketing and promotion of a park's attractions precede the provision of facilities, increased visitation can cause significant demand pressures on the park and its facilities. It is important that a balance is achieved between visitor numbers and facilities provided so that recreation opportunities are quality experiences. Resources for provision of facilities will be sought prior to marketing and promotion to address this issue where possible.

The Recreation, Tourism and Visitor Use section looks at the major recreational activities, ie. fishing, diving and other water sports, and addresses management of commercial tourism concessions.

CALM's policy is to provide a broad spectrum of recreation opportunities which do not jeopardise the reserves' ecological values or the experience of visitors, and provide opportunities for nature based tourism which can lead to an understanding of conservation values and also secure resources for management. Not all activities can be provided for in the same area as they may not be compatible. Zoning is the major management tool in resolving these conflicts (see Section 4.0).

STRATEGIES

Ongoing

1. **Ensure that recreation developments and activities do not detract from or adversely impact on the conservation values of the reserves.**

2. **Maintain close liaison with pastoralists, Shires and other relevant land managers in regard to planning for and managing coastal access and recreational activities.**

3. **Monitor marketing and promotion of the marine reserves and liaise with relevant agencies (eg. WA Tourism Commission) to ensure it is accurate and consistent with management directions.**

Short Term

4. **Seek resources to provide facilities commensurate with the demands placed on the reserves.**

5. **Provide for a broad spectrum of recreational activities in the marine reserves.**

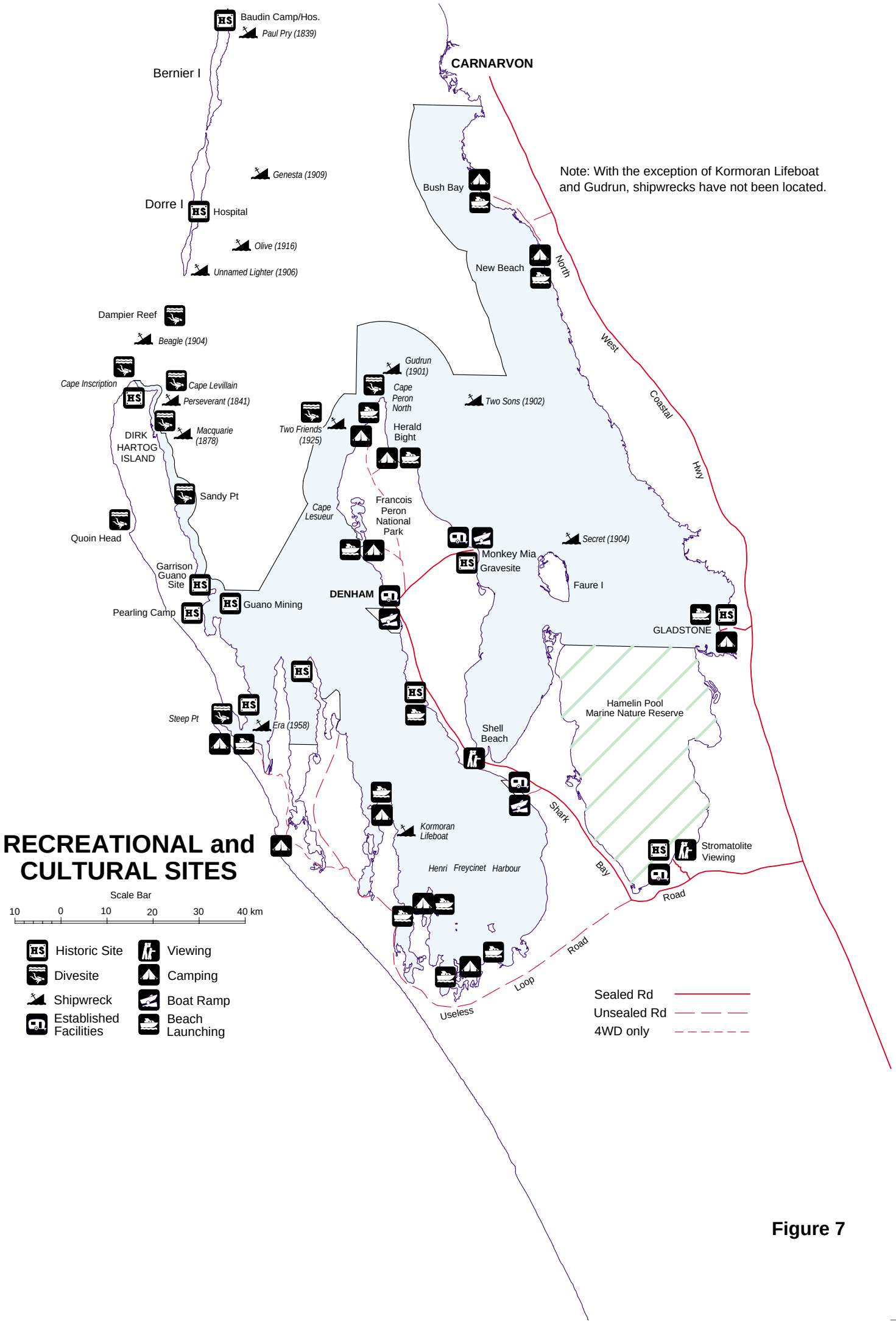
Baudin Camp/Hos.
Paul Pry (1839)
Bernier I
Genesta (1909)
Dorre I
Hospital
Olive (1916)
Unnamed Lighter (1906)
CARNARVON
Bush Bay
New Beach
North West Coastal Hwy
Note: With the exception of Kormoran Lifeboat and Gudrun, shipwrecks have not been located.
Dampier Reef
Beagle (1904)
Cape Inscription
Cape Levillain
Perseverant (1841)
DIRK HARTOG ISLAND
Macquarie (1878)
Sandy Pt
Quoin Head
Gudrun (1901)
Cape Peron North
Two Sons (1902)
Two Friends (1925)
Herald Bight
Cape Lesueur
Francois Peron National Park
Secret (1904)
Monkey Mia
Gravesite
Faure I
Garrison Guano Site
Guano Mining
DENHAM
Pearling Camp
GLADSTONE
Steep Pt
Era (1958)
Shell Beach
Hamelin Pool Marine Nature Reserve
Shark Bay Road
Kormoran Lifeboat
Henri Freycinet Harbour
Stromatolite Viewing
Useless Loop Road
RECREATIONAL and CULTURAL SITES
Scale Bar
10 0 10 20 30 40 km
Historic Site
Divesite
Shipwreck
Established Facilities
Viewing
Camping
Boat Ramp
Beach Launching
Sealed Rd
Unsealed Rd
4WD only

Figure 7

6.2 COMMERCIAL CONCESSIONS

The objective is to facilitate commercial concessions which are compatible with the marine reserves' values.

The increasing popularity of Shark Bay as a tourist destination presents opportunities for a significant expansion of visitor services. While it is established that most of the approximately 100 000 visitors to Shark Bay per year go to view dolphins at Monkey Mia, if further attractions were marketed and made accessible to visitors, people will stay longer in the region and thus gain a better understanding of the unique Shark Bay environment. A greater economic benefit would also flow to the community.

A commercial concession is a right granted by way of licence for occupation or use of part of an area of land or water managed by CALM. Each proposal for a concession by way of licence will require approval of the NPNCA and the Minister. It is necessary for the concession to conform to the management plan for the marine reserves. It is desirable that licensed ventures including commercial tour and hire services enhance public enjoyment and understanding of the environment. Commercial operators will be subject to licence conditions to ensure that the natural environment is not adversely impacted by the operation.

Concessions will be allowed where they are consistent with the purposes of the reserves, the zoning plan, and the maintenance of the reserves' values so that visitors can use the reserves and enjoy them in safety. Concessions can provide employment and other valuable inputs into the local economy. The input is even more valuable if concessions are a year round operation and not just there for the tourist season.

All concession rights will be subject to conditions which may include specification of the requirements and standards of services and goods to be provided, for example aesthetic standards, safety standards, hours of operation, and restrictions on litter-generating products. Concession rights will be monitored. Failure of concession holders to comply with conditions may result in penalties or cancellation of the concession.

Fees charged for concessions will be set and adjusted from time to time. Fees will be utilised to recoup management costs incurred by the Department. Lower fees may be charged where the Department is materially assisted by the concession holder, for example by educational benefits, or by amenities provided for public use as a by-product of the concession.

The quality of the information provided by operators is important in achieving customer satisfaction and informs visitors on the values of the marine environment. Tourism operators can be an important medium in disseminating information and educating visitors on appropriate behaviour. Training is crucial for the fulfilment of this potential and although training is the operator's responsibility, CALM can provide assistance in this regard to help maintain a high standard of operation which will ultimately improve the tourism industry. There are also advantages in maintaining close liaison over the production of promotion materials. It is important these are accurate, do not create false expectations and do not encourage behaviour which could result in adverse impacts on the marine reserves.

Use of the marine reserves for filming or product promotion will be permitted where these activities are compatible with maintenance or the reserves' values. If in the course of these activities CALM staff or equipment are required, a fee may be levied to cover the costs.

STRATEGIES

Ongoing

1. **License commercial operations where they are compatible with this management plan and the proper maintenance of the reserves' values.**

2. **Permit filming for commercial purposes where this is compatible with management of the marine reserves. Fees will be levied where this involves CALM staff or equipment.**

3. **Liaise with relevant agencies and operators to ensure that promotional material is accurate and that it does not create environmental or management problems as a result of the information supplied.**

4. **Develop licence conditions in liaison with relevant authorities.**

5. **Maintain liaison with the Monkey Mia Management Committee for commercial operations which occur on both the marine park and the Monkey Mia Reserve.**

Short Term

6. **Provide training and information to operators to enhance the quality of nature-based tourism concessions.**

6.3 CHARTER BOATS

The objective is to provide for a broad spectrum of recreational charter opportunities while maintaining the marine reserves' conservation values.

Commercial charter operations are vessels which are chartered by recreational users in the marine reserves. Charter boats take paying passengers for a variety of recreational activities including line fishing, spearfishing, snorkelling, diving, sightseeing, wildlife interaction (eg. whale watching) or a combination of these activities. Charter boats provide access to a variety of activities which the non-boating public would not normally be able to participate in. They are also an important avenue to provide information to visitors on the values and wise use of the reserves.

All vessels are required to hold a Special Passenger Vessel (SPV) survey from the Department of Transport. Some charter boats also hold a Western Australian Licensed Fishing Boat (LFB) Licence from the Fisheries Department. Charter vessels operating in the Shark Bay Marine Park and the Hamelin Pool Marine Nature Reserve are required under the CALM Act to obtain a Commercial Operators Licence for all commercial activities except for fishing subject to the provisions of the Fish Resources Management Act. Conditions may be placed on the licence.

Popular locations often include coral communities where damage from anchors can severely impact on these fragile benthic communities. Moorings within the marine reserves have been established by charter operators in strategic locations around Dirk Hartog Island. Anchors can also be destructive to seagrass communities. It would be beneficial to install additional moorings at popular destinations to prevent this damage, however a priority should be to promote appropriate anchoring techniques through information and education.

There is a need for regulation of the industry to ensure the resources are protected from overexploitation and other environmental impacts. It is desirable that high standards on charter vessels are maintained to ensure visitors have a quality experience, gain an appreciation of values of the area and ensure their activities do not adversely impact on the area. Charter operations can be split into three major groups - fishing, diving and scenic charters.

Fishing charters involve line fishing and to a lesser extent spear fishing. Large fish species such as mackerel, baldchin groper and snapper are mainly targeted. The majority of areas fished are located in the World Heritage Area outside the marine reserves in the offshore areas between False Entrance and Cape Ronsard at Bernier Island. Some areas within the marine park are occasionally utilised for line fishing on charter, including the deeper waters near Denham, Monkey Mia, Steep Point, Turtle Bay and other areas adjacent to the eastern side of Dirk Hartog Island.

There is potential for increased charter fishing effort to result in a reduction of fish stocks. Research in other parts of the world has shown that charter fishing can become the dominating influence on fish stocks. There is particular concern from charter operators that the sheltered waters of the marine park such as the eastern side of Dirk Hartog Island are being overfished. It has been suggested that no charter fishing should occur within the marine reserves to protect these areas. CALM will rely on the advice of the Fisheries Department to determine what level of charter fishing can be permitted whilst maintaining fish stocks. Restrictions on recreational fishing apply to persons on a fishing charter. ~~The Fisheries Department has changed regulations covering recreational fishing in the marine reserves (see Appendix 1); these will apply to charter fishing operations~~.

Diving charters can be categorised into two groups, non-extractive diving (being the majority) and underwater fishing. Spearfishing charters are covered in the previous paragraph. The marine reserves provide a large variety of diving opportunities (Section 6.6), however many of the most attractive sites are inaccessible to the general public. Charter boats offer access to these areas providing safe opportunities to view the best dive sites. Diving operations can have significant impacts as has been documented in high visitation sites elsewhere in the world. Direct impacts through collection of marine life, physical damage to coral from divers and anchor damage need to be controlled. Indirect impacts, such as those resulting from effluent disposal, are more difficult to monitor but can have significant long term effects on the marine environment. Responsible operators can also minimise impacts of visitor use by controlling the activities of the passengers.

Scenic charter tours are becoming increasingly popular in Shark Bay as they provide access to the most visually attractive sites which are not accessible to the majority of visitors. Areas such as Steep Point, South Passage, Dirk Hartog Island, and the various peninsulas, prongs and islands in the marine reserves are not accessible to the normal visitor without a boat and/or four wheel drive. Charter boats also provide opportunities for visitors to view marine wildlife such as sharks, rays, turtles, dugongs, dolphins and whales. Charters with this emphasis should be encouraged in the marine reserves as they have minimal impact on the marine environment if conducted responsibly.

It is important that a common code of ethics be developed for charter operations to ensure that operations take place with minimal impact on the conservation values of the marine reserves. It is also important that the information provided to passengers is factual, informative, related to the natural features and values, and encourages appropriate behaviour.

STRATEGIES

Ongoing

1. **License charter operations which are compatible with the maintenance of the reserves' values in accordance with the CALM Act.**

2. **The Fisheries Department will determine the number of fishing charter boats that can operate in the marine reserves and conditions related to fishing which will ensure the maintenance of fish stocks.**

3. **Encourage activities that protect and promote the values of the marine reserves and which minimise impacts on other users.**

4. **Determine appropriate licence conditions for charter operators to ensure public safety and education, the protection of conservation values and the maintenance of fish stocks.**

5. **Liaise with charter operators in the development of strategies relating to charter operations.**

6. **Encourage operators to maintain high standards of operation particularly in relation to the information provided to visitors.**

7. **Permit acceptable concessions in all zones, with the most stringent assessment and environmental requirements for Sanctuary zones.**

8. **Monitor charter operations and impose limits on the number of vessels where necessary to minimise environmental damage and impacts on other users.**

Short Term

9. **Provide information and training for charter boat operators relevant to the protection of the marine reserves' values.**

10. **Record and monitor charter boat monthly catch and effort details, places visited and numbers of passengers taken.**

11. **Prohibit spearfishing from charter boats.**

12. **Ensure the mooring strategy (see Section 9.3) considers the current and future needs of charter vessels, other boat users and the marine environment.**

6.4 RECREATIONAL FISHING

The objective is to manage recreational fishing on a sustainable basis.

Western Australia's recreational fisheries represent a major community asset. In regional centres such as Denham and Carnarvon, recreational fisheries are significant contributors to the local economy and a major attraction for visitors.

Shark Bay is considered one of the most popular recreational fishing locations in the State and line fishing is the most popular water-based recreational activity (CALM and Fisheries Department, 1994).

The enclosed waters of the marine park are very accessible and experience considerable fishing pressure. Popular areas include South Passage, Dirk Hartog Island, Freycinet Harbour, Peron Peninsula, Gladstone and isolated coral patches such as Bar Flats. The greatest fishing effort occurs between the months of April and August when the weather is generally mild and both resident and migratory fish species are present in abundance. Fishing is not permitted in the Hamelin Pool Marine Nature Reserve.

Recreational fisheries impact on a comparitively small number of mollusc, crustacean and finfish families. Both pelagic and reef-dwelling species are taken by fishers in the marine park and there is anecdotal evidence to suggest that some predatory reef-dwelling fish - in particular cods - are highly vulnerable to fishing pressure.

Management of recreational fishing needs to consider both the conservation and sustainability of fish resources and habitats, and issues relating to the quality and diversity of recreational fishing experiences, community stewardship of the resource, value to the community, equity between users, and where appropriate, allocation of fish resources between user groups to optimise community benefits.

Recreational fisheries within the marine park will continue to be managed by the Fisheries Department in consultation with the Recreational Fishing Advisory Committee (RFAC) and the community. Two Fisheries Officers are currently based at Denham, three are based at Carnaron and one Honorary Fisheries Officer is based on Carrarang Station near Steep Point. Vast distances of land and sea make enforcement and direct-contact education programs difficult and costly.

The original draft management proposals for fish resources in the Shark Bay World Heritage Property (Fisheries Department, 1994) contained recommendations relating to recreational fishing controls, including new bag, size and possession limits specific to the area. While these had local support, further consideration of the proposals is required to ensure consistency in the context of a statewide framework.

Consequently, the Minister for Fisheries decided that most of the specific recreational fishing management controls proposed in the draft management plan for fish resources would not be implemented during 1996/97. The Minister has emphasised that any shift in resource allocation will need to take into account the needs of all user groups and issues relating to equity.

Visitor and recreational fishing catch surveys will be conducted in Shark Bay by the Fisheries Department during 1996 and 1997 to provide a foundation for the future management of recreational fishing in the area. Revised porposals for recreational fishing in the Shark Bay World Heritage Property, which includes the marine park, will be prepared by the Fisheries Department.

Line Fishing

Line fishing is the most popular form of recreational fishing in the marine park. Fishers using boats generally target reef species such as cod, coral trout, emperors, pink snapper, sharks and pelagic species such as spanish and shark mackerel. Anglers fishing from cliffs mainly target pelagic species whereas beach fishers target inshore species such as whiting, juvenile tailor, mulloway and cod.

Pink snapper is a prized recreational fishing species and occurs in great abundance in the waters of Shark Bay. Growing pressure by recreational line fishers on snapper and other fish stocks at Shark Bay represents a significant risk to the continued quality of fishing in the area, and may represent a risk to the sustainability of snapper stock.

The Fisheries Department, in consultation with RFAC and the community will develop appropriate strategies for the sustainable management of recreational line fishing within the marine park.

Recreational line fishing will be permitted in all areas of the marine park except Sanctuary Zones and the Dolphin Interaction Area at Monkey Mia.

Netting

Recreational netting occurs througout the coastal areas of Shark Bay (figure 8) predominantly during the tourist season from April to September. Three recreational netting methods (set, haul and throw) are permitted. A Fisheries Department licence is required to use a net, and fishers must comply with regulations.

A statewide review of recreational net fishing has been finalised by the Fisheries Department in consultation with the public. One result of this review is the prohibition of unattended recreational gill netting throughout Western Australia. Further controls may also be needed.

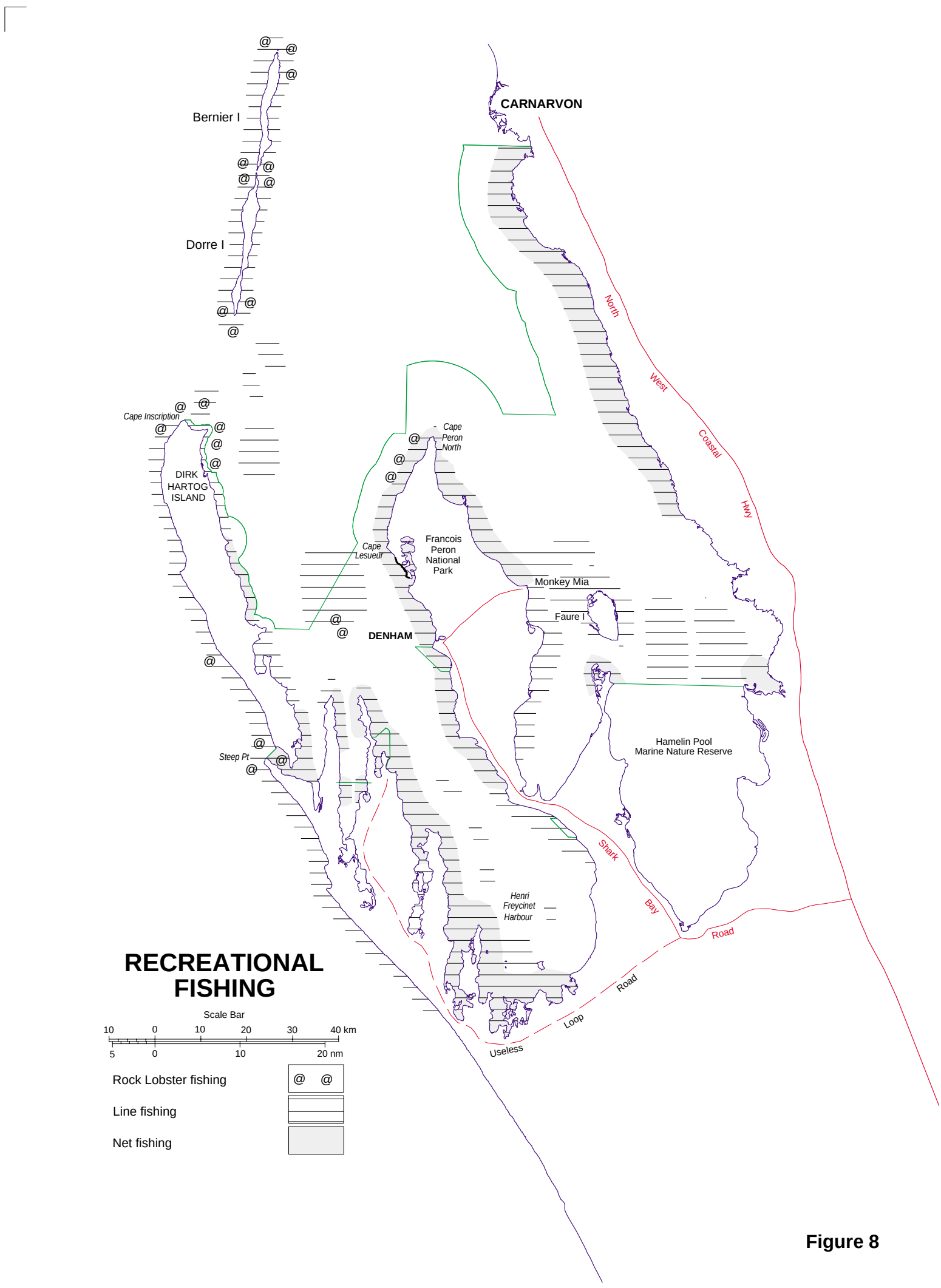
Bernier I
Dorre I
CARNARVON
North West Coastal Hwy
Cape Inscription
DIRK HARTOG ISLAND
Cape Peron North
Cape Lesueur
Francois Peron National Park
Monkey Mia
Faure I
DENHAM
Steep Pt
Hamelin Pool Marine Nature Reserve
Shark Bay Road
Henri Freycinet Harbour
Useless Loop Road
RECREATIONAL FISHING
Scale Bar
10 0 10 20 30 40 km
5 0 10 20 nm
Rock Lobster fishing
Line fishing
Net fishing

Figure 8

Netting will be permitted in all areas of the marine park except Sanctuary and Recreation Zones and the Big Lagoon, Boorabuggatta and Cape Peron Special Purpose Zones. The Gladstone Special Purpose Zone will be subject to seasonal recreational netting closures (see section 4.0).

Underwater Fishing

Underwater fishing usually involves the use of a gidgee or speargun, either by snorkel or compressed air, to catch fish. Most spearfishers are selective in terms of finfish species and the size of their targets, however the use of compressed air significantly increases the efficiency and range of fishing effort compared to spearfishing without compressed air. Research in Queensland has shown that spearfishing on compressed air can significantly reduce populations of resident reef fish species, such as coral trout, cod and groper and represents a significant risk to the sustainability of these predatory fish.

Consequently spearfishing on compressed air will not be permitted in the marine park, as reflected in CALM and NPNCA policies.

Spearfishing without compressed air will be permitted in the General Use Zones and in the Gladstone, Wooramel and Freycinet Special Purpose Zones.

Rock Lobster Fishing

Stocks of rock lobsters are not abundant in the marine park and are considered to be particularly vulnerable to divers. Most recreational rock lobster fishing in the marine park occurs within South Passage and adjacent to Dirk Hartog Island (figure 8).

Most rock lobsters are taken by divers using compressed air breathing apparatus. Regulations state that lobsters may only be taken by hand or with a non-piercing implement. A licence is required to take rock lobsters and State fishing regulations apply in the marine park.

Recreational rock lobster fishing will be permitted in all areas of the marine park except Sanctuary Zones and the Dolphin Interaction Area at Monkey Mia.

Crabbing

Recreational crabbing occurs in waters adjacent to Peron Peninsula. No recreational fishing licence is required to take crabs, however fisheries regulations define the gear that may be used and daily bag and size limits.

Compliance with regulations is high and recreational crabbing will be permitted in all areas of the marine park except Sanctuary and Recreation Zones.

Collection of shellfish such as pipis, clams and oysters is addressed in Section 6.5. The zoning plan in Section 4.0 outlines controls on certain recreational fishing activities.

STRATEGIES

Ongoing

1. Permit recreational fishing in the General Use Zone and compatible recreational fishing activities in Recreation and Special Purpose Zones. Recreational fishing will not be permitted in the marine nature reserve, Sanctuary Zones or in the Dolphin Interaction Area at Monkey Mia (see Section 4.2.2).

2. The Fisheries Department will manage recreational fishing in the marine park on a sustainable basis.

Short Term

3. The Fisheries Department will review the management requirements for recreational fisheries in the area and develop a recreational fisheries management program which takes into account other values of the marine park.

4. The Fisheries Department, in conjunction with CALM, will implement education and interpretation programs to increase public understanding of recreational fishing regulations and awareness of related conservation values.

5. The Fisheries Department will design and implement monitoring programs to assist in management of recreational fishing and review of the zoning plan.

6.5 COLLECTING

The objective is to protect the conservation values of the reserves through the management and control of collecting activities.

Recreational collecting comprises collection for private purposes and collection for research, study or reference purposes.

Collection for private purposes may include collection for consumption (eg. abalone), bait (eg. pipis), private aquariums (fish, invertebrates etc.), garden fertiliser (seagrass) or for private collections (eg. shells). These activities have a direct impact on the marine reserves.

Collection for research, study or reference purposes also results in removal of marine biota, however this has the potential to result in benefits through the generation of useful biological or ecological information or through providing a medium to educate and inform the public about the marine environment.

Collection may result in direct impacts on species abundance and distribution. Whilst collection of some species may be sustainable, there are certain species which may be geographically restricted or rare which would be vulnerable to collection. Collection may also result in a species being denuded in frequently visited sites, therefore affecting its distribution. Collection activities may also result in habitat degradation through use of unacceptable methods or through physical removal of biota or substrate which are important components of the marine environment.

Indirect impacts may also occur as a result of removal of species. These may include problems created through shifting the ecological balance. An example of this may be removing a food source or a predator in a particular marine community. The diversity of species is also important in providing attractions for people involved in diving, beach and reef walking activities. Collection may therefore affect the quality of experience by users.

For these reasons it is important that collection activities for private purposes are restricted to species which can be harvested at a sustainable level and with minimal impact on habitats or on other species. For each of these species appropriate size and bag limits and collection methods need to be determined to ensure collection is sustainable. Current State limits may be too generous and should be reviewed for the marine reserves.

Action to protect species from collecting, or to regulate and manage collecting where it is permitted, will be taken under the CALM, Wildlife Conservation or Fish Resources Management Acts as appropriate, depending on the nature of the collecting activity.

Species which are determined as being suitable for collection for private purposes will be managed under the Fish Resources Management Act. All other species will be protected from collecting under the Wildlife Conservation Act. No collection for private purposes will be permitted in Sanctuary Zones or in the marine nature reserve.

Applications for collection of protected species for study, research or reference purposes will be reviewed by CALM and if considered acceptable a permit may be issued with relevant conditions.

STRATEGIES

Short Term

1. **Prohibit the collection of all species for private purposes in Sanctuary Zones and in the marine nature reserve.**

2. **Determine species which will be protected from collection and provide the necessary legislation to achieve this.**

3. **The Fisheries Department, in liaison with CALM, to determine acceptable bag and size limits, and collection methods for species which will be able to be collected for private purposes.**

4. **Allow collection of biota for research, study and reference purposes by permit only and subject to conditions (see Section 11.0).**

Medium Term

5. **Design and implement a monitoring program to determine the effects of collecting on the marine environment. This should examine the impacts on species abundance and diversity and indirect impacts on the marine environment.**

6.6 DIVING

The objective is to provide for diving activities which do not adversely affect the marine reserves' values.

The marine reserves offer a large variety of diving opportunities, including a wide diversity of marine habitats and features (Figure 7). A number of suitable areas in shallow and sheltered locations are safe for novice compressed air divers and snorkellers. Diving activities help promote public awareness and understanding of marine environments and generally have minimal impact on the marine environment. They will be encouraged in the reserves where this use will maintain these environmental values.

Coral communities are generally remote from population centres and camping areas, however areas that are most suitable for diving are also favoured for recreational fishing. Sanctuary Zones (Section 4.0) will provide diving opportunities free from fishing. These areas will minimise potential conflict with fishers and will maintain and possibly increase fish species diversity and abundance. Sanctuary Zones which would provide for these diving opportunities include the Gudrun Wreck, Mary Anne Island, Sandy Point and Surf Point Sanctuary Zones. The experiences can also be greatly enhanced if the diver has an understanding of the ecosystem through the provision of information and interpretation facilities.

The main safety issues relating to diving activities are the presence of strong currents and potentially dangerous marine animals such as sharks, seasnakes and stone fish. Visitors to the marine park should be aware of these hazards in the park and take appropriate precautions.

The continued use of a particular site can have adverse impacts. Anchoring for example has the potential to damage coral. To minimise disturbance to sensitive habitats, information needs to be provided on safe and environmentally acceptable anchoring procedures and location of areas suitable for anchoring. If popular anchoring areas are being disturbed, the use of moorings may need to be investigated.

STRATEGIES

Short Term

1. **Provide information on marine natural history and opportunities for diving in the marine reserves.**

2. **Encourage visitors to obtain information on potential hazards in the reserves and take appropriate precautions. Information will be available at the CALM District Office.**

3. **Liaise with the State Emergency Service and Police to establish procedures for the treatment of diving accidents within the reserves in accordance with approved practices.**

4. **Investigate establishment of interpretive dive trails in the reserves.**

5. **Monitor popular dive sites and take action as necessary to protect areas being damaged as a result of diving activities.**

6.7 BOATING AND SURFACE WATER SPORTS

The objective is to provide for recreational boating and surface water sports in the marine reserves while minimising adverse effects on conservation values and conflicts between users.

Recreational boating refers to dinghies, sailing vessels and vessels associated with surface water sports, ie. jet skis, power boats. The Department of Transport is responsible for all regulations pertaining to boating including safety, speed, anchoring and moorings.

Management of recreational boating must consider the following:

(a) safety for boat users;
(b) the safety and disturbance of other recreational users;
(c) possible disturbance of important or threatened species or their habitats;
(d) possible conflicts with commercial fishing and tourism operations.

Potential impacts from recreational boating activities in the marine reserves include disturbance to wildlife, such as dugongs and dolphins, resulting from noise and collisions. Inexperience or irresponsible boat use can also cause physical damage to seagrass and coral communities.

Various areas within and adjacent to the marine reserves are suitable for windsurfing, sailing, water skiing, jet skis and paddle boats. Where conflicts arise between surface water sports, boating and other activities, rationalisation will be required with certain uses to take precedence over others. To avoid potential conflicts, options such as speed and area restrictions should be investigated in consultation with the Department of Transport. Monkey Mia, Little Lagoon and Gladstone are considered in this section.

Monkey Mia's sheltered waters provide great potential for surface water sports. Surface water sports include skiing, jet skis, windsurfers and surfcats or similar sailcraft. The potential impact on the marine environment and compatibility with other users varies greatly. Motorised water sports have potential to disturb and possibly injure dolphins and dugongs as well as damage seagrass in shallow waters. This, combined with the noise, disturbance and potential

congestion that these activities create, make them incompatible with marine mammal protection and other recreational uses of the area. In terms of impact, sailcraft have much less effect. Some concerns have been raised regarding the threat of collision with a dugong or dolphin given the high speeds that can be reached, however to date there have been no recorded collisions. The enforcement of speed limits around Monkey Mia should avoid this possibility.

An enlarged dolphin interaction area has been defined at Monkey Mia, from the end of the jetty west for 150 m to a point 40 m offshore from high water mark, to allow the dolphins to be able to enter the shallows free from potential harm or distress. All boating will be prohibited in this area by means of a closed waters notice under Department of Transport legislation and swimming will only be permitted in the western half.

The Department of Transport gazetted Little Lagoon as a water ski area in October 1991, following a request by the Shire of Shark Bay Council. The Council subsequently withdrew support for the activity in 1993 and the Department of Transport degazetted the area. The Fisheries Department has concerns that motorised water sports could disturb fish breeding and nursery habitats in the Lagoon, although there is no evidence to suggest this is the case. Motorised watersports also have the potential to conflict with passive use of the Lagoon, ie. swimming, windsurfing and picnicking. Given the above, use of motorised watercraft is not considered compatible with Little Lagoon and will be prohibited.

The Gladstone waters are particularly important for dugongs and a special purpose zone will be gazetted to protect these values (see Sections 5.5.6 and 4.2.3). Defined areas within this zone will be closed to all boating by means of a closed waters notice under Department of Transport legislation to protect these high conservation values. These closed areas are shown on Figure 4.2 on page 23.

It is expected that recreational boating in the marine reserves will increase and it is important that management is able to respond to the potential impacts of boating activities.

Anchoring also has the potential to damage coral, seagrass and other marine habitats. To minimise disturbance to sensitive habitats, information needs to be provided on safe and environmentally acceptable anchoring procedures and location of areas suitable for anchoring. If popular anchoring areas are being disturbed the use of moorings may need to be investigated. Locations where natural areas are most vulnerable to boating and anchoring include the Gladstone area, Monkey Mia, the Freycinet Estuary, Little Lagoon, Big Lagoon and all coral and seagrass communities.

STRATEGIES

Ongoing

1. **Liaise with the Department of Transport to control recreational boating and anchoring where conservation values are threatened or if conflicts arise with other users.**

2. **Approve compatible organised sporting events and impose conditions where necessary to minimise impacts.**

Short Term

3. **Provide information for recreational boat users to minimise environmental impacts as a result of boat use and anchoring.**

4. **Incorporate into interpretive materials information on recreational boat safety requirements, regulations and local conditions in liaison with the Department of Transport.**

5. **Prohibit jet skis and waterskiing and determine appropriate speed limits and watercraft for the Monkey Mia Recreation Zone in liaison with the Department of Transport to minimise the disturbance to dolphins and visitors.**

6. **Prohibit boating access within the Dolphin Interaction Area in the Monkey Mia Recreation Zone. Access to the jetty by professional fishing boats will be maintained.**

7. **Prohibit the use of motorised watercraft at Little Lagoon except for rescue craft at sporting events in liaison with the Department of Transport and the Shire of Shark Bay.**

8. **The Fisheries Department will monitor fish populations in Little Lagoon to determine impacts of recreational activities.**

9. **Prohibit boating access within the areas defined in the Gladstone Special Purpose Zone for the defined periods (see Section 4.2.3) and review as information becomes available.**

7.0 RESOURCE UTILISATION

The overall objective is to allow for ecologically sustainable resource use.

7.1 COMMERCIAL FISHING

The overall objective is to allow for ecologically sustainable commercial fisheries in the marine park.

Commercial fishing in the marine park is managed by the Fisheries Department through legislative, consultative and enforcement mechanisms. This plan addresses commercial fishing in the marine park, however the Fisheries Department has also prepared a plan to detail management of fisheries in the broader World Heritage Area. The Shark Bay World Heritage Property Management Paper for Fish Resources provides greater detail on management strategies to control commercial fisheries and should be read in conjunction with this management plan.

The commercial fisheries operating in Shark Bay had a capital investment of approximately $80 million in 1994 and accounted for the direct employment of about 500 people. Commercial fisheries harvest seafood worth approximately $35 million per year and comprise an important social and economic component of the region (D Clayton, pers. comm.).

Research and industry consultative programs have led to a good understanding of, and a comprehensive system of management strategies for each of the major commercial fisheries in the Bay. The Fisheries Department has introduced a number of Managed ~~Limited~~ ~~Entry~~ Fisheries ~~(LEFs)~~. Performance monitoring of these LEFs indicates that the management strategies in place are effective in maintaining ~~fish stocks~~ ecologically sustainable fisheries.

Most existing commercial fisheries are regarded as fully exploited and are not considered capable of supporting an increase in fishing effort if stocks and the industry are to remain viable. Alternative developments in the areas of tuna, mackerel, squid and bait fish could provide areas of future expansion. Possibly the greatest potential for expansion in Shark Bay is aquaculture, with the clean, sheltered and shallow waters of the Bay providing an ideal environment for some components of this industry. Any proposals for expansion of the commercial fishing industry in the marine park will be carefully assessed to ensure that the park's marine conservation and social values are maintained.

Compatible commercial fishing activities will be permitted in General Use and Special Purpose Zones (Section 4.0). All commercial fishing will be prohibited from Recreation and Sanctuary Zones. Each of the major commercial fisheries operating within the marine park is discussed below. Specific fisheries management issues along with strategies are also given.

STRATEGY

Ongoing
The licensing of new sustainable commercial fisheries which are compatible with the marine park's values will be controlled by the Fisheries Department in consultation with CALM.

7.1.1 Trawling

Shark Bay supports the most productive and lucrative prawn and scallop fisheries in WA. 14 scallop ~~licences~~ licensees work a season from about March to October. A similar season applies for prawns and 27 ~~licences~~ licensees currently operate. Trawling is carried out between the 13 to 35 metre isobaths, most of which occurs outside the marine reserves.

The preferred natural habitat of scallops and adult prawns is the open silty sand sea floor of Shark Bay and this is the area trawled. The seagrass meadows within the marine park are important prawn nurseries. Trawling does not occur in seagrass meadows, and prawn nursery area closures apply under the Fish Resources Management Act.

At the time of gazettal, the marine park boundaries were generally aligned so as not to conflict with prawn and scallop fishing grounds and to protect prawn nursery areas. However some prawn and scallop fishing grounds were included in the marine park. These include a small area adjacent to Wooramel Bank, the waters east and west of Peron Flats and an area within Denham Sound (Figure 9).

Since gazettal of the park, more accurate information on seagrass distribution has been obtained. This revealed that significant seagrass meadows are currently outside the marine park. It is important to protect these areas and consideration should be given to including them in the marine park.

To assist with management of the prawn and scallop fisheries in and adjacent to the marine park and ensure that significant conservation values are protected, the marine park boundaries in the vicinity of the trawl grounds and seagrass meadows will be reviewed. The aim of the review will be to clearly define practical marine park boundaries which meet the requirements of

seagrass protection and better facilitate management of the prawn and scallop fisheries.

As part of the review, a working group consisting of NPNCA, CALM, Fisheries Department and trawling industry representatives will be formed to:

- define prawn and scallop grounds within the marine park;
- identify areas of seagrass and other relevant conservation values which are outside the present marine park; and
- propose modifications, using latitude and longitude coordinates and straight lines, to the marine park boundaries which better facilitate management of prawn and scallop fisheries and protection of seagrass beds and other relevant conservation values.

The process will aim to simplify management of the marine park by excluding, as far as possible, existing prawn and scallop fishing grounds from the park whilst including areas of high conservation value currently outside the park. The objective is to enhance the conservation values of the park and the process must ensure that the broad integrity of the marine park is maintained. Trawling will continue to be permitted in the marine park in the existing prawn and scallop grounds identified by the working group.

Any proposals for change to the marine park boundary will require consideration and endorsement by the NPNCA, the Minister for the Environment, the Minister for Fisheries and the Western Australian Parliament. Other interests such as conservation and recreational interest groups will be consulted before the proposal is submitted to the NPNCA for endorsement.

Advice from the Fisheries Department has indicated that the disposal of scallop shell at particular sites may cause localised smothering of reef or seagrass. The Fisheries Department has implemented controls on this activity at the Abrolhos Islands and similar controls may be necessary within the marine park. There have been no investigations of the impacts of this activity, however popular anchorages should be monitored.

Given the importance of nursery areas for the viability of the industry, potential adverse impacts on these areas from activities such as mining, boating and aquaculture need to be minimised.

STRATEGIES

Ongoing

1. Ensure prawn ~~and scallop~~ nursery areas are protected from activities which could impact on nursery areas.

Short Term

2. Establish a working group comprising representatives from the NPNCA, CALM, Fisheries Department and trawling industry to review the existing marine park boundaries and propose modifications, using latitude and longitude coordinates and straight lines, which better facilitate management of prawn and scallop fisheries and protection of seagrass beds and other relevant conservation values.

3. Progress boundary changes proposed by the working group.

Medium Term

4. Implement controls on the disposal of scallop shells from trawlers in the marine park if there is evidence that this activity is impacting on the values of the area.

7.1.2 Wetlining

Wetlining is the commercial taking of fish by bottom hand line, drop line, set line or trolling. ~~All~~ Most licensed fishing boats in Western Australia are endorsed to wetline throughout Western Australian waters though restrictions do apply in certain areas.

Wetlining is permitted within the marine park, however there is a prohibition on the use of shark set lines and on the catching of pink snapper (*Pagrus auratus*) unless endorsed in the Shark Bay Snapper Managed ~~Limited Entry~~ Fishery (see below). Wetline boats that are not endorsed in the Snapper Managed ~~Limited Entry~~ Fishery tend not to fish in the marine park waters (Figure 9) as, apart from pink snapper, there is no other viable wetline species of finfish in the marine park.

Pink snapper is a highly prized fish in Shark Bay for commercial fishers. The commercial catch in the Shark Bay Snapper Fishery built up through the 1980's until it reached a maximum of about 1300 tonnes in 1985. Research suggested that this catch rate was not sustainable and management measures were introduced to reduce the annual catch to a more sustainable level of around 450 - 500 tonnes. This process was undertaken by the introduction of a quota system and the implementation of strict transfer rules which reduced quota upon transfer. The fishery was made limited entry in 1987 by the Fisheries Department. Approximately $1.5M is generated annually from the export of Shark Bay Snapper; this represents about 70% of the value of the State's production (D. Clayton, pers. comm.).

Three major populations of Snapper have been identified (Johnson *et al*. 1986)). These comprise two inshore populations, east of Monkey Mia and in Freycinet Harbour, and the oceanic population. Results of Fisheries Department monitoring programs indicate that current fishing activities targeting the oceanic snapper stocks are sustainable. Concern however has been expressed that the inshore stocks located within the marine park may be more susceptible to overfishing as they appear to be isolated from each other with little or no recruitment from the more robust outside stocks. Monitoring of these

inshore stocks is required to ensure that the recreational and commercial fishing effort is within sustainable levels.

The commercial taking of groper and tusk fish, cods and coral trout should be monitored to ensure that the fishing levels remain sustainable and that conflict with other users is minimised.

Marine nature reserves are closed to fishing and other extractive uses. However at Hamelin Pool, ~~Ministerial approval had previously allowed~~ ~~for~~ one commercial fishing licence ~~to continue to operate~~, has been granted approval for continued access as the licensee had a history of fishing there prior to the establishment of the marine nature reserve. This ~~endorsement should be revoked as it is contrary to the purpose of the marine nature reserve~~ authority is currently under reveiew and the Fisheries Department has advised the licensee that steps are being taken to withdraw the licence.

Demersal gill nets, demersal long lines and shark drop lines are now prohibited through Fisheries legislation in Shark Bay to protect large sharks. These regulations, however, do not prevent other wetline and beach seine fishers catching sharks while handlining or beach seining for other species.

The targeting of large sharks, such as the tiger shark (mainly for their fins), in Shark Bay is a major concern due to the slow growth rate and apparent vulnerability of these species. The harvesting of other sharks such as thickskins, dusky whalers, hammerheads, grey nurse, black tipped, fiddler, whisker and shovel nose rays may be affecting stocks of these species. Sharks are an important component of the ecosystem and play a major role in the food chain. They are also an attraction for passengers on charter vessels.

The monitoring of the shark fishery in the Bay by the Fisheries Department indicates a need for further controls. A number of management options are currently being investigated by the Fisheries Department to ensure that shark stocks are maintained. The Fisheries Department recommends that all manta rays, grey nurse sharks, tiger sharks and hammerhead sharks be completely protected within the marine park.

Commercial wetlining will be permitted in the General Use Zone, and in Special Purpose Zones where this activity is compatible with the purpose of the zone (Section 4.0).

STRATEGIES

Ongoing

1. **Allow commercial wetlining in the marine park in areas zoned General Use and in Special Purpose Zones (Section 4.0).**

2. **The Fisheries Department will monitor the commercial wetline catch and undertake research as required to ensure the continued sustainability of this fishery.**

3. **Provide protection for species at risk of overfishing as recommended by the Fisheries Department.**

Short Term

4. **Liaise with the Fisheries Department with a view to revoking the one commercial fishing licence in the Hamelin Pool Marine Nature Reserve.**

7.1.3 Beach Seine and Mesh Net Fishing

The Shark Bay beach-seine fishery extracts whiting, bream, mullet, tailor and some snapper, with whiting being the main target species. The whiting fishery of Shark Bay was established in 1933 as a secondary interest to pearling.

Research undertaken on whiting stocks in the late 1960's postulated that the fishery in Shark Bay was in decline due to overfishing. Recommendations were made for the fishery to be carefully managed and monitored to ensure the sustainability of fish stocks and subsequently the industry stabilised during the 1980's. Today the fishery is a Managed ~~as a Limited Entry~~ Fishery ~~(LEF)~~ and is considered to be sustainable with minimal impacts on the environment. The ~~LEF~~ Fishery includes all Shark Bay waters south of the line drawn from Cape Inscription due east to the mainland and 12 fishing units have access to the Fishery ~~LEF~~.

Haul nets, mostly deployed from jet boats, are used to capture schools of fish in shallow water. No set netting occurs which minimises the impacts on non target species.

The zoning plan (Section 4.0) provides for commercial beach seine fishing in the General Use and Special Purpose Zones.

STRATEGY

Ongoing

Allow commercial beach seine fishing in the General Use and Special Purpose Zones (Section 4.0).

7.1.4 Crab Trapping

The small crab fishery operating in Shark Bay produces an average of around 17.7 tonnes of product per year. The main crab caught is the blue manna crab (*Portunus pelagicus*) which inhabits estuarine and inshore waters of most of the State. It matures at about one year of age, towards the end of their first summer, when their shell is around the legal minimum size of 127 mm wide. All undersize and female crabs with eggs attached must be returned unharmed.

In 1993 the crab fishery in Shark Bay was made a restricted entry fishery which limited access to the fishery to those fishers with current approval to take crabs, those fishers who are licensed to operate in the Shark Bay Beach Seine and Mesh Net Fishery and those fishers who have current access to the Shark Bay Snapper ~~Limited Entry~~ Managed Fishery at Denham.

The use of crab nets in Shark Bay is prohibited due to the potential by-catch of species such as snapper, whiting and mullet which are Managed ~~as Limited Entry~~ Fisheries in Shark Bay. All crab pots used in the fishery must be of an approved design that does not also catch fish and/or rock lobsters. There is no limit to the number of pots an endorsed fisher can use. As of July 1994, six fishing units were utilising about 200 pots per fishing unit to catch crabs. Monitoring of the numbers of pots used and their impacts on crab populations and the environment should be implemented.

Commercial crabbing is provided for in the General Use Zone and some Special Purpose Zones where this activity is compatible with the intention of the zone (Section 4.0).

STRATEGIES

Ongoing

1. **Allow commercial crabbing in the marine park in General Use Zones, and in the Wooramel, Freycinet and Gladstone (summer only) Special Purpose Zones (Section 4.0).**

Short Term

2. **The Fisheries Department to take steps to implement a monitoring program to determine if there is a need to introduce pot limits for the fishery.**

7.1.5 Rock Oysters

Shark Bay rock oysters are known for their excellent quality. This is due largely to good water quality and low fresh water input. The taking of pearl oysters for consumption in Shark Bay is prohibited due to high cadmium levels. Research has indicated that these high cadmium levels were not due to poor water quality but were a result of cadmium from other sources such as suspended sediments (Fisheries Department, 1989). In 1994 nine commercial oyster licences existed that could be used in the marine park, however not all of these are utilised and some only on a part time basis.

Seventy kilograms of oyster meat were collected in 1991-92 by a small number of operators. Most oysters are collected from the eastern side of Dirk Hartog Island. Two operators reside in Denham and another three visit the area intermittently to collect oysters. The number of operators may vary from year to year. The maintenance of healthy stocks will largely depend upon the number of operators using the area.

STRATEGIES

Ongoing

1. **Allow commercial oyster picking in the marine park in areas zoned for General Use (Section 4.0).**

2. **The Fisheries Department to manage commercial collecting of oysters to ensure that the activity is sustainable.**

7.1.6 Rock Lobsters

The majority of rock lobster fishing occurs outside the marine park. South Passage is the only area which is fished by professional rock lobster fishermen, however this use is very small. South Passage is however important to professional fishermen as a safe anchorage and to position live holdings cages for temporary storage of rock lobsters. To avoid potential damage to corals these cages should be located outside the Surf Point Sanctuary Zone.

STRATEGIES

Ongoing

1. **Allow commercial rock lobster fishing in the General Use Zone.**

Short Term

2. **Prohibit the use of lobster holding cages in the Surf Point Sanctuary Zone.**

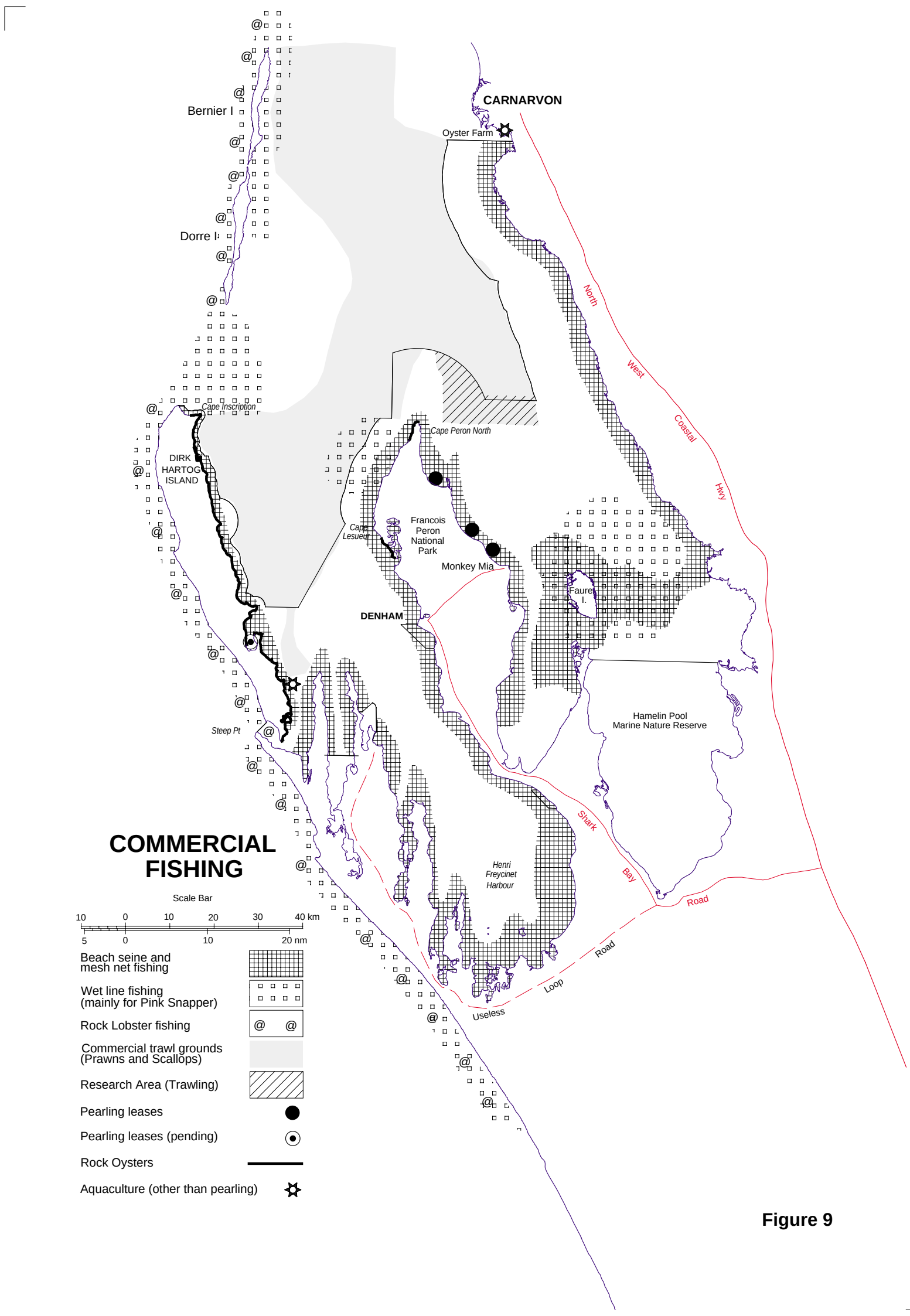
CARNARVON
Oyster Farm
Bernier I
Dorre I
North West Coastal Hwy
Cape Inscription
Cape Peron North
DIRK HARTOG ISLAND
Cape Lesueur
Francois Peron National Park
Monkey Mia
Faure I.
DENHAM
Steep Pt
Hamelin Pool Marine Nature Reserve
Shark Bay Road
Henri Freycinet Harbour
Useless Loop Road
COMMERCIAL FISHING
Scale Bar
10 0 10 20 30 40 km
5 0 10 20 nm
Beach seine and mesh net fishing
Wet line fishing (mainly for Pink Snapper)
Rock Lobster fishing
Commercial trawl grounds (Prawns and Scallops)
Research Area (Trawling)
Pearling leases
Pearling leases (pending)
Rock Oysters
Aquaculture (other than pearling)

Figure 9

7.1.7 Commercial Aquarium Collection

The Fisheries Department has a limited issue of ~~25~~ 15 licences for the commercial collecting of aquarium fish plus ~~35~~ 36 licences for specimen shell ~~endorsements and~~ collecting. There are also a small number of rock and coral collecting endorsements which will be reviewed by the Fisheries Department. These licence holders have permission to undertake their activities in all marine waters of Western Australia except, as stated in CALM policy, in the State's marine parks. In special cases the Executive Director of CALM may permit some operations to continue in marine parks (eg, one licence holder is permitted to continue operations within the Ningaloo Marine Park). All collecting is prohibited within the Hamelin Pool Marine Nature Reserve.

Licence holders must adhere to recreational size limits where applicable though bag limits may be exceeded. Other conditions issued include: the prohibition of the use of explosives and chemicals, the permitted methods for taking fish and the requirement to report all takings to the Fisheries Department.

Most demand is for small and juvenile fish, especially colourful fish of tropical origins, but the taking of juvenile tropical rock lobsters is prohibited. Other marine life including seaweed and live shells are collected under different licensing arrangements. Excessive collecting could impact adversely on certain populations and reduce some recreational values of the marine park. Little is known about the quantities taken from the area.

STRATEGIES

Short Term

1. **Allow commercial collecting of aquarium species in the General Use Zone only.**

2. **The Fisheries Department will design and implement a monitoring program to determine quantities removed and impacts on populations and habitat. Limits will be imposed as required.**

3. **The Fisheries Department will liaise with commercial aquarium collectors to determine the species which may be commercially collected. All other species will be protected from commercial collecting.**

7.1.8 Aquaculture

Aquaculture is the farming of aquatic organisms, including fish, molluscs, crustaceans and aquatic plants. Farming implies some form of intervention in the rearing process to enhance production, such as regular stocking, feeding or protection from predators. Aquaculture provides the potential for an environmentally sustainable industry, providing employment and making a significant contribution to the State's economy.

The Pearling Act controls the Pearl Oyster (*Pinctada maxim*a) industry. All other pearl farms, including those in Shark Bay, are managed under the Fish Resources Management Act. Both activities operate under a strict set of conditions. The three existing pearling companies operating in Shark Bay currently use live pearl shell, for the cultivation of pearls. The Department of Transport is responsible for approving the installation of structures such as jetties, objects fixed to the sea bed, the mooring of surface buoy lines, the use of fixed and mobile marine bases and objects that may affect navigation.

Oysters are susceptible to parasites and diseases which can be easily transported with the relocation of live shell. This practice is usually discouraged and often prohibited in other areas of the State. Applications to transport pearl or other oysters into Shark Bay should not be permitted, except in accordance with an approved translocation proposal.

The focus of aquaculture to date in Shark Bay has been on the production of cultured pearls, however there have been spasmodic attempts to cultivate edible oysters (*Saccostrea* sp) which occur abundantly in Shark Bay. Whilst traditionally the industry has cultured *Pinctada albina albina*, there has also been interest in "black-lipped pearl oysters" (*Pinctada magaritifera*) and "hammer shell" (*Pteria penguin*) which occur in small numbers within Shark Bay.

Whilst developments have traditionally been low key, Shark Bay offers one of the few areas of protected waters available on the entire west coast. Given the acute lack of similar sites and the existing level of infrastructure developed by associated industries, it is likely that interest in this area will continue. In 1995 two licenses were approved for fish cage operations in Blind Strait. Interest in the establishment of aquaculture operations within Shark Bay continues for:

- edible oysters;
- marine fin fish;
- giant clams;
- cultured pearls.

Aquaculture may affect the natural environment through physical, visual, chemical and genetic influences. Although some aspects of aquaculture can be beneficial to the environment by reducing pressure on wild fish stocks, there is the potential for significant adverse environmental and social impacts. Environmental effects may include eutrophication due to nutrient release, impact of foreign biota (ie.

parasites, algae and exotic species), the altering of the genetics of natural populations and direct impacts on the benthic environment. The most potentially damaging impacts could occur from the importation and release of foreign biota. It would also be the most difficult problem to address. Consequently no aquaculture operations will be permitted in the marine park which utilise ~~foreign~~ exotic species.

Social impacts can also occur as a result of conflicts with recreational and other commercial uses. This is because operations often require exclusive use of a site due to the presence of infrastructure that could be damaged by other users. Visual impacts may also be significant for certain forms of aquaculture. It is important that planning criteria and consultation processes be developed to ensure that the requirements of the marine environment and other commercial and recreational users are considered. The requirements for land based facilities also need to be assessed as this may impact on the coastal fringe.

STRATEGIES

Ongoing

1. **Allow aquaculture operations ~~only~~ in areas where there will be minimal impact on the marine park's values. Operations will not be permitted in the marine nature reserve and in Sanctuary and Recreation Zones.**

2. **Assess applications for aquaculture operations ~~in liaison with the Fisheries Department~~ through the Inter-Departmental Committee for Aquaculture (IDCA) and other relevant organisations with regard to impacts on the park's conservation, commercial, recreation and social values.**

3. **Support the review and application assessment criteria as determined by the ~~Inter-Departmental Committee for Aquaculture~~ IDCA in the consideration of new aquaculture proposals.**

4. **The Fisheries Department will continue to license and manage aquaculture operations in liaison with CALM.**

5. **Applications for operations which propose the use of exotic species will not be approved.**

7.2 MINING

The overall objective is to protect the marine reserves' values from the impacts of mineral exploration and mining.

As at May 1995 no mining tenements existed within the marine reserves, though a portion of an exploration lease did extend into the marine park at Gladstone. Several mining tenements existed over lands and waters adjacent to the marine park. Evaporitic rocks within the Silurian sequence (eg. sandstone, siltstone and limestone) may contain more valuable components, such as sylvite (KCl). No occurrences are known in the Shark Bay Region, but if indications of its presence were to be found there could be a demand to explore for it in the marine reserves. No other mineral commodities can be conceived to be prospective in the prevailing economic and strategic climate. CALM policy on marine reserves states a requirement for CALM to evaluate the management of adjacent areas which may have an impact on the environment and biota of marine reserves. Impacts of existing and proposed mining activities on the marine park will be assessed to determine the direct effects of extraction and associated effects from such things as transport, shipping and waste disposal. Visual impacts also need to be considered (See Section 5.6).

New mining proposals will be subject to environmental assessment procedures in accordance with relevant legislation and Government policy.

7.2.1 Petroleum Exploration

The Shark Bay region has not seen active petroleum tenements for over a decade, and active field exploration for some 20 years. There also have never been oil wells drilled in the area. The major reasons cited by the Department of Minerals and Energy for this apparent lack of interest were:

- logistics problems in the acquisition of seismic data in very shallow water;
- land access issues;
- concentration of exploration on areas perceived during this period as more highly prospective; and
- the low oil price.

The petroleum potential of the area has traditionally been considered to be low because of the generally oxidised nature of the Silurian sequence. The evaporitic sequences may be potential source rocks and it is possible that hydrocarbons could also migrate into the area from Devonian age sequences which exist north of Shark Bay.

With a renewed interest in the petroleum potential of Palaeozoic basins, the development of new technology and continuing research into methods of minimising environmental impact of petroleum field operations, there may be renewed interest in the petroleum prospectivity of the Shark Bay area in the medium to long term.

Petroleum exploration lease EP 274 (offshore title), adjacent to Dorre and Bernier Islands, was withdrawn in July 1989. EP 378 (onshore title) is the only current petroleum lease in the area. This lease has a minor

encroachment into the eastern boundary of the marine park (see Figure 3).

On 30 July 1994 the Government announced its policy on petroleum exploration and development in marine conservation reserves (Government of WA, 1994). No drilling or production will be allowed in the Hamelin Pool Marine Nature Reserve, or Sanctuary and Recreation zones of the marine park. Drilling and production will be possible in those portions of General Use zones where it has been established that such activities will not impact on sensitive marine habitats. Drilling and production will not be permitted in Special Purpose zones where such activities are incompatible with the conservation purpose of the zone. Low impact seismic surveys may be permitted to extend into areas of the marine park that are not available for drilling where it has been assessed that such an activity will not impact on sensitive marine habitats. Any proposals for seismic surveys, exploration and production are referrable under the Environmental Protection Act process.

STRATEGIES

Ongoing

1. **Maintain liaison between the petroleum industry, the Department of Minerals and Energy, the Department of Environmental Protection and CALM to ensure that adequate conditions are set and followed to minimise any detrimental effects caused to the environment within the marine reserves from any petroleum exploration or production.**

2. **In accordance with Government policy, require proponent companies to carry out a comprehensive assessment of biological values, petroleum prospectivity and potential risk to conservation values in regard to the proposal. Use this information to determine areas of the marine park in which it might be possible to carry out petroleum drilling and production.**

7.2.2 Salt Production

Salt is produced from mining leases at Useless Loop and Useless Inlet, adjacent to the marine park. The salt operation is conducted in accordance with the Shark Bay Solar Salt Industry Agreement Act 1983, an agreement between the State and the Shark Bay Salt joint venture. This Agreement Act provides Shark Bay Salt with the right (and also the obligation) to carry out solar salt production on the whole area of the mining lease the Shark Bay Salt joint venture holds under the Act, and the maintenance of all necessary infrastructure to support that operation. This includes any expansion at Useless Loop or Useless Inlet, expansion of wharf facilities and expansion of the Denham Channel by dredging. The Agreement Act is administered by the Department of Resources Development (DRD).

The Agreement Act requires Shark Bay Salt to operate in accordance with State environmental legislation and also contains provisions requiring ongoing environmental investigation, monitoring and reporting for the duration of the project. Environmental reporting is on a three-year cycle of two annual interim reports and a detailed triennial report, in which past performance is evaluated and plans for the next three-year period are put forward. The reports are reviewed by the Department of Minerals and Energy and other relevant agencies.

The triennial reporting procedures allow the State or the developer to seek amendments to existing environmental programs. This normally results from a review of past results, experience and changes in technology or project structure. If the State is not satisfied with changes proposed by the developer, amendments to the program can then be required by the responsible Minister.

With about 35 ship loadings per year at Useless Loop, the most significant potential impacts on the park from salt production include the risk of oil spillage from shipwreck and the possibility of introducing foreign biota via ballast waters. These issues are addressed in the Marine Pollution Section 5.9 (page 68).

STRATEGY

Ongoing

Liaise with Shark Bay Salt, DRD, the Department of Environmental Protection and the Department of Minerals and Energy to minimise impacts on the marine park.

7.2.3 Gypsum Mining

Mining leases are held over unexploited gypsum deposits at Brown Inlet and Peron Peninsula. The Peron deposits are within an area currently excluded from, but proposed for inclusion in, Francois Peron National Park. The two tenements were granted in 1984 and 1986 and expire in 2005 and 2007 respectively.

Whilst the extraction of gypsum would have little or no direct impact on the marine park, the requirements for transport could have an impact through increased shipping movements, stockpiling and the construction of loading facilities.

STRATEGY

Medium Term

Provide advice on applications for gypsum mining to the Department of Environmental Protection to minimise impacts on the marine reserves.

7.2.4 Other Extractive Industries

The extraction of basic raw material resources for commercial purposes such as shell, sand and gravel on Crown land is regulated under the Mining Act 1978. Main Roads Western Australia extract a large quantity of basic raw material for road construction and maintenance from land areas adjacent to the marine reserves. Potential road developments that need to be considered are outlined in the draft Gascoyne Regional Road Development Strategy (1994). Local Authorities generally access materials through creation of reserves under the Land Act, however they can also access private property through extractive industry licences let under the Local Government Act. The extraction of basic raw materials can proceed under a mining lease granted under the Mining Act 1978. When local conditions warrant extraction of basic raw materials under a mining lease, then the operation will be regulated and managed by the Department of Minerals and Energy as stipulated by the Mining Act 1978 and Mining Regulations Act 1974.

Extraction of shell deposits occurs adjacent to the marine park. The Shire of Shark Bay and a private operator operate leases adjacent to Lharidon Bight. Mining activities should also be controlled to ensure they do not impact on the marine environment.

Shire reserve 41076 (Figure 3) contains a shell grit quarry from which private operators may extract grit and adjoining this reserve is a mining lease for shell extraction. These operations adjoin the Lharidon Bight Sanctuary Zone near Shell Beach. Existing quarrying practices appear to have minimal impact on marine ecosystems however visual impacts need to be managed as Shell Beach is a popular visitor site.

STRATEGIES

Ongoing

1. **Assess proposed extractive uses adjacent to the marine reserves to minimise impacts on the reserves.**

Short Term

2. **Encourage research into the natural processes which influence the shell deposits at Lharidon Bight.**

8.0 COASTAL LAND USE

The objective is to ensure that coastal land use is compatible with management of the marine reserves.

The Shark Bay coastline, consisting mainly of unconsolidated dunes, is a fragile land system. Approximately 1000 km of Shark Bay's coastline is encompassed by the marine reserves. Government, landholders and lessees have a mix of responsibilities for managing these shores which are becoming the focus of escalating recreational use. Recreation has generally evolved in an ad hoc fashion with limited control over visitor access and use and as a result degradation is common at many coastal sites. To ensure that coastal landforms and resources are protected for the future and minimise impacts on the marine reserves, it will be necessary to manage visitor use and upgrade, redevelop or close some recreation sites.

It is imperative that recreation and access to the marine reserves are only facilitated on suitable areas of the coast. Vehicle use must be controlled and careful site planning will be necessary to sustain long term recreational use. The Fisheries Department should be consulted to ensure fishing issues are addressed in site planning.

Existing arrangements for the management of coastal recreation vary throughout Shark Bay with sites being managed either by CALM, the Shires or by lessees of adjoining pastoral stations. Should the Shires and station managers wish to continue managing coastal recreation, CALM's role could be to assist by advising on standards for sustainable recreation development and providing support in terms of design specifications and the implementation of works. The ability of Shires and station lessees to manage recreation would be greatly enhanced by appointing onsite managers as Honorary CALM Officers who would have legal powers to regulate recreation use within designated areas on lands and waters within the marine reserves. Future management arrangements for coastal recreation are yet to be formalised, but must reflect the wishes of the pastoral lessees and local authorities and ensure that the coast is securely protected. Any proposed recreation development will be done in liaison with the relevant lessee. CALM will prepare a management plan which will address management of the François Peron National Park, Shell Beach Conservation Park and the island nature reserves within the marine reserves.

In determining future levels of coastal recreation, the following criteria must be considered:

- the presence of features which attract visitors;
- existing and potential effects of visits on wildlife, coastal landforms and offshore resources;
- management capability to protect coastal and marine resources;
- integrating coastal use with adjacent zoning of marine reserves;
- costs and infrastructure required to provide for recreation;
- effects of recreational use on adjacent pastoral operations;
- requirements for research;
- visual impacts of development.

Information will be required at many recreation sites to interpret the adjacent marine environment and to advise visitors of any limitations on use of nearby zones or particularly sensitive marine habitats. Information and community education are particularly important at remote sites where there is minimal management presence.

Seaward boundaries of adjacent pastoral stations are generally not fenced and, in some cases, lessees utilise portions of vacant Crown land (VCL) and the marine reserves for their operations. Fencing and water pipe lines encroach on the marine reserves and stock occasionally graze within the reserves. It is recognised these uses are necessary for effective management of pastoral operations and have minimal impact on the marine reserves. Fencing between stations and the marine reserves will generally not be required and pastoral operations which encroach on the reserves will be permitted provided that values are not impaired. Any fencing that may be required will be done in liaison with pastoralists and costs will be negotiated.

A 40m wide strip of VCL exists along much of the Shark Bay shoreline between the existing marine park and marine reserve boundary at high water mark and the pastoral lease boundaries. It is necessary for visitors to cross this 40m strip of VCL to access the marine park and this area is subject to increasing pressure and degradation from recreational use. This strip should be vested in the NPNCA as marine park or marine nature reserve. Coastal recreation sites are key locations for managing use of the marine reserves. This will be done in close liaison with the adjoining pastoralists and Shires. The VCL will not be vested where it is currently leased for other purposes (eg. mining lease).

Commercial fishers require traditional land access to a variety of locations in the marine reserves. In certain locations this access by commercial fishers is significant compared to recreational users and will be provided unless it can be clearly shown that it is causing significant damage to the coastal system.

The following strategies provide management principles which relate to all coastal lands in or adjacent to the marine reserves. Six distinct coastal precincts have been identified (Figure 10) and strategies for each of the six coastal precincts are included in Sections 8.1 to 8.6.

STRATEGIES

Ongoing

1. **Integrate management of the marine reserves with management of adjacent pastoral land in consultation with the pastoralists concerned.**

2. **Maintain existing access for commercial fishers and assess requirements for additional access.**

3. **Coordinate management of the marine reserves with management of nature reserve islands.**

Short Term

4. **Liaise with Shires, pastoral lessees and other relevant organisations to determine and implement appropriate management of coastal lands including:**
   - **where, and to what extent, public access and use of the coast or adjacent marine resources can be sustained without incurring unacceptable levels of degradation or disturbance;**
   - **areas where development or access should be discouraged;**
   - **management arrangements.**

5. **Vest the adjoining 40m wide strip of VCL in the NPNCA as marine park and in the case of Hamelin Pool, as marine nature reserve (with the exception of Faure Island and VCL leased for other purposes).**

6. **Liaise with Shires, pastoral lessees and other relevant Departments in preparing recreation development plans to cater for existing and future coastal use.**

7. **Where appropriate appoint Honorary CALM Officers to assist with the management of recreation on the coast and offshore areas.**

8. **Provide information at key sites to interpret marine features and advise visitors of any regulations or requirements relating to their use of the marine reserves.**

Medium Term

9. **Devise and implement a program for monitoring coastal recreation sites to determine the impacts of visitor use on the marine reserves.**

8.1 WOORAMEL COAST

The coastline between Carnarvon and Gladstone comprises extensive intertidal mud flats with mangroves adjacent to creeklines and the Wooramel River delta. The area has relatively low scenic values but has numerous tracks and small camp sites. Visitors include Carnarvon residents and travellers who enjoy the isolation and fishing opportunities in adjacent channels of the marine park.

The Shire of Carnarvon provides for the management of the more popular camp sites at Gladstone and north of Greenough Point, though numerous minor coastal sites are unmanaged. In spite of low numbers of visitors, many coastal sites are being degraded by uncontrolled use. Pastoralists from Brick House, Edagee, Wooramel and Yaringa Stations do not promote access for coastal recreation, and have expressed concern that recreation access impacts on their operations and needs to be restricted at certain sites.

Coastal degradation warrants rehabilitation at many sites and extensive works are needed to minimise the impacts of visitors. Where management resources cannot be provided to properly manage the impacts of visitors, public access should be restricted.

STRATEGIES

Short Term

1. **Liaise with the Shire of Carnarvon and lessees of Brick House, Edagee, Wooramel and Yaringa Stations to restrict public access to agreed sites on the coast between Greenough Point and Gladstone.**

2. **Assist the Shire of Carnarvon to prepare and implement recreation and site development plans for Gladstone and the coast north of Greenough Point. These plans should aim to enhance the visitors' experience and minimise their impacts on the coastal environment.**

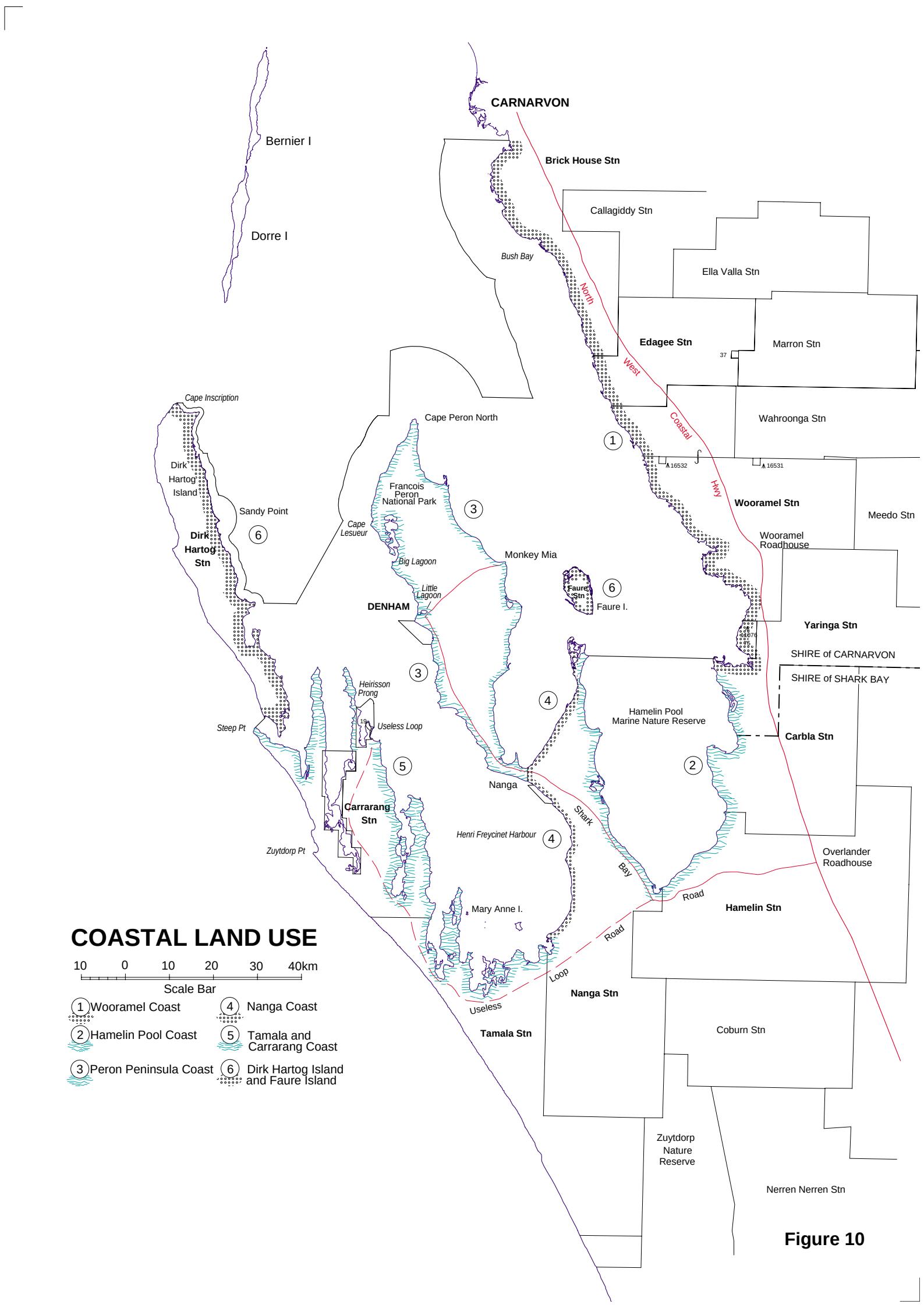
CARNARVON
Bernier I
Dorre I
Brick House Stn
Callagiddy Stn
Bush Bay
Ella Valla Stn
North West Coastal Hwy
Edagee Stn
Marron Stn
37
Wahroonga Stn
16532
16531
Wooramel Stn
Meedo Stn
Wooramel Roadhouse
Cape Inscription
Dirk Hartog Island
Sandy Point
Dirk Hartog Stn
Cape Peron North
Francois Peron National Park
Cape Lesueur
Big Lagoon
Little Lagoon
DENHAM
Monkey Mia
Faure Stn
Faure I.
Yaringa Stn
SHIRE of CARNARVON
SHIRE of SHARK BAY
Heirisson Prong
Useless Loop
Steep Pt
Hamelin Pool Marine Nature Reserve
Carbla Stn
Nanga
Carrarang Stn
Henri Freycinet Harbour
Shark Bay
Overlander Roadhouse
Zuytdorp Pt
Mary Anne I.
Road
Hamelin Stn
Loop
Nanga Stn
Useless
Tamala Stn
Coburn Stn
Zuytdorp Nature Reserve
Nerren Nerren Stn
1
2
3
4
5
6
COASTAL LAND USE
10 0 10 20 30 40km
Scale Bar
1 Wooramel Coast
2 Hamelin Pool Coast
3 Peron Peninsula Coast
4 Nanga Coast
5 Tamala and Carrarang Coast
6 Dirk Hartog Island and Faure Island

Figure 10

8.2 HAMELIN POOL COAST

World Heritage listing recognised that natural processes operating in Hamelin Pool are of major ecological significance. Stromatolites, microbial communities and other marine features around the tidal zone of Hamelin Pool are extremely fragile and sensitive to disturbance. Vehicle access along Hamelin Pool's shoreline is limited, with only one designated public access road into Hamelin Pool at Flagpole Landing (Telegraph Station). Managers of the adjoining stations discourage public use of the coast though visitors continue to use station tracks without permission and intertidal marine communities are inadvertently being damaged by four wheel drivers. Use of this coastline should be limited and controlled.

Commercial tours are conducted along the western shores of Hamelin Pool. Coastal areas of Carbla and Hamelin Stations are frequented by research and student groups.

Sheep and feral goats are not known to graze on microbial communities and whilst stock occasionally wander across the microbial mats, there is little potential for this to cause significant damage. Herbivores grazing amongst the holocene dunes are also believed to have minimal impact as these landforms are relatively consolidated and can sustain such use.

STRATEGIES

Ongoing

1. **Ensure that access to the Hamelin Pool coastline for tours, education, research or other uses is restricted to controlled or guided activities authorised by permission from CALM and the relevant lessee.**

2. **Liaise with relevant departments, and the managers of the Telegraph Station and Hamelin Station, to ensure that tourism development does not impact on the marine nature reserve's values.**

3. **Liaise with the managers of the Telegraph Station to promote visitor awareness and appreciation of the area's values.**

4. **Do not provide public boat launching facilities in Hamelin Pool.**

Short Term

5. **Develop the Flagpole Landing area as the only public facility for access to stromatolites and other features of Hamelin Pool Marine Nature Reserve.**

6. **Liaise with lessees to ensure that public access to the Hamelin Pool coastline (other than that at Flagpole Landing) is restricted by the use of gates, fences, signs, etc.**

7. **Monitor visits to restricted areas of the marine nature reserve through liaison with the lessees of Yaringa, Carbla, Hamelin and Nanga Stations.**

8.3 PERON PENINSULA COAST

Peron Station was purchased by the Western Australian Government in 1991 and in 1993 the northern half of the station became national park and the Shell Beach area was reserved as conservation park. Management plans for these reserves will be prepared and will detail proposals for coastal development and management.

Proposals for the southern portion of Peron are being considered. Future tenure should allow for multiple use which may include Sandalwood and firewood production, recreation, tourism, conservation, gravel extraction and other commercial uses. The coastline of south Peron has a number of recreation sites attractive for camping, day trips, fishing and sightseeing. Recreation sites on the west coast are established and maintained by the Shire. The east coast of south Peron is currently unmanaged and has fairly low visitor numbers due to limited promotion and access. South Peron has a variety of interesting coastal landforms and marine features which could be promoted for tourism. An east coast road to provide a tourist loop for day visitors has been suggested. The promotion, development and management of south Peron must be planned to minimise disturbance of coastal landforms, marine resources and visual qualities.

Marine wildlife and habitats most sensitive to disturbance from visitors to the national park include:

- nursery grounds, seagrass and mangrove communities (Big Lagoon);
- seabird rookeries (Guichenault Point and areas of Big Lagoon);
- Cape Peron's abundant marine wildlife and spectacular viewing opportunities;
- fish and oyster stocks adjacent to popular recreation sites (Broadhurst Bight, Big Lagoon, Herald Bight).

Commercial fishers use the national park roads and launching areas for access to adjacent waters. This access will be maintained as previously discussed, however the development of exclusive onshore facilities for commercial fishing is not consistent with national park policy.

STRATEGIES

Ongoing

1. Monitor and, if necessary, control visitor activities at sites with wildlife sensitive to disturbance.

Short Term

2. Liaise with the Shire and other relevant agencies to determine and implement management arrangements for south Peron which achieve high standards for managing coastal recreational use.

3. Prepare and implement a recreation development plan for the National Park ensuring that any development protects and restores the coastline's physical stability and visual quality and provides onshore facilities to access and interpret marine resources.

4. Restrict vehicle access to and around Little Lagoon to designated tracks, in liaison with the Shire of Shark Bay.

5. Restrict vehicle access on Shell Beach.

Medium Term

6. Prepare and implement a recreation development plan for south Peron.

7. Provide information to interpret marine features along the Peron coast and to advise visitors of the regulations and code of conduct relating to their use of the marine park.

8. Provide assistance to the Shire of Shark Bay with the provision of information and establishment of appropriate day visitor facilities.

8.4 NANGA COAST

Use of the Nanga coast adjacent to the Hamelin Pool Marine Nature Reserve has been addressed in Section 8.2. The remainder of the Nanga coast addressed in this section abuts the marine park along Lharidon Bight and Freycinet Harbour.

Recreation in this area is largely confined to the Nanga Holiday Village which is a freehold tourist development. An area adjacent to Nanga was excluded from the marine park (see Figure 3). Subsequently the 40m strip of VCL adjacent to Nanga Holiday Village will not be vested as marine park as will occur elsewhere. The current lessee of Nanga Station has actively restricted recreational use of the remainder of the coast, which has provided reasonably good protection of coastal landforms and marine resources. Some four wheel driving occurs along the eastern shores of Lharidon Bight despite management restrictions and coastal degradation is becoming evident. Vehicle use of the beach in this area may need to be controlled if it impacts on the landforms.

One mining lease and one shire reserve for the extraction of shell grit exist on the south east shores of Lharidon Bight in the vicinity of the Shell Beach visitor site. This has been addressed in Section 7.2.4.

STRATEGIES

Ongoing

1. Liaise with the Department of Environmental Protection, Department of Minerals and Energy, the Shire and mining lessees to ensure that operations for the extraction of coquina do not adversely affect marine park values or detract from the interpretive qualities of the area.

Short Term

2. Liaise with the lessee of Nanga Station to restrict public access for recreation on the Nanga coast, other than at the Nanga Holiday Village.

8.5 TAMALA AND CARRARANG COAST

Tamala Station and the eastern portion of Carrarang Station are pastoral operations where some coastal camping is permitted. The western portion (Edel Land) of Carrarang Station has been managed by the Station lessees primarily for recreation. Edel Land was proposed in the Shark Bay Region Plan to be reserved as national park in recognition of the area's values and potential for both recreation and conservation. The lessees of the Carrarang Station are keen to retain select areas of the Edel Land coast for the development of tourism facilities. The scale, location and operation of tourism developments will have a direct impact on adjacent marine resources.

Freycinet Harbour, South Passage and Blind Strait include some of the most popular waters of the marine park for fishing and diving. Being remote, these areas are subject to a high level of illegal fishing. Use of these areas is increasing in response to greater public awareness of the area's opportunities for fishing, diving, camping and appreciation of spectacular coastal scenery. Increasing use is placing greater pressure on the marine and coastal resources and recreation on the Carrarang and Tamala coast must be carefully planned and managed.

Coastal degradation is evident at many sites and is quite severe at some sites. Degradation of marine resources is also of concern as the coast provides easy access for boats, fishing and diving. Management of coastal recreation sites can directly influence visitor use of adjacent marine resources.

Bellefin Prong is devoid of roads and subject to relatively little recreational use. As such the coast and adjacent marine resources have suffered little degradation in comparison to other areas.

STRATEGIES

Short Term

1. **Liaise with the lessees of Carrarang and Tamala Stations, the Shire and other relevant agencies to integrate coastal recreation planning, management and development with management of the marine park.**

2. **Liaise with the station lessees in regard to management of the Carrarang and Tamala coastlines. There is a need to assess the area's capacity to sustain visitor use and identify:**
   - **areas suitable for low key recreation development;**
   - **areas suitable for more intensive recreation development;**
   - **sites which are degraded or sensitive to disturbance;**
   - **sites and tracks which need to be upgraded, closed or rehabilitated;**
   - **the capacity of camp sites;**
   - **facilities which should be provided at each site (eg. toilets, vehicle barriers, boat launching, rubbish receptacles, information, etc.)**

3. **In conjunction with lessees monitor the impacts of visitor use along the Tamala and Carrarang coast and identify the requirements to manage use at locations sensitive to disturbance.**

4. **Provide information to interpret the area's marine features and to advise visitors of the regulations and code of conduct relating to their use of the marine park.**

5. **Encourage the lessees of Carrarang Station to maintain restrictions on access to Bellefin Prong.**

8.6 DIRK HARTOG AND FAURE ISLANDS

Dirk Hartog and Faure Islands are pastoral leases which are currently subject to limited though increasing recreational use. As boating activity around these islands increases, coastal sites adjacent to anchorages are becoming more prone to disturbance.

Dirk Hartog supports an array of natural and cultural features of interest to visitors and the Shark Bay Region Plan recommended that this island becomes national park. There is significant potential for tourism development of the island. An area of about 100 ha of freehold land exists which could potentially be used for these purposes.

STRATEGIES

Ongoing

1. **Ensure that proposals for tourism development on Dirk Hartog Island consider the impacts on the marine reserves.**

Short Term

2. **Liaise with the lessees of Dirk Hartog and Faure Islands to integrate recreation use and development with management of the marine park.**

3. **In conjunction with lessees, monitor use of the Dirk Hartog and Faure coastlines and identify the requirements to manage use at locations sensitive to disturbance.**

Medium Term

4. **Provide information to interpret the area's marine features and to advise visitors of the regulations and code of**

conduct relating to their use of the marine park.

9.0 FACILITIES AND DEVELOPMENTS

The overall objective is to ensure that facility and other development is compatible with environmental values of the marine reserves.

9.1 FISH AGGREGATING DEVICES AND ARTIFICIAL REEFS

Fish aggregating devices (FADs) are used for recreational and commercial fishing purposes, to lure fish into a particular area so that they become easier to catch. Fish can be attracted by any floating object, so FADs may include buoys, pontoons, permanent structures and simple floating objects. FADs do not enhance the habitat for fish stocks and do not increase the size of fish stocks. They simply make existing fish stocks more vulnerable to being caught.

Artificial reefs can also act as a FAD. These structures are made from a variety of materials, however they differ from floating FADs in that they can create new habitats for fish species rather than purely attracting fish from surrounding waters.

Any proposals for artificial reefs or FADs should address the potential impacts of the structures on the surrounding habitats and biota as well as impacts from the increased recreational use of the area.

STRATEGIES

Ongoing

1. **Assess proposals for FADs or artificial reefs in liaison with the Fisheries Department and the Department of Transport.**

Short Term

2. **Prohibit the use of FADs or installation of artificial reefs in Sanctuary Zones.**

9.2 NAVIGATION AND OTHER MARKERS

Existing offshore and onshore navigation markers guide vessels around South Passage, Naturaliste Channel, Denham Channel, Cape Peron, Monkey Mia and Faure Island. Navigation markers are provided and maintained by the Department of Transport. The Port of Carnarvon waters extend into the marine park.

Buoys mark the Dolphin Interaction Area at Monkey Mia. These buoys were provided by the Shire of Shark Bay but CALM will assume responsibility for them, in consultation with the Monkey Mia Management Committee.

The marking of zones or other special areas may be required. This will be done in an environmentally and visually sensitive manner in close liaison with the Department of Transport.

STRATEGY

Ongoing

Install offshore markers with the permission of the Department of Transport and only where there is a demonstrated need and no effective alternative.

9.3 MOORINGS

Moorings can be valuable safety assets, but they can also impinge upon the use of an area and imply rights to exclusive use. The location and design of moorings needs careful consideration to avoid environmental damage (eg, to seagrass beds) and to ensure public safety. CALM will liaise with the Department of Transport (DOT) on matters relating to moorings as DOT is responsible for marine safety and can revoke moorings or stop their installation where they pose a safety hazard.

If DOT gazettes a "proclaimed mooring area" it can also set standards for moorings. The management of these areas can then be delegated to other authorities where there are clear advantages in doing so. This will be investigated in the marine reserves.

Private moorings have been placed in several locations throughout the marine park, most notably at Monkey Mia and South Passage. Existing moorings have been laid for the purposes of the fishing industry, leisure craft and commercial tourist vessels.

There may be areas where it is unacceptable to allow anchoring because of the associated impacts (eg. on coral, seagrass) especially in heavily used recreational sites. In these cases it may be necessary to provide permanent moorings for use as an alternative to anchoring.

Monkey Mia's sheltered waters make it an ideal anchorage and it is a popular location as a stopover point for sea travellers. With the increasing popularity of the area, some problems may arise through too many boats congregating at Monkey Mia. Apart from the obvious congestion, a concern is the effect on water quality through the discharge of raw sewage and other refuse from moored boats. The ability to flush this waste is unknown and would be restricted under low tidal regimes. Currently, there are several fixed moorings owned by private individuals including some commercial fishermen. Numerous beach moorings for small craft have been installed at Monkey Mia. Management of these is being addressed by the Monkey Mia Management Committee. Liaison needs to be maintained with this committee.

The Monkey Mia recreation zone should be gazetted as a "proclaimed mooring area" to provide controls on the positioning, number and standard of moorings. There is no current need to set a ceiling on moorings, however this may be required in the future if demand increases. Anchoring should be actively discouraged in seagrass areas or where anchoring will cause congestion or create a hazard for other boats.

Given the range of issues associated with management of moorings, it will be necessary to develop a mooring strategy for the marine reserves in close liaison with the Department of Transport. This strategy will address the management of existing moorings, policies for installation of moorings, the needs of commercial operators and provision of permanent moorings to protect sensitive sites.

STRATEGIES

Ongoing

1. **Permit the location and installation of new moorings with approval from the Department of Transport and CALM. Only approved materials and designs will be allowed.**

2. **Liaise with the Monkey Mia Management Committee in regard to management of beach moorings at Monkey Mia.**

Short Term

3. **Develop a mooring strategy for the marine reserves in close liaison with the Department of Transport.**

4. **Determine the location of all existing moorings in the marine park and establish ownership.**

5. **Prohibit the installation of moorings in Little Lagoon.**

6. **Recommend to the Department of Transport that the Monkey Mia Recreation Zone be gazetted as a "proclaimed mooring area" and liaise with the Department over management arrangements. Approval for moorings will be required in respect of position and standard.**

7. **Monitor mooring numbers at Monkey Mia and set a ceiling where the extent and nature of moorings is representing a safety hazard or conflicting with dolphin protection or other recreational uses.**

8. **Develop a defined anchorage area at Monkey Mia in consultation with user groups and with respect to the location of seagrass beds. Discourage anchoring in sensitive areas.**

9.4 JETTIES

The Monkey Mia jetty is owned and managed by the Shire of Shark Bay. The Useless Loop and Denham jetties are outside the park and service commercial vessels and some recreational use. Private jetties have also been built on Dirk Hartog Island and Faure Island. The remains of the Gladstone jetty are of historic importance but offer no amenity for boats.

All jetties in the marine reserves must comply with provisions of the Jetties Act administered by the Department of Transport. Design, management and location of new jetties will require approval from the Department of Transport and CALM in liaison with the Local Authorities. The environmental impacts arising from such developments, including social and management factors such as extra parking and other facilities, will require full consideration.

Many boats which use the park are small dinghies which can be launched from ramps or sandy beaches, with no need for jetties or launching facilities. In the event that a jetty is necessary to service tourist operations, the cost of design, construction and maintenance may be borne partly or entirely by the commercial operators.

Submissions to the Monkey Mia Reserve draft management plan proposed the construction of a new jetty approximately 300m west of the existing Shire owned and managed jetty. The rationale for this proposal was that it would provide an alternative mooring facility for small boats which currently moor on the beach. This would assist in reducing congestion on the beach. Additionally, it would provide commercial tour boat operators with a place to load/unload passengers. This would help reduce boat and pedestrian traffic near the Dolphin Interaction Area.

There are potential impacts of this concept which need to be addressed. The proposal would involve dredging the shallow sand banks to permit vessels access for mooring. There is concern that the resulting boat activity may encourage dolphins away from the Dolphin Interaction Area and away from Ranger supervision. The visual impacts also need to be determined. If these environmental issues are resolved then arrangements for the jetty's use, ownership and responsibilities for maintenance will need to be determined before approval is considered.

STRATEGIES

Ongoing

1. **Assess all proposals for new jetties in relation to potential impacts on the marine reserves' values.**

Short Term

2. **Investigate the proposal to build a second jetty at Monkey Mia taking into account the possible environmental, social and management implications for the marine park and the Monkey Mia Reserve.**

9.5 MARINAS, GROYNES AND BREAKWATERS

Marinas, groynes and breakwaters may cause considerable environmental impact by altering existing patterns of tidal movement, sedimentation or distribution of marine fauna and flora. In the event that proposals for marinas, groynes or breakwaters within or adjacent to the marine reserves are put forward, they should be subject to an appropriate level of environmental assessment.

STRATEGIES

Ongoing

1. **Subject proposals for marinas, groynes and breakwaters to an appropriate level of environmental assessment.**

2. **Assess the impacts of adjacent marinas, groynes or breakwater developments on the marine reserves.**

Short Term

3. **Prohibit the construction of marinas, groynes and breakwaters in Sanctuary Zones, in the Monkey Mia, Little Lagoon and Dubaut Recreation Zones and in the Cape Peron, Big Lagoon and Boorabuggatta Special Purpose Zones.**

9.6 STRUCTURES AND PLATFORMS

Floating platforms exist in association with pearling leases and other structures exist such as the Hamelin Pool visitor boardwalk. It is likely that there will be future proposals for structures associated with aquacultural industries and whilst the approval of new fishing licences is the responsibility of the Fisheries Department, comments on the environmental and social impacts of such proposals will be provided by CALM and other relevant agencies.

Proposals to place platforms or structures for tourism purposes may range in scale from small swimming platforms and boardwalks to floating hotels.

STRATEGY

Ongoing

Assess potential environmental impacts, and user conflicts, of proposals to place structures in the marine reserves.

9.7 BOAT LAUNCHING

Boat ramps have been constructed at Denham, Monkey Mia, Nanga and Useless Loop, however boat launching is possible at numerous other sites within the marine reserves. Where possible these should be rationalised to minimise coastal degradation.

Boat launching off the beach may impact on coastal communities and on the marine environment. There may be a need to define launching sites at suitable locations to minimise these impacts.

STRATEGIES

Short Term

1. **Prohibit the construction of boat ramps at Little Lagoon and Dubaut Recreation Zones and in all Sanctuary Zones.**

2. **Monitor boat launching sites and implement controls where necessary to minimise coastal degradation (see Section 8.0).**

10.0 INFORMATION, INTERPRETATION AND EDUCATION

The objective is to increase visitor awareness, appreciation and understanding of values and management of the marine reserves and to encourage responsible use.

Meeting the expectations of visitors is a major challenge. Education and communication programs are important for promoting public awareness, appreciation and appropriate use of the marine environment. This is particularly the case in Shark Bay given the large areas and limited field staff. Information and education can play a vital role in encouraging appropriate behaviour, therefore minimising activities which impact on the marine reserves and minimising the need for enforcement. A comprehensive communication program is required to develop the public's awareness, understanding and support of regulations and restrictions in the marine reserves.

The information needs for the marine reserves will be determined by means of an interpretation plan. This will be developed in liaison with the Fisheries Department, Department of Transport, the WA Museum and other groups such as the Shires and pastoralists. It will address the priority issues highlighted in this management plan to tackle activities which threaten the marine reserves' values. The need for information and education is referenced throughout this plan.

The visitor centre at Monkey Mia was the only public education facility in Shark Bay in 1995 to provide information about dolphins, marine mammals and the marine environment. This plays an important role, however a facility to cater for future marine education and research programs is integral to successful management of the area.

Local people involved in businesses and commercial tourism operators which deal with visitors on a regular basis play a significant role in relaying information concerning the marine reserves. Training will be provided where possible to improve communication skills and understanding of the marine reserves and their management. This should result in visitors gaining a greater appreciation of the values of the marine reserves and promote appropriate behaviour.

STRATEGIES

Short Term

1. **Develop an interpretation plan for the marine reserves.**

2. **Address the long term needs and opportunities for information facilities, services, and educational activities and publications on the Shark Bay marine environment.**

3. **Provide information for boat users on safety requirements, conditions at sea and boating ethics. The Departments of Fisheries, Transport and CALM will consult over the requirements for a safe, minimal impact boating program.**

Medium Term

4. **Consider the establishment of a visitor facility for the provision of marine education and information in Shark Bay.**

5. **Provide training and promote guided tours conducted by appropriately trained persons to interpret the marine environment.**

6. **Conduct training sessions for local business people in order to enhance knowledge of the marine reserves.**

7. **Design and construct interpretive trails (walk, drive, boat, dive, fly) as resources permit. Use of trails will be monitored in association with operators where applicable.**

8. **Assist in the promotion of tours by schools and other appropriate groups.**

11.0 KNOWLEDGE

The objective is to plan and implement an integrated program of survey, research and monitoring in the marine reserves to:

- *increase knowledge of natural and cultural environments;*
- *assess visitor use including experiences and perceptions; and*
- *evaluate the effectiveness of management strategies.*

Implementing research and monitoring programs is pivotal to improving understanding of the oceanographic and biological processes, and visitor use of the marine reserves. The extent of research is restricted by the funds available and the remoteness of the reserves from marine research facilities.

Research programs should be designed to fill gaps in knowledge, and management oriented research and monitoring programs will be encouraged. Research which involves unwarranted manipulation or destruction of natural resources will not be approved.

The impacts that recreational and commercial uses have on natural resources and their potential for expansion without conflict, are fundamental issues to management of the marine reserves and economic development of the region. The monitoring of recreational fishing should be a priority.

Effective management of recreation and tourism and provision of quality opportunities require an understanding of existing and future uses of the reserves and resultant impacts. Recreation-oriented research includes undertaking visitor surveys, collecting visitor use data, and research and monitoring of the environmental and social impacts of particular recreation activities and facilities.

Information that is sought may include visitor profile data (such as numbers, types and patterns of use, origin of visitors), market segmentation, information requirements, recreation needs and expectations, attitudes, and visitors' appraisal of their stays. The information sought may be of a general nature, specific to a particular locality or development, or confined to participants in a particular recreation activity.

Ongoing recreation and tourism research and monitoring are required to ensure that strategies outlined in this plan are appropriate and to enable management to focus on areas under significant pressure to prevent or minimise impacts.

The Shark Bay World Heritage Property Scientific Advisory Committee will provide advice on research priorities, new information or developments in scientific knowledge, the scientific basis of management principles and practice, and maintaining World Heritage values. Users of the marine reserves, including recreational interests, commercial operators and recreational and commercial fishing interests, should have the opportunity to provide input to the committee, including, for example, in relation to research priorities.

The attractiveness of the area to overseas researchers indicates the potential for the establishment of an integrated research centre.

All research that involves removal of biota or interference with the natural environment will require a permit from CALM, or the Fisheries Department in the case of species subject to fishing. A permit may be issued subject to an evaluation of the impacts and benefits of the research project.

STRATEGIES

Ongoing

1. **Encourage and support management-orientated research and monitoring projects within the marine reserves.**

Short Term

2. **Encourage research into the ecology and oceanography of Shark Bay. All research programs should be sanctioned by permits from the relevant departments.**

3. **Monitor marine flora and fauna to gain an understanding of factors which influence marine communities in the marine reserves.**

4. **Encourage research and monitoring of fish stocks. Permits will be required for research in sanctuary zones.**

5. **Monitor recreational and commercial use in and adjacent to the marine reserves to determine the impacts of human use on marine communities.**

6. **Establish a biological inventory of habitats and species located in sanctuary zones as a base to monitor impacts of use in other zones.**

7. Implement monitoring programs in sanctuary, recreation, special purpose and general use zones to monitor habitat and species diversity.

8. Design and implement a recreation research and monitoring program including:
- **regular monitoring of visitor use including numbers of visitors and boats, types of recreational activities taking place and patterns of use;**
- **conducting more detailed visitor surveys to assess visitor impacts, expectations and attitudes, and preferences in terms of activities and facilities;**
- **giving priority to implementing a recreational fishing survey.**

9. Liaise with the WA Tourism Commission and other relevant agencies to coordinate research and monitoring of visitor use.

Medium Term

10. Establish marine research facilities as resources permit.

11. Investigate the establishment of an integrated research centre for Shark Bay, as resources permit.

12.0 IMPLEMENTATION

12.1 COMMUNITY LIAISON

The objective is to develop, encourage and facilitate liaison with the community and involvement in management of the marine reserves.

Ongoing liaison with the local community is essential, as is liaison with interests further afield. This is mostly achieved by day-to-day contact between CALM and Fisheries staff and members of the public, including direct contract when on patrol or giving talks, and indirect contact through brochures, signs and other media.

This management plan for the marine reserves has been prepared with the assistance of the Shark Bay Marine Reserves Advisory Committee, a representative body drawn primarily from local residents but with representation from outside the area as well.

A Shark Bay World Heritage Property Community Consultative Committee comprising a majority of local residents will be convened to provide advice on the management of the World Heritage Area. The committee will be consulted by CALM, the Fisheries Department, the Department of Transport and the NPNCA to assist with policy and decision-making processes for the marine reserves. The committee will not have responsibility for day-to-day management of the marine reserves.

STRATEGIES

Ongoing

1. **CALM and the Fisheries Department will communicate regularly with the local community, industry and interest groups to inform and seek advice on aspects of management of the marine reserves.**

2. **Encourage community involvement in the implementation of the management plan.**

3. **Encourage industry and community consultation and participation on research programs and priorities.**

12.2 RESOURCING, SURVEILLANCE AND ENFORCEMENT

The objective is to provide sufficient resources to enable appropriate management.

The marine reserves are managed by CALM staff based at Denham and Carnarvon. Fisheries Officers operating from Denham and Carnarvon enforce Fisheries Regulations. Other staff from CALM and the Fisheries Department provide support and assistance as necessary.

The current level of visitor numbers and the large area of the marine reserves can create difficulties for management. Increased visitor numbers will increase pressures on existing management resources. It is important that staff and resource levels are monitored to ensure that they are appropriate for management requirements. CALM, Fisheries Department and Department of Transport officers work in close liaison to ensure an integrated approach to day-to-day management of the marine reserves. This ensures that Government resources are used efficiently. There is also potential to utilise local government rangers with the appropriate training and skills in education, enforcement and surveillance operations. To facilitate this coordinated approach it will be necessary to provide reciprocal enforcement powers to some government officers. This will enable a greater management presence in the marine reserves. However this should occur after appropriate training has been provided.

Surveillance operations provide information on patterns of use, detect breaches of regulations and aid in detection and prevention of accidents. Surveillance and enforcement are particularly important in the initial years of management as they afford an opportunity to familiarise users with the rules and encourage compliance with regulations. Surveillance and enforcement also support users who abide by rules, by protecting their right to equitable use of resources.

Public attitudes towards the environment are such that more and more people are wanting to volunteer their time and services to become actively involved in conservation work. Volunteer work may involve wildlife surveys, assisting visitors, caring for injured wildlife or assisting researchers. Volunteers can be of great assistance to reserve management providing there are adequate staff resources for the establishment, supervision and continuation of programs.

Information and education are vital to encourage users of the marine reserves to respect and support the management effort and help minimise the resources required for enforcement. Implementation of an information and education program will be a high priority in management of the marine reserves.

STRATEGIES

Ongoing

1. **Subject to Departmental priorities and funding, provide adequate resources to enable the implementation of the management plan. Seek external funding from relevant sources as appropriate.**

2. **Ensure surveillance, educational and enforcement activities are coordinated between relevant CALM, Fisheries, Department of Transport and Local Government staff.**

Short Term

3. **Provide information to users on the values, wise use of the area and regulations applicable in the marine reserves.**

4. **Ensure appropriate powers are provided to Government enforcement officers to maximise efficiency of enforcement activities.**

Medium Term

5. **Facilitate reciprocal functions through provision of appropriate training for Government officers.**

6. **Establish a formal volunteer program as resources permit.**

12.3 SAFETY

The objective is to enhance the safety of users of the marine reserves.

A number of boating accidents have occurred in the marine reserves. Most incidents appear to have been due to a combination of factors, including inadequate information and knowledge of local conditions, inappropriate boats for the prevailing seas and lack of safety equipment. Inexperience or incompetence are often significant contributing factors.

Climatic conditions in Shark Bay can vary considerably and deteriorate in a very short time. Whilst conditions may appear safe when boats venture out, they can rapidly change to a situation where return is hazardous.

STRATEGIES

Ongoing

1. **Incorporate information on safety at sea into CALM's interpretive program for the marine reserves in consultation with the Department of Transport and the Police.**

2. **Assist the Police and the Department of Transport in search and rescue operations in the marine reserves.**

12.4 PLAN IMPLEMENTATION AND REVIEW

The objective is to implement strategies for management on a priority basis and review the plan as required.

This plan outlines a broad range of strategies designed to achieve optimum management of the marine reserves. These strategies require funding and will be implemented on a priority basis subject to the availability of resources. The strategies have been allocated into groups depending on their priority and the likely timeframe for implementation and are summarised in Table 3. The strategies are either ongoing (ie. already being implemented or implemented on an as required basis); short term (ie. likely to be implemented within the first five years of the plan) or medium term (ie. likely to be implemented after the first five years). The allocation of these priorities is a guide only. The timing of the implementation of strategies may change subject to priorities and the availability of resources. Priorities will be reviewed on an annual basis or as circumstances change.

An implementation plan will be prepared which will schedule the implementation of strategies. This will be reviewed annually and, in this process, strategies that have been implemented will be identified and new information which may affect management will be assessed.

The vesting body, the NPNCA, has responsibility for monitoring implementation of the management plan and will call for progress reports from time to time. In addition the World Heritage Property Community Consultative Committee is likely to provide advice on the implementation of, and proposed changes to, the plan.

This plan will be current for up to 10 years from the date of Ministerial approval and will remain so until it is reviewed and a new plan approved. Amendments to the plan can occur, however these changes can only be made after going through the statutory public consultation process. The 10 year review should identify the extent to which the objectives have been achieved and strategies implemented, the reasons for lack of achievement or implementation, and assess new information which may affect management. The review may also propose changes and new strategies where appropriate.

STRATEGIES

Ongoing

1. **Actively seek resources to implement this plan.**

2. **Review the implementation plan annually and prepare an annual progress report.**

3. **The NPNCA will monitor the implementation of the Shark Bay Marine Reserves management plan as required under the CALM Act.**

Short Term

4. **Prepare an implementation plan, taking into consideration priorities as allocated in the management plan.**

Medium Term

5. **Review the plan within 10 years from the date of Ministerial approval of the plan.**

6. **Allocate resources for monitoring of a mid term review of this plan.**

TABLE 3 STRATEGIES BY LEVEL OF PRIORITY

ONGOING PRIORITY

3.3 Interagency Responsibilities

1. Liaise with relevant agencies and individuals to ensure management of the coast and the marine reserves is integrated and in accord with appropriate legislation.

3.4 International Treaties

1. Ensure management of the marine reserves meets obligations under the World Heritage Convention.
2. Ensure that management of the marine reserves conforms with the obligations of all other applicable international treaties.
3. Seek Commonwealth cooperation and assistance for management to satisfy national and international obligations.

5.2 Geology and Geomorphology

Control recreational or commercial activities which have the potential to cause significant disturbance to the seafloor or coastal landforms.

5.4.1 Microbial Communities

1. Control human activities that would result in the loss or movement of sediments on the Faure Sill.
2. Ensure site developments avoid or minimise damage to microbial structures.

5.4.2 Seagrass Communities

1. Minimise actual or potential damage to seagrass communities.
2. Encourage research into the diversity and habitat dynamics of seagrass communities.

5.4.3 Mangrove Communities

1. Assess potential impacts of aquaculture activities, coastal development and recreation and other proposals likely to impact on mangrove communities, and act to minimise these impacts.

5.5.2 Other Invertebrates

1. Manage recreational collecting of invertebrates as detailed in the strategies in Section 6.5.
2. Manage commercially collected invertebrate species within the marine reserves according to the strategies in Section 7.1.
3. Consider the effects on invertebrate communities when assessing the impacts of developments, visitor use and marine pollution.

5.5.3 Fish

1. The licensing of new sustainable commercial fisheries which are compatible with the park will be controlled by the Fisheries Department in consultation with CALM.
2. License commercial fish feeding activities where compatible with the park in liaison with the Fisheries Department.

5.5.4 Reptiles

1. Monitor recreational use of turtle nesting sites and control this where it is impacting on nesting activities.

5.5.5 Birds

1. Manage recreational and commercial activities to minimise disturbance to birdlife.

5.5.6 Dugongs

1. Control activities which may adversely impact on dugongs.

5.5.7 Bottlenose Dolphins

1. Regularly review interaction procedures and the feeding strategy for the dolphins and recommend changes to the Monkey Mia Management Committee as required.
2. Monitor visitor numbers and control if necessary to preserve the quality of the interaction experience and to protect the dolphins.

5.5.8 Whales

1. Manage whale watching activities as detailed in Section 5.5.9 (Wildlife Interaction).

ONGOING PRIORITY cont.

5.5.9 Wildlife Interaction

1. License acceptable commercial operations involved with wildlife interaction and determine appropriate conditions.
2. Permit access to seasonal wildlife events only where human presence will not threaten the natural activity.
3. Monitor public visitation and impacts of interaction on wildlife events (for example, turtle nesting) and take action where adverse impacts are occurring.
4. Allow commercial operators to carry out fish feeding activities subject to licence by CALM and approval of the Fisheries Department.

5.6 Seascape and Landscape

1. Assess potential impacts of developments, uses and management on visual seascape and landscape values and minimise these impacts where appropriate.

5.7 Aboriginal Cultural Heritage

1. Liaise with the WA Museum and the Aboriginal Affairs Department regarding activities associated with the marine reserves which may impact on Aboriginal sites.
2. Monitor Aboriginal hunting activities in the marine reserves in liaison with local Aboriginal communities.

5.8 Other Cultural Heritage

1. Liaise with the WA Maritime Museum and the Heritage Council over marine and associated coastal activities which could impact on cultural heritage sites.

5.9 Marine Pollution

1. Continue to liaise with the DEP on marine pollution management. Ensure that new proposals to discharge toxic or hazardous substances are referred to the DEP.
2. Liaise with the DEP and Shark Bay Salt to ensure that dredging operations, including dredge spoil disposal in the marine park, are managed to minimise adverse impacts on the marine park.

5.10 Aircraft

1. Liaise with the Civil Aviation Authority and the Royal Australian Air Force to avoid, wherever possible, disturbance to wildlife and users of the marine reserves as a result of aircraft use.

6.1 Recreation, Tourism and Visitor Use

1. Ensure that recreation developments and activities do not detract from or adversely impact on the conservation values of the reserves.
2. Maintain close liaison with pastoralists, Shires and other relevant land managers in regard to planning for and managing coastal access and recreational activities.
3. Monitor marketing and promotion of the marine reserves and liaise with relevant agencies (eg. WA Tourism Commission) to ensure it is accurate and consistent with management directions.

6.2 Commercial Concessions

1. License commercial operations where they are compatible with this management plan and the proper maintenance of the reserves' values.
2. Permit filming for commercial purposes where this is compatible with management of the marine reserves. Fees will be levied where this involves CALM staff or equipment.
3. Liaise with relevant agencies and operators to ensure that promotional material is accurate and that it does not create environmental or management problems as a result of the information supplied.
4. Develop licence conditions in liaison with relevant authorities.
5. Maintain liaison with the Monkey Mia Management Committee for commercial operations which occur on both the marine park and the Monkey Mia Reserve.

6.3 Charter Boats

1. License charter operations which are compatible with the maintenance of the reserves' values in accordance with the CALM Act.
2. The Fisheries Department will determine the number of fishing charter boats that can operate in the marine reserves and conditions related to fishing which will ensure the maintenance of fish stocks.
3. Encourage activities that protect and promote the values of the marine reserves and which minimise impacts on other users.
4. Determine appropriate licence conditions for charter operators to ensure public safety and education, the protection of conservation values and the maintenance of fish stocks.
5. Liaise with charter operators in the development of strategies relating to charter operations.
6. Encourage operators to maintain high standards of operation particularly in relation to the information provided to visitors.

ONGOING PRIORITY cont.

6.3 Charter Boats cont.

7. Permit acceptable concessions in all zones, with the most stringent assessment and environmental requirements for Sanctuary zones.
8. Monitor charter operations and impose limits on the number of vessels where necessary to minimise environmental damage and impacts on other users.

6.4 Recreational Fishing

1. Permit recreational fishing in the General Use Zone and compatible recreational fishing activities in Recreation and Special Purpose Zones. Recreational fishing will not be permitted in the marine nature reserve, Sanctuary Zones or in the Dolphin Interaction Area at Monkey Mia (see Section 4.2.2).
2. The Fisheries Department will manage recreational fishing in the marine park on a sustainable basis.

6.7 Boating and Surface Water Sports

1. Liaise with the Department of Transport to control recreational boating and anchoring where conservation values are threatened or if conflicts arise with other users.
2. Approve compatible organised sporting events and impose conditions where necessary to minimise impacts.

7.1 Commercial Fishing

The licensing of new sustainable commercial fisheries which are compatible with the marine park's values will be controlled by the Fisheries Department in consultation with CALM.

7.1.1 Trawling

1. Ensure prawn ~~and scallop~~ nursery areas are protected from activities which could impact on nursery areas.

7.1.2 Wetlining

1. Allow commercial wetlining in the marine park in areas zoned General Use and in Special Purpose Zones (Section 4.0).
2. The Fisheries Department will monitor the commercial wetline catch and undertake research as required to ensure the continued sustainability of this fishery.
3. Provide protection for species at risk of overfishing as recommended by the Fisheries Department.

7.1.3 Beach Seine and Mesh Net Fishing

Allow commercial beach seine fishing in the General Use and Special Purpose Zones (Section 4.0).

7.1.4 Crab Trapping

1. Allow commercial crabbing in the marine park in General Use Zones, and in the Wooramel, Freycinet and Gladstone (summer only) Special Purpose Zones (Section 4.0).

7.1.5 Rock Oysters

1. Allow commercial oyster picking in the marine park in areas zoned for General Use (Section 4.0).
2. The Fisheries Department to manage commercial collecting of oysters to ensure that the activity is sustainable.

7.1.6 Rock Lobsters

1. Allow commercial rock lobster fishing in the General Use Zone.

7.1.8 Aquaculture

1. Allow aquaculture operations ~~only~~ in areas where there will be minimal impact on the marine park's values. Operations will not be permitted in the marine nature reserve and in Sanctuary and Recreation Zones.
2. Assess applications for aquaculture operations ~~in liaison with the Fisheries Department~~ through the Inter-Departmental Committee for Aquaculture (IDCA) and other relevant organisations with regard to impacts on the park's conservation, commercial, recreation and social values.
3. Support the review and application assessment criteria as determined by the ~~Inter-Departmental Committee for Aquaculture~~ IDCA in the consideration of new aquaculture proposals.
4. The Fisheries Department will continue to license and manage aquaculture operations in liaison with CALM.
5. Applications for operations which propose the use of exotic species will not be approved.

ONGOING PRIORITY cont.

7.2.1 Petroleum Exploration

1. Maintain liaison between the petroleum industry, the Department of Minerals and Energy, the Department of Environmental Protection and CALM to ensure that adequate conditions are set and followed to minimise any detrimental effects caused to the environment within the marine reserves from any petroleum exploration or production.
2. In accordance with Government policy, require proponent companies to carry out a comprehensive assessment of biological values, petroleum prospectivity and potential risk to conservation values in regard to the proposal. Use this information to determine areas of the marine park in which it might be possible to carry out petroleum drilling and production.

7.2.2 Salt Production

Liaise with Shark Bay Salt, DRD, the Department of Environmental Protection and the Department of Minerals and Energy to minimise impacts on the marine park.

7.2.4 Other Extractive Industries

1. Assess proposed extractive uses adjacent to the marine reserves to minimise impacts on the reserves.

8.0 Coastal Land Use

1. Integrate management of the marine reserves with management of adjacent pastoral land in consultation with the pastoralists concerned.
2. Maintain existing access for commercial fishers and assess requirements for additional access.
3. Coordinate management of the marine reserves with management of nature reserve islands.

8.2 Hamelin Pool Coast

1. Ensure that access to the Hamelin Pool coastline for tours, education, research or other uses is restricted to controlled or guided activities authorised by permission from CALM and the relevant lessee.
2. Liaise with relevant departments, and the managers of the Telegraph Station and Hamelin Station, to ensure that tourism development does not impact on the marine nature reserve's values.
3. Liaise with the managers of the Telegraph Station to promote visitor awareness and appreciation of the area's values.
4. Do not provide public boat launching facilities in Hamelin Pool.

8.3 Peron Peninsula Coast

1. Monitor and, if necessary, control visitor activities at sites with wildlife sensitive to disturbance.

8.4 Nanga Coast

1. Liaise with the Department of Environmental Protection, Department of Minerals and Energy, the Shire and mining lessees to ensure that operations for the extraction of coquina do not adversely affect marine park values or detract from the interpretive qualities of the area.

8.6 Dirk Hartog and Faure Islands

1. Ensure that proposals for tourism development on Dirk Hartog Island consider the impacts on the marine reserves.

9.1 Fish Aggregating Devices and Artificial Reefs

1. Assess proposals for FADs or artificial reefs in liaison with the Fisheries Department and the Department of Transport.

9.2 Navigation and Other Markers

Install offshore markers with the permission of the Department of Transport and only where there is a demonstrated need and no effective alternative.

9.3 Moorings

1. Permit the location and installation of new moorings with approval from the Department of Transport and CALM. Only approved materials and designs will be allowed.
2. Liaise with the Monkey Mia Management Committee in regard to management of beach moorings at Monkey Mia.

9.4 Jetties

1. Assess all proposals for new jetties in relation to potential impacts on the marine reserves' values.

ONGOING PRIORITY cont.

9.5 Marinas, Groynes and Breakwaters

1. Subject proposals for marinas, groynes and breakwaters to an appropriate level of environmental assessment.
2. Assess the impacts of adjacent marinas, groynes or breakwater developments on the marine reserves.

9.6 Structures and Platforms

Assess potential environmental impacts, and user conflicts, of proposals to place structures in the marine reserves.

11. Knowledge

1. Encourage and support management-orientated research and monitoring projects within the marine reserves.

12.1 Community Liaison

1. CALM and the Fisheries Department will communicate regularly with the local community, industry and interest groups to inform and seek advice on aspects of management of the marine reserves.
2. Encourage community involvement in the implementation of the management plan.
3. Encourage industry and community consultation and participation on research programs and priorities.

12.2 Resourcing, Surveillance and Enforcement

1. Subject to Departmental priorities and funding, provide adequate resources to enable the implementation of the management plan. Seek external funding from relevant sources as appropriate.
2. Ensure surveillance, educational and enforcement activities are coordinated between relevant CALM, Fisheries, Department of Transport and Local Government staff.

12.3 Safety

1. Incorporate information on safety at sea into CALM's interpretive program for the marine reserves in consultation with the Department of Transport and the Police.
2. Assist the Police and the Department of Transport in search and rescue operations in the marine reserves.

12.4 Plan Implementation and Review

1. Actively seek resources to implement this plan.
2. Review the implementation plan annually and prepare an annual progress report.
3. The NPNCA will monitor the implementation of the Shark Bay Marine Reserves management plan as required under the CALM Act.

SHORT TERM PRIORITY

2.2.2 Shark Bay Marine Reserves

1. Cancel Reserve 30885 for the Protection of Sedimentary Deposits and incorporate the area into the adjoining marine park or marine nature reserve.
2. Vest the 40m strip of VCL adjoining the marine park with the NPNCA as marine park (excluding Faure Island and VCL leased for other purposes).
3. Vest the 40m strip of VCL adjoining the marine nature reserve with the NPNCA as marine nature reserve.
4. Consider including the waters adjoining Bernier and Dorre Islands and the waters west of Dirk Hartog Island and Edel Land in the marine park on the basis of their biological values and existing and proposed use.
5. Define the marine park boundary using coordinates and straight lines which closely approximate the existing boundary, in liaison with relevant organisations. Gazette this redefined boundary.

3.3 Interagency Responsibilities

2. Develop Memoranda of Understanding between CALM and the Fisheries Department, Department of Transport and other relevant organisations which detail management arrangements and maximise Government efficiency through coordination of staff, equipment, vessels and provision of information.

3.4 International Treaties

4. Identify and protect areas within the marine reserves that are important for migratory birds covered by the JAMBA and CAMBA agreements.

4.2.4 General Use Zones

1. Implement the zoning plan as described above and illustrated in Figure 4.

2. Proclaim regulations and notices under the appropriate legislation to enable the management of uses and activities in the marine reserves, consistent with the zoning plan.

SHORT TERM PRIORITY cont.

5.1 Climate and Oceanography

Encourage research into water circulation, salinity and temperature fluctuations in Shark Bay and utilise this information in marine reserve management and assessment of proposed developments in, and affecting, the marine reserves.

5.3 Marine Habitats

1. Develop a comprehensive habitat map for the marine reserves.
2. Encourage research into the community structure of each habitat to facilitate monitoring programs (see Section 11.1).
3. Determine the condition of habitats to enable determination of priorities for management.

5.4.1 Microbial Communities

3. Implement education programs to increase public awareness of the nature, sensitivity and importance of microbial communities.

5.4.2 Seagrass Communities

3. Promote public awareness of the significance of seagrass to Shark Bay and the consequences of damaging seagrass beds.
4. Provide information on responsible boating for seagrass protection, with particular regard to navigation, anchoring and speed.

5.4.3 Mangrove Communities

2. Investigate the impacts of netting within mangrove creeks and act to minimise any adverse impacts.
3. Determine acceptable access points, prepare site development plans and prioritise works for recreation sites adjacent to mangrove areas. All inappropriately positioned sites will be closed to public access.

5.5.1 Coral Communities

1. Prohibit the collection of live corals within the marine reserves except by permit for research purposes.
2. Survey and assess coral distribution, diversity and conditions within the marine reserves.
3. Consult with relevant groups on the management of coral sites and implement management strategies as necessary.
4. Prepare a mooring strategy in liaison with the Department of Transport that considers the requirements of both present and future boat users, the need for permanent moorings and the protection of the marine environment and its natural inhabitants.
5. Educate boat users to anchor in sand clear of coral and seagrass.
6. Assess current impacts on coral communities and take action to prevent further damage.

5.5.2 Other Invertebrates

4. Encourage research into the biology of *Fragum erugatum*.

5.5.3 Fish

3. Provide legislative protection for species not fished (eg. Manta Rays) and liaise with the Fisheries Department to give special protection to species in need of it (eg. Queensland Groper).

5.5.4 Reptiles

2. Conduct further research into turtle nesting in the marine reserves and utilise volunteers to monitor these activities.
3. Conduct research into the turtle population with respect to population trends, biology, foraging patterns and interaction with commercial and recreational use, and take action to reduce or eliminate any adverse impacts.

5.5.6 Dugongs

2. Encourage further research on dugong distribution, abundance, biology and behaviour in the reserves.
3. Implement a long-term population monitoring program for dugongs.

5.5.7 Bottlenose Dolphins

3. Instigate an education program to increase public awareness of the potential threat to dolphin health from the unrestricted feeding of dolphins and inappropriate interaction.
4. Encourage dolphin research with priority given to studies that assist the management of the dolphin-human interaction phenomenon or that increase knowledge of dolphin ecology.

SHORT TERM PRIORITY cont.

5.5.9 Wildlife Interaction

5. Discourage fish feeding by visitors at popular visitor sites within the reserves.
6. Develop interaction guidelines for each species of interest in the marine reserves.
7. Provide legislative protection for species targeted for non-extractive activities.
8. Provide information to the public on opportunities and guidelines for wildlife interaction in the marine park.
9. Prohibit commercial dugong watching tours in the Gladstone Special Purpose Zone.

5.7 Aboriginal Cultural Heritage

3. Determine suitable management arrangements for Aboriginal hunting activities in the marine reserves in consultation with Aboriginal groups in Denham and Carnarvon. Appropriate areas and catch levels should be determined.

5.8 Other Cultural Heritage

2. Provide interpretive and educational materials and opportunities for visitors to appreciate the maritime cultural history in liaison with the WA Maritime Museum.

5.9 Marine Pollution

3. Conduct testing of specific sites to determine the presence of foreign organisms as a result of bilge and ballast discharge.
4. Liaise with the DEP, the Department of Transport, the Fisheries Department and AQIS to ensure there is adequate monitoring of compliance with guidelines for ballast and bilge discharge.
5. Develop and implement a long term water quality monitoring program with a focus on waters, including groundwater, adjacent to potential pollution sources.
6. Prepare a contingency plan for emergency pollution and oil spill situations.
7. Inform visitors and local residents of guidelines and regulations concerning marine pollution, including disposal of bilge, waste water, fish waste and litter and the implications of such pollution of the marine environment.
8. Liaise with the Department of Transport to ensure the careful use of antifouling products.
9. Require sullage tanks on all new or replacement commercial tourism concession vessels and encourage existing operators to fulfil this requirement.
10. Develop and implement regulations to prevent discharge of bilge and sullage in Sanctuary, Recreation and Special Purpose Zones.
11. Encourage local authorities to provide facilities for the removal and treatment of sullage from vessels at major ports and anchorages.
12. Encourage relevant authorities to ensure that coastal developments do not result in the release of effluent or pollution into the marine reserves.
13. Establish and maintain an inventory of significant sources of direct and indirect discharges into the marine reserves and monitor water quality at key locations, eg. Monkey Mia.
14. Liaise with relevant authorities to minimise the impacts of discharges into the marine reserves.
15. Encourage the provision of shore-based fish waste disposal systems for recreational and commercial fishers.

5.10 Aircraft

2. Identify areas within the marine reserves where low flying may impact on wildlife or the visitor experience.

6.1 Recreation, Tourism and Visitor Use

4. Seek resources to provide facilities commensurate with the demands placed on the reserves.
5. Provide for a broad spectrum of recreational activities in the marine reserves.

6.2 Commercial Concessions

6. Provide training and information to operators to enhance the quality of nature-based tourism concessions.

6.3 Charter Boats

9. Provide information and training for charter boat operators relevant to the protection of the marine reserves' values.
10. Record and monitor charter boat monthly catch and effort details, places visited and numbers of passengers taken.
11. Prohibit spearfishing from charter boats.
12. Ensure the mooring strategy (see Section 9.3) considers the current and future needs of charter vessels, other boat users and the marine environment.

SHORT TERM PRIORITY cont.

6.4 Recreational Fishing

3 The Fisheries Department will review the management requirments for recreational fisheries in the area and develop a recreational fisheries management program which takes into account other values of the marine park.

4. The Fisheries Department, in conjunction with CALM, will implement education and interpretation programs to increase public understanding of recreational fishing regulations and awareness of related conservation values.

5. The Fisheries Department will design and implement monitoring programs to assist in management of recreational fishing and review of the zoning plan.

6.5 Collecting

1. Prohibit the collection of all species for private purposes in Sanctuary Zones and in the marine nature reserve.
2. Determine species which will be protected from collection and provide the necessary legislation to achieve this.
3. The Fisheries Department, in liaison with CALM, to determine acceptable bag and size limits, and collection methods for species which will be able to be collected for private purposes.
4. Allow collection of biota for research, study and reference purposes by permit only and subject to conditions (see Section 11.0).

6.6 Diving

1. Provide information on marine natural history and opportunities for diving in the marine reserves.
2. Encourage visitors to obtain information on potential hazards in the reserves and take appropriate precautions. Information will be available at the CALM District Office.
3. Liaise with the State Emergency Service and Police to establish procedures for the treatment of diving accidents within the reserves in accordance with approved practices.
4. Investigate establishment of interpretive dive trails in the reserves.
5. Monitor popular dive sites and take action as necessary to protect areas being damaged as a result of diving activities.

6.7 Boating and Surface Water Sports

3. Provide information for recreational boat users to minimise environmental impacts as a result of boat use and anchoring.
4. Incorporate into interpretive materials information on recreational boat safety requirements, regulations and local conditions in liaison with the Department of Transport.
5. Prohibit jet skis and waterskiing and determine appropriate speed limits and watercraft for the Monkey Mia Recreation Zone in liaison with the Department of Transport to minimise the disturbance to dolphins and visitors.
6. Prohibit boating access within the Dolphin Interaction Area in the Monkey Mia Recreation Zone. Access to the jetty by professional fishing boats will be maintained.
7. Prohibit the use of motorised watercraft at Little Lagoon except for rescue craft at sporting events in liaison with the Department of Transport and the Shire of Shark Bay.
8. The Fisheries Department will monitor fish populations in Little Lagoon to determine impacts of recreational activities.
9. Prohibit boating access within the areas defined in the Gladstone Special Purpose Zone for the defined periods (see Section 4.2.3) and review as information becomes available.

7.1.1 Trawling

2. Establish a working group comprising representatives from the NPNCA, CALM, Fisheries Department and trawling industry to review the existing marine park boundaries and propose modifications, using latitude and longitude coordinates and straight lines, which better facilitate management of prawn and scallop fisheries and protection of seagrass beds and other relevant conservation values.
3. Progress boundary changes proposed by the working group.

7.1.2 Wetlining

4. Liaise with the Fisheries Department with a view to revoking the one commercial fishing licence in the Hamelin Pool Marine Nature Reserve.

7.1.4 Crab Trapping

2. The Fisheries Department to take steps to implement a monitoring program to determine if there is a need to introduce pot limits for the fishery.

7.1.6 Rock Lobsters

2. Prohibit the use of lobster holding cages in the Surf Point Sanctuary Zone.

SHORT TERM PRIORITY cont.

7.1.7 Commercial Aquarium Collection

1. Allow commercial collecting of aquarium species in the General Use zone only.
2. The Fisheries Department will design and implement a monitoring program to determine quantities removed and impacts on populations and habitat. Limits will be imposed as required.
3. The Fisheries Department will liaise with commercial aquarium collectors to determine the species which may be commercially collected. All other species will be protected from commercial collecting.

7.2.4 Other Extractive Industries

2. Encourage research into the natural processes which influence the shell deposits at Lharidon Bight.

8.0 Coastal Land Use

4. Liaise with Shires, pastoral lessees and other relevant organisations to determine and implement appropriate management of coastal lands including:
   - where, and to what extent, public access and use of the coast or adjacent marine resources can be sustained without incurring unacceptable levels of degradation or disturbance;
   - areas where development or access should be discouraged;
   - management arrangements.
5. Vest the adjoining 40m wide strip of VCL in the NPNCA as marine park and in the case of Hamelin Pool, as marine nature reserve (with the exception of Faure Island and VCL leased for other purposes).
6. Liaise with Shires, pastoral lessees and other relevant Departments in preparing recreation development plans to cater for existing and future coastal use.
7. Where appropriate appoint Honorary CALM Officers to assist with the management of recreation on the coast and offshore areas.
8. Provide information at key sites to interpret marine features and advise visitors of any regulations or requirements relating to their use of the marine reserves.

8.1 Wooramel Coast

1. Liaise with the Shire of Carnarvon and lessees of Brick House, Edagee, Wooramel and Yaringa Stations to restrict public access to agreed sites on the coast between Greenough Point and Gladstone.
2. Assist the Shire of Carnarvon to prepare and implement recreation and site development plans for Gladstone and the coast north of Greenough Point. These plans should aim to enhance the visitors' experience and minimise their impacts on the coastal environment.

8.2 Hamelin Pool Coast

5. Develop the Flagpole Landing area as the only public facility for access to stromatolites and other features of Hamelin Pool Marine Nature Reserve.
6. Liaise with lessees to ensure that public access to the Hamelin Pool coastline (other than that at Flagpole Landing) is restricted by the use of gates, fences, signs, etc.
7. Monitor visits to restricted areas of the marine nature reserve through liaison with the lessees of Yaringa, Carbla, Hamelin and Nanga Stations.

8.3 Peron Peninsula Coast

2. Liaise with the Shire and other relevant agencies to determine and implement management arrangements for south Peron which achieve high standards for managing coastal recreational use.
3. Prepare and implement a recreation development plan for the National Park ensuring that any development protects and restores the coastline's physical stability and visual quality and provides onshore facilities to access and interpret marine resources.
4. Restrict vehicle access to and around Little Lagoon to designated tracks, in liaison with the Shire of Shark Bay.
5. Restrict vehicle access on Shell Beach.

8.4 Nanga Coast

2. Liaise with the lessee of Nanga Station to restrict public access for recreation on the Nanga coast, other than at the Nanga Holiday Village.

SHORT TERM PRIORITY cont.

8.5 Tamala and Carrarang Station

1. Liaise with the lessees of Carrarang and Tamala Stations, the Shire and other relevant agencies to integrate coastal recreation planning, management and development with management of the marine park.
2. Liaise with the station lessees in regard to management of the Carrarang and Tamala coastlines. There is a need to assess the area's capacity to sustain visitor use and identify:
   - areas suitable for low key recreation development;
   - areas suitable for more intensive recreation development;
   - sites which are degraded or sensitive to disturbance;
   - sites and tracks which need to be upgraded, closed or rehabilitated;
   - the capacity of camp sites;
   - facilities which should be provided at each site (eg. toilets, vehicle barriers, boat launching, rubbish receptacles, information, etc.)
3. In conjunction with lessees monitor the impacts of visitor use along the Tamala and Carrarang coast and identify the requirements to manage use at locations sensitive to disturbance.

8.5 Tamala and Carrarang Station cont.

4. Provide information to interpret the area's marine features and to advise visitors of the regulations and code of conduct relating to their use of the marine park.
5. Encourage the lessees of Carrarang Station to maintain restrictions on access to Bellefin Prong.

8.6 Dirk Hartog and Faure Islands

2. Liaise with the lessees of Dirk Hartog and Faure Islands to integrate recreation use and development with management of the marine park.
3. In conjunction with lessees, monitor use of the Dirk Hartog and Faure coastlines and identify the requirements to manage use at locations sensitive to disturbance.

9.1 Fish Aggregating Devices and Artificial Reefs

2. Prohibit the use of FADs or installation of artificial reefs in Sanctuary Zones.

9.3 Moorings

3. Develop a mooring strategy for the marine reserves in close liaison with the Department of Transport.
4. Determine the location of all existing moorings in the marine park and establish ownership.
5. Prohibit the installation of moorings in Little Lagoon.
6. Recommend to the Department of Transport that the Monkey Mia Recreation Zone be gazetted as a "proclaimed mooring area" and liaise with the Department over management arrangements. Approval for moorings will be required in respect of position and standard.
7. Monitor mooring numbers at Monkey Mia and set a ceiling where the extent and nature of moorings is representing a safety hazard or conflicting with dolphin protection or other recreational uses.
8. Develop a defined anchorage area at Monkey Mia in consultation with user groups and with respect to the location of seagrass beds. Discourage anchoring in sensitive areas.

9.4 Jetties

2. Investigate the proposal to build a second jetty at Monkey Mia taking into account the possible environmental, social and management implications for the marine park and the Monkey Mia Reserve.

9.5 Marinas, Groynes and Breakwaters

3. Prohibit the construction of marinas, groynes and breakwaters in Sanctuary Zones, in the Monkey Mia, Little Lagoon and Dubaut Recreation Zones and in the Cape Peron, Big Lagoon and Boorabuggatta Special Purpose Zones.

9.7 Boat Launching

1. Prohibit the construction of boat ramps at Little Lagoon and Dubaut Recreation Zones and in all Sanctuary Zones.
2. Monitor boat launching sites and implement controls where necessary to minimise coastal degradation (see Section 8.0).

10. Information, Interpretation and Education

1. Develop an interpretation plan for the marine reserves.
2. Address the long term needs and opportunities for information facilities, services, and educational activities and publications on the Shark Bay marine environment.
3. Provide information for boat users on safety requirements, conditions at sea and boating ethics. The Departments of Fisheries, Transport and CALM will consult over the requirements for a safe, minimal impact boating program.

SHORT TERM PRIORITY cont.

11. Knowledge

2. Encourage research into the ecology and oceanography of Shark Bay. All research programs should be sanctioned by permits from the relevant departments.
3. Monitor marine flora and fauna to gain an understanding of factors which influence marine communities in the marine reserves.
4. Encourage research and monitoring of fish stocks. Permits will be required for research in sanctuary zones.
5. Monitor recreational and commercial use in and adjacent to the marine reserves to determine the impacts of human use on marine communities.
6. Establish a biological inventory of habitats and species located in sanctuary zones as a base to monitor impacts of use in other zones.
7. Implement monitoring programs in sanctuary, recreation, special purpose and general use zones to monitor habitat and species diversity.

11. Knowledge cont.

8. Design and implement a recreation research and monitoring program including:
   - regular monitoring of visitor use including numbers of visitors and boats, types of recreational activities taking place and patterns of use;
   - conducting more detailed visitor surveys to assess visitor impacts, expectations and attitudes, and preferences in terms of activities and facilities;
   - giving priority to implementing a recreational fishing survey.
9. Liaise with the WA Tourism Commission and other relevant agencies to coordinate research and monitoring of visitor use.

12.2 Resourcing, Surveillance and Enforcement

3. Provide information to users on the values, wise use of the area and regulations applicable in the marine reserves.
4. Ensure appropriate powers are provided to Government enforcement officers to maximise efficiency of enforcement activities.

12.4 Plan Implementation and Review

4. Prepare an implementation plan, taking into consideration priorities as allocated in the management plan.

MEDIUM TERM PRIORITY

4.2.4 General Use Zones

3. Review the zoning plan if a need is identified within the life of this plan and make changes where appropriate after public consultation.

5.4.2 Seagrass Communities

5. Identify aspects of existing and proposed activities, including commercial operations, which are damaging or which risk damaging the health of seagrass communities.

5.4.3 Mangrove Communities

4. Collate data on the distribution of mangroves in the marine reserves.
5. Develop education programs to promote public understanding of mangrove communities and the regulations which apply to protection of these sensitive areas.

5.5.2 Other Invertebrates

5. Encourage research into the diversity and distribution of invertebrates within the marine reserves.

5.5.4 Reptiles

4. Provide information to users on interaction with nesting turtles and on seasnake biology and behaviour.

5.5.5 Birds

2. Assess the reserves' birdlife distribution, susceptibility to disturbance and identify sources of disturbance.
3. Provide information and interpretation to the public on important breeding and roosting areas for birds in and adjacent to the marine reserves and on possible impacts of disturbance to birdlife.

5.5.6 Dugongs

4. Investigate and report on any observed cases of dugong breeding or calving in the reserves.
5. Encourage the wise management of important dugong habitats outside the reserves.

MEDIUM TERM PRIORITY cont.

5.5.7 Bottlenose Dolphins

5. Encourage research on the inshore hunting behaviours of dolphins at Cape Peron, and control human activities that may disturb this behaviour.
6. Investigate and document reports of dolphin beaching behaviour for locations other than Cape Peron within the marine park.

5.5.8 Whales

2. Devise programs to encourage commercial boat operators and the public to report whale sightings within the marine park.
3. Develop a system to record information on whale identification, location, movement and activity.
4. Undertake surveys to determine and monitor whale populations.

5.6 Seascape and Landscape

2. Classify and evaluate the visual seascapes and landscapes of the marine reserves.

5.7 Aboriginal Cultural Heritage

4. Develop interpretive and educational opportunities for visitors relating to Aboriginal cultural heritage in liaison with local Aboriginal communities.

5.8 Other Cultural Heritage

3. Encourage the identification and protection of sites in or adjacent to the marine reserves.

6.5 Collecting

5. Design and implement a monitoring program to determine the effects of collecting on the marine environment. This should examine the impacts on species abundance and diversity and indirect impacts on the marine environment.

7.1.1 Trawling

4. Implement controls on the disposal of scallop shells from trawlers in the marine park if there is evidence that this activity is impacting on the values of the area.

7.2.3 Gypsum Mining

Provide advice on applications for gypsum mining to the Department of Environmental Protection to minimise impacts on the marine reserves.

8.0 Coastal Land Use

9. Devise and implement a program for monitoring coastal recreation sites to determine the impacts of visitor use on the marine reserves.

8.3 Peron Peninsula Coast

6. Prepare and implement a recreation development plan for south Peron.
7. Provide information to interpret marine features along the Peron coast and to advise visitors of the regulations and code of conduct relating to their use of the marine park.
8. Provide assistance to the Shire of Shark Bay with the provision of information and establishment of appropriate day visitor facilities.

8.6 Dirk Hartog and Faure Islands

4. Provide information to interpret the area's marine features and to advise visitors of the regulations and code of conduct relating to their use of the marine park.

10. Information, Interpretation and Education

4. Consider the establishment of a visitor facility for the provision of marine education and information in Shark Bay.
5. Provide training and promote guided tours conducted by appropriately trained persons to interpret the marine environment.
6. Conduct training sessions for local business people in order to enhance knowledge of the marine reserves.
7. Design and construct interpretive trails (walk, drive, boat, dive, fly) as resources permit. Use of trails will be monitored in association with operators where applicable.
8. Assist in the promotion of tours by schools and other appropriate groups.

11. Knowledge

10. Establish marine research facilities as resources permit.
11. Investigate the establishment of an integrated research centre for Shark Bay, as resources permit.

MEDIUM TERM PRIORITY cont.
12.2 Resourcing, Surveillance and Enforcement
5. Facilitate reciprocal functions through provision of appropriate training for Government officers.
6. Establish a formal volunteer program as resources permit.
12.4 Plan Implementation and Review
5. Review the plan within 10 years from the date of Ministerial approval of the plan.
6. Allocate resources for monitoring of a mid term review of this plan.

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