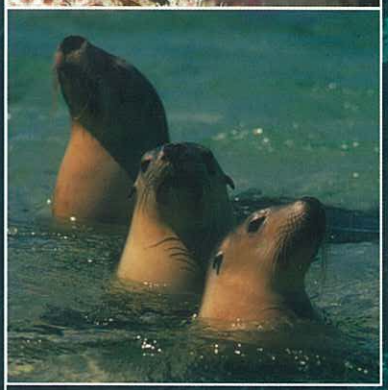
Jurien Bay Marine Park Management Plan

2005-2015

Management Plan No 49



GOVERNMENT OF WESTERN AUSTRALIA
DEPARTMENT OF Conservation AND LAND MANAGEMENT
Conserving the nature of WA
MPRA
MARINE PARKS & RESERVES AUTHORITY

JURIEN BAY MARINE PARK MANAGEMENT PLAN

2005-2015

Management Plan Number 49

Vision

In the year 2025, the marine flora and fauna, habitats and water quality of the Jurien Bay Marine Park will be in the same or better condition than in the year 2005. The area will support viable and ecologically sustainable fishing, aquaculture, recreation and nature-based tourism and the marine park will be considered an important asset by the local community.

Cover photograph (insert 2 – Lionfish) courtesy of Ron Currie. Other cover photographs courtesy of Department of Conservation and Land Management

ACKNOWLEDGMENTS

The Marine Parks and Reserves Authority and the Department of Conservation and Land Management (CALM) was greatly assisted in the preparation of the *Jurien Bay Marine Park Management Plan 2005 – 2015* by the considerable time and effort put into discussion and meetings by the Advisory Committee for the Proposed Jurien Bay Marine Reserve.

Many groups provided valuable input on the zoning scheme for the marine park, such as representatives from the science, conservation, tourism, recreational and commercial fishing and aquaculture sectors and the Central West Coast Professional Fishermen's Association. The input from the local community of Jurien Bay, Cervantes and Green Head and the Shires of Dandaragan and Coorow is also acknowledged.

A number of CALM's planning team staff were involved in the preparation of the management plan including Andrew Hill (Coordinator), Dr Chris Simpson, Dr Sue Osborne, Liesl Jonker, Dave Rose, Nigel Sercombe, Ray Lawrie and Phil Kindleysides, with staff from other branches providing assistance.

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EXECUTIVE SUMMARY

The Jurien Bay Marine Park was gazetted on the 26 August 2003. The *Jurien Bay Marine Park Management Plan 2005 – 2015* has been approved by the Minister for the Environment in accordance with the *Conservation and Land Management Act 1984* (CALM Act).

The management plan has been prepared in close consultation with the community and the major users of the area. In accordance with Section 14 of the CALM Act, an indicative management plan was released for public comment in October 2000. After due consideration of the comments received, the body in which the park is vested, the Marine Parks and Reserves Authority (MPRA) recommended a number of amendments to the indicative management plan. These are incorporated in the management plan for the Jurien Bay Marine Park.

This management plan will guide the management of the marine park for the next ten years. The management plan can only be changed through a statutory consultation process and in accordance with the requirements of the CALM Act.

After the end of the ten year period, a review of the management plan will take place. This review will require the publication of a draft management plan for public comment as required under the CALM Act.

1 INTRODUCTION

The coastal environment of Western Australia extends from latitudes 14° to 35° South and ranges from the warm, tropical waters off the Kimberley coast to the cool temperate waters of the Great Australian Bight. The coastline is over 13,000 km in length and comprises about 40% of the continental coastline of Australia. A unique feature of the coastal waters of Western Australia is the presence of a poleward, shelf-edge flow of tropical water, the Leeuwin Current, which flows down the Western Australian coastline. The Leeuwin Current flows year round but is stronger and closer to shore during autumn and winter due to the absence of the opposing southerly wind stress and associated nearshore northward Capes and Ningaloo currents that occur during the late spring and summer months (Pearce & Pattiaratchi, 1999; Taylor & Pearce, 1999).

The Leeuwin Current has a major influence on the biogeography of the State's marine flora and fauna and is responsible for the occurrence of tropical biota at latitudes where these species are not typically found (Pearce & Walker, 1991). Three major biogeographic zones occur: a *tropical* zone north of North West Cape; a *temperate* zone east of Cape Leeuwin; and a *biological overlap* zone in between. Other major influences on the marine environment of Western Australia are the regular occurrence of severe tropical storms (i.e. cyclones), particularly off the northwest coastline, the low level of freshwater and sediment input to most of the nearshore waters of the State and the high wave energy of the west and south coasts.

The above natural characteristics and influences combine to produce a diversity of marine ecosystems and habitats unrivalled in other States of Australia. Much of the marine biodiversity of the State is poorly described, particularly along the west and south coasts where many endemic species are likely to occur. The conservation of Western Australia's marine biodiversity is not only important from an intrinsic point of view but also as the fundamental basis of major recreational, tourism, fishing and, potentially, pharmaceutical industries.

In recognition of the importance of conserving the State's marine biodiversity, the Minister for the Environment established the Marine Parks and Reserves Selection Working Group (MPRSWG) in 1986 to identify representative and unique areas of Western Australia's marine waters for consideration as part of a statewide system of marine conservation reserves under the CALM Act. The MPRSWG's report was released in June 1994 and identified over seventy candidate areas throughout the coastal waters of Western Australia (MPRSWG, 1994).

The marine and coastal environment of the Jurien Bay region, with its unique combination of offshore reefs, islands and sheltered lagoons, was identified in the MPRSWG report as an area that is likely to be representative of the marine biodiversity of the central west coast of Western Australia. In addition, the proposal to build a coastal road linking Lancelin to the Cervantes-Jurien Bay area provided further impetus to ensure appropriate marine management arrangements were in place in advance of the projected increase in visitors using the marine and coastal environment of this area. In early 1996, representatives from the Department of Conservation and Land Management (CALM) and the Shire of Dandaragan met to discuss the feasibility of establishing a marine conservation reserve in the Jurien Bay area. In September 1997, the Minister for the Environment appointed a stakeholder committee, the Advisory Committee for the Proposed Jurien Bay Marine Reserve, to assist CALM in developing an indicative management plan in relation to the conservation and management of the marine environment in this area. The advisory committee met seven times between 1997 and 1999. The results of their deliberations were summarised in the *Indicative Management Plan for the Proposed Jurien Bay Marine Park 2000* (CALM & MPRA, 2000), which was released for public comment in October 2000. Following the review of public submissions on the proposal, the Jurien Bay Marine Park was gazetted in 2003 and the *Jurien Bay Marine Park Management Plan 2005 – 2015* was finalised.

The management plan provides a detailed description of the ecological and social values of the area, management objectives, strategies and targets. The goal of the plan is to facilitate the conservation of marine biodiversity of the area and to ensure that the existing and future pressures on the values of the marine park are managed within a framework aimed at ensuring ecological sustainability. The management plan also provides mechanisms for the local community to actively participate in the day to day planning and management of the marine park.

The management plan for the marine park should not be viewed in isolation but as an integral part of a suite of complementary management practices that occur within and adjacent to the marine park. These include fisheries regulations, wildlife protection, pollution control and environmental impact assessment, as well as maritime transport and safety measures. The management plan has been prepared to be consistent with the management objectives of the adjacent coastal and island reserves. In addition it should be noted that many marine species are

not permanently resident in the marine park and move in and out of the marine park during different stages of their lifecycles. The water quality within the marine park may also be affected by activities outside the marine park. It is therefore critical that the management objectives of the environment external to and within the marine park are compatible. The management plan provides a framework to achieve the necessary integration and close co-operation that are needed between marine management and regulatory agencies to achieve the conservation and sustainable management objectives outlined in this management plan.

2 DEFINITION OF THE AREA AND RESERVE TENURE

The Jurien Bay Marine Park is located on the central west coast of Western Australia about 200 km north of Perth and covers an area of 82,375 ha (Figure 1). The marine park was gazetted on the 26 August 2003 as a Class A marine park. The western boundary of the marine park is defined as the seaward limit of Western Australian coastal waters, which is defined as 3 nm from the Territorial Baseline. The landward point of the southern boundary of the marine park is located just south of Wedge (30° 50' 20" South) and is contiguous with the southern boundary of the Wanagarren Nature Reserve. The northern boundary is located at the northern point of Dynamite Bay at Green Head (30° 4' 7.9" South). The landward boundary of the marine park is the low water mark. A technical description of the boundary of the marine park is presented in Appendix I.

The CALM Act (Section 13B (1)) states that a marine park is established *"… for the purpose of allowing only that level of recreational and commercial activity which 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."*

The CALM Act (Section 6 (6)) also states that a marine park *"… includes:*

(a) the airspace above such waters or land;

(b) in the case of waters, the sea-bed or other land beneath such waters and the subsoil below that sea-bed or other land to a depth of 200 m; and

(c) in the case of land other than waters, the subsoil below such land to a depth of 200 m."

The indicative management plan recommended that the marine park should extend to the high water mark. However, due to constraints of the *Native Title Act 1994*, the marine park has initially been gazetted with its shoreward boundary at the low water mark with the intention of amending the boundary to the high water mark when these constraints are resolved. The intertidal components are an important marine habitat, and the low water mark is an impractical boundary for management. CALM will therefore be undertaking negotiations with the registered native title claimants to seek agreement to the inclusion of the intertidal component in the marine park as soon as is practicable. This is consistent with the *notice of intent* and the indicative management plan that recommended that the intertidal area be vested as marine park.

The mainland coast adjacent to the Jurien Bay Marine Park consists of various land reserves which extend to the low water mark. The islands within the marine park are vested as A Class nature reserves and extend to the low water mark. The boundaries of the marine park and the adjacent terrestrial tenure are shown in Figure 2. There are a number of cases where the marine park adjoins a national park or nature reserve at the low water mark. Where this occurs the management of the intertidal area within the terrestrial reserve will be integrated with management of the marine park. Specifically, where a management zone restricts certain activities (e.g. a sanctuary zone), the adjoining intertidal area will reflect this and be managed consistent with these restrictions. Notices under the *Fish Resources Management Act 1994* (FRM Act) will generally extend to the high water mark to facilitate integrated and practical management.

As the marine park was gazetted as a Class A reserve, any amendment of the purpose and boundary of the reserve requires the tabling of an order in both Houses of Parliament. Either House can resolve to disallow an order; Class A vesting therefore provides high security of tenure. By contrast, the zoning scheme and the management plan can be amended through a formal public consultation process in accordance with the CALM Act, and do not require Parliamentary consideration. This provides the flexibility to amend management approaches where appropriate in response to changing priorities, community aspirations and new information. Any substantial change to the management plan requires a statutory three month public submission period and approval by the Minister for the Environment, Minister for Agriculture, Forestry and Fisheries and the Minister for State Development.

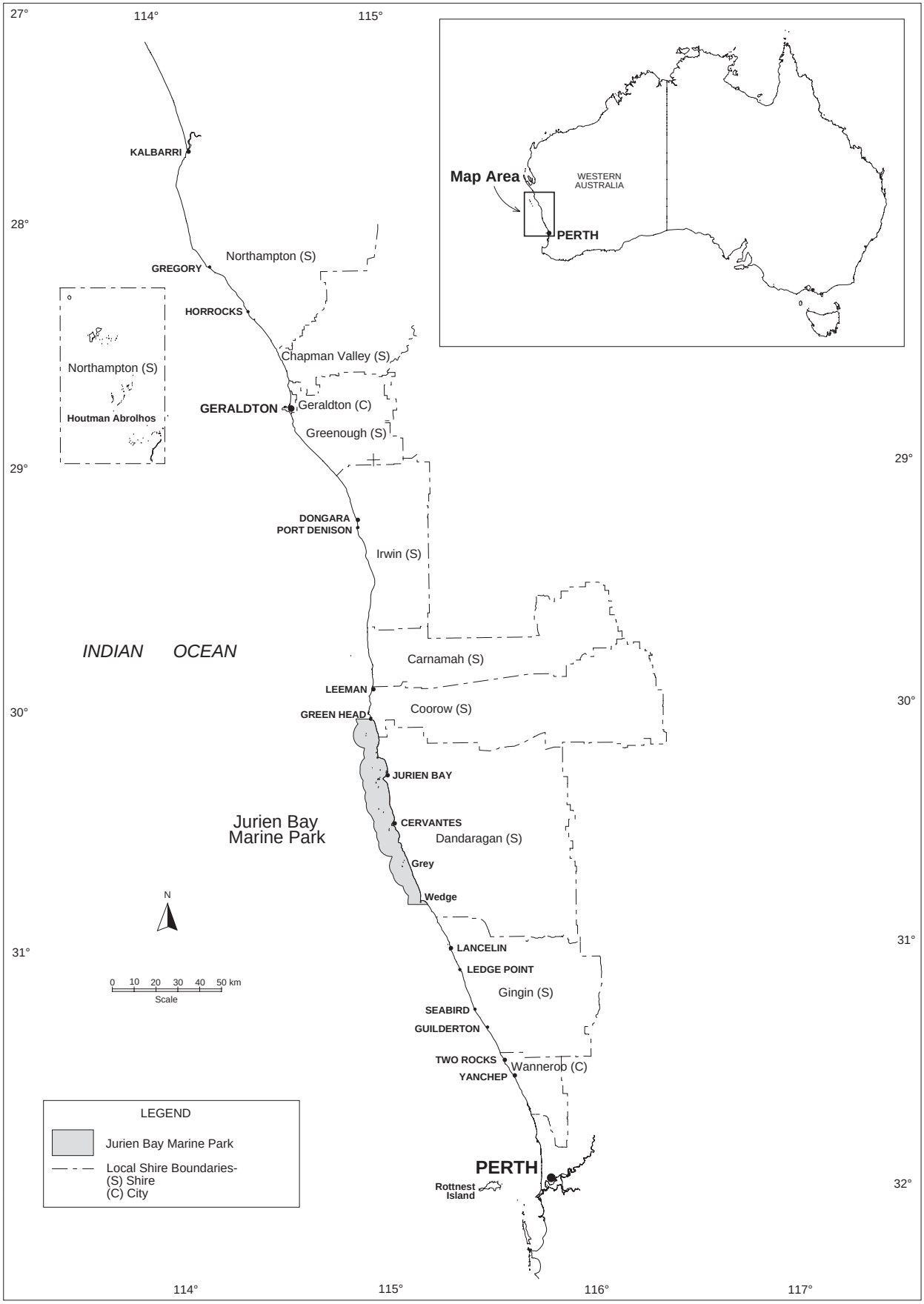

Figure 1: Locality map of the Jurien Bay Marine Park

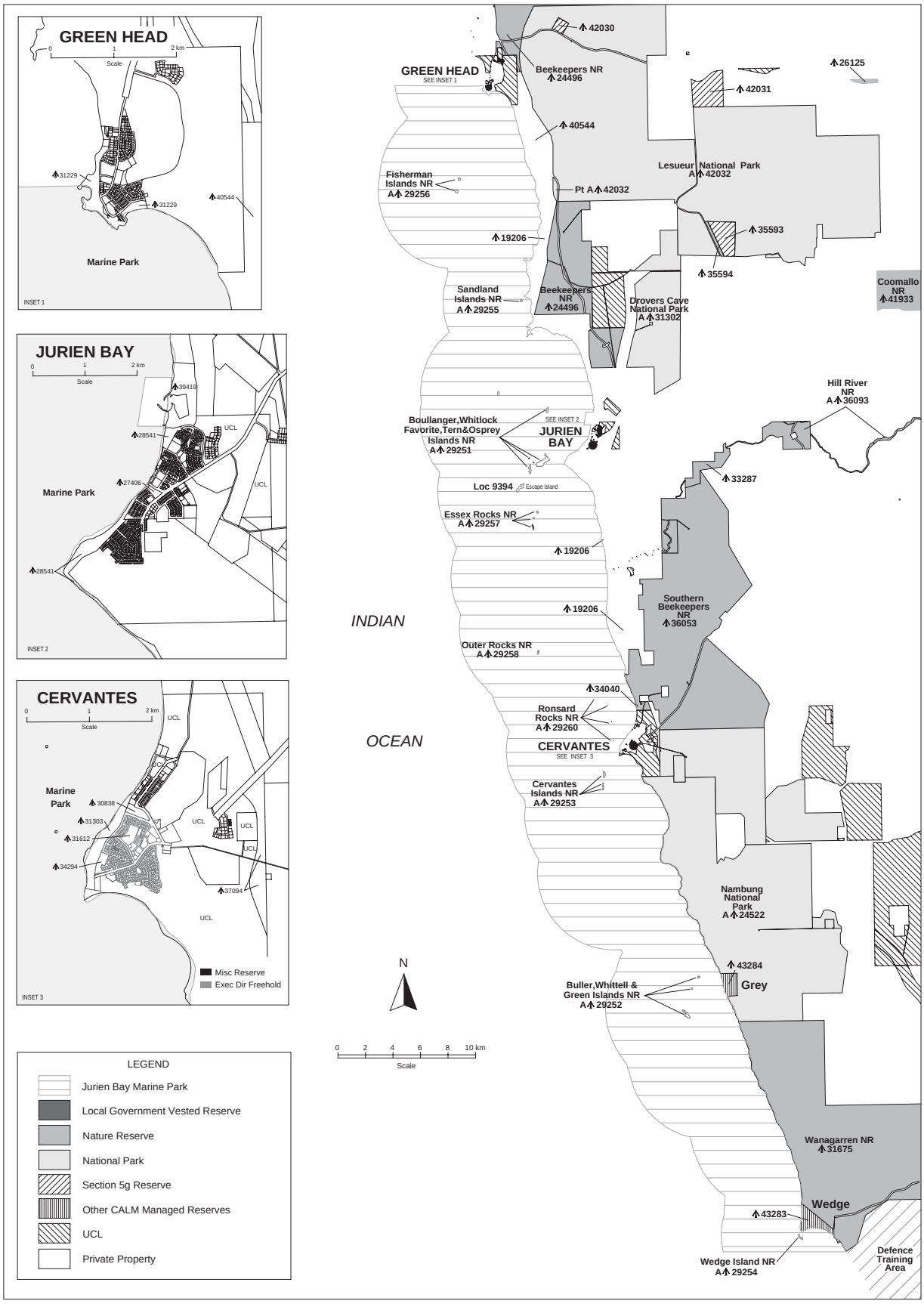

Figure 2: Tenure within and adjacent to the Jurien Bay Marine Park

3 VISION AND STRATEGIC OBJECTIVES

3.1 Vision

The vision statement for the Jurien Bay Marine Park represents the community's future aspirations for the Marine Park and provides a broad direction for management of the Marine Park.

Vision for the Jurien Bay Marine Park

In the year 2025, the marine flora and fauna, habitats and water quality of the Jurien Bay Marine Park will be in the same or better condition than in the year 2005. The area will support viable and ecologically sustainable fishing, aquaculture, recreation and nature-based tourism and the marine park will be considered an important asset by the local community.

3.2 Strategic Objectives

The Government has a policy of establishing a comprehensive, adequate and representative system of marine conservation reserves in Western Australia, based on the principle of multiple use. The objectives of the marine conservation reserve system are:

- to preserve representative as well as special ecosystems in the marine environment; and
- to put a formal management framework in place to ensure the various uses of marine conservation reserves are managed in an equitable, integrated and sustainable manner.

Within the context of Government policy and the CALM Act, the strategic objectives for the Jurien Bay Marine Park are:

Conservation

- to maintain the marine biodiversity of the marine park;
- to maintain the ecological integrity of the marine park (i.e. key ecosystem structure and function);

Recreational Uses

- to facilitate, manage and, where appropriate, assist in the management of recreational activities in the marine park within an equitable and ecologically sustainable framework;

Commercial Uses

- to facilitate, manage and, where appropriate, assist in the management of commercial activities in the marine park within an equitable and ecologically sustainable framework; and

Science and Education

- to promote education, nature appreciation and scientific research.

The strategic objectives of the marine park cannot be achieved in isolation from other statutory and non-statutory management measures both within and external to the marine park. Thus the management of the marine park must be seen as part of a complementary suite of management practices including fisheries management, wildlife management, pollution control, environmental impact assessment and maritime transport and safety measures that all contribute in varying degrees to achieving the above strategic objectives.

4 ECOLOGICAL AND SOCIAL VALUES

The conservation of marine biodiversity and the management of human uses are the major management objectives for the marine park. These generic terms need to be defined operationally to be useful in a management context. This is achieved by identifying the key ecological and social values of the marine park and setting management objectives, targets and strategies in relation to these values.

This section briefly outlines the ecological and socio-economic values of the Jurien Bay Marine Park. More comprehensive and detailed descriptions of the natural attributes and social values of the area can be found in Section 7, in some of the references and source documents outlined in Sections 11 and 12, and in the *Jurien Bay Regional Perspective* paper (CALM, 1998).

Ecological values are the intrinsic physical, chemical, geological and biological characteristics of an area. Their value is measured in relation to their local, regional, national and global biodiversity significance and their role in maintaining the structure and function of ecosystems. For convenience the ecological values are treated individually in this plan. However, in reality the marine environment of the Jurien Bay Marine Park is a structurally and functionally complex array of relationships with the plants and animals interacting with their physical environment. Social values are those cultural, aesthetic, recreational and economic characteristics for which the area is significant or well known.

The southern boundary of the Jurien Bay Marine Park is located about 200 km north of Perth by road. The marine park is located within the Central West Coast marine bioregion (IMCRA, 1997). The Central West Coast marine bioregion is a zone of biogeographical overlap between the warm, tropical waters of the north and the cool, temperate waters off the south coast of Western Australia. The Central West Coast marine bioregion extends for about 600 km, from Trigg Island to Kalbarri and the Jurien Bay Marine Park is considered to be broadly representative of the Central West Coast limestone reef system, which is a major marine ecosystem within this bioregion. The marine biota of the area consists of an unusual mix of tropical and temperate species as well as many endemic species and the Central West Coast marine bioregion also contains more seagrass species than any other area in Australia (Larkum & Hartog, 1989). The area is considered to be in a pristine condition largely as a result of the relatively low human population and lack of an industrial base. The Jurien Bay region was identified for consideration as a marine conservation reserve in the MPRSWG report for the above reasons (MPRSWG, 1994).

The coastline in the Jurien Bay region generally has a north-south alignment, consisting of curved beaches backed by low dunes, with intervening sand promontories or points, rocky headlands and low cliffs of limestone. The nearshore seabed topography is complex. Inside the 20 m depth contour, there is a series of elongate limestone reefs running parallel to the shore, which form part of the largest continuous temperate limestone reef in Australia (running from Dongara to Trigg). Associated with this reef are numerous emergent rocks and islands that have well developed intertidal rock platforms. It is this system of reefs and islands that in places, provides protection from swell waves resulting in sheltered lagoonal environments. The shallow (<10 m depth) lagoons are interspersed with sandbars that run approximately perpendicular to the shore, the largest of these in the Jurien Bay Marine Park being Island Point in the vicinity of the Jurien Bay township and Thirsty Point at Cervantes. Deeper basins (>10 m depth) occur immediately to the north and south of Island Point.

The offshore areas of the marine park come under the influence of the tropical, low salinity Leeuwin Current that flows south along the Western Australian coastline from the North West Shelf to the Great Australian Bight. However, due to the constricting effects of the continental shelf, reefs and islands, the Leeuwin Current has a limited effect on the water circulation and flushing of the lagoon systems of the Central West Coast region. Nearshore water movements and mixing patterns are primarily wind-driven, but are also influenced by tidal movement, wave pumping, seabed topography and the steering effect of islands and reefs. Although these processes cause strong surface currents in some parts of the lagoon, the deeper lagoon areas are poorly flushed, particularly during autumn.

The marine flora and fauna of the Central West Coast region is a mixture of tropical and temperate species, the former carried south by the Leeuwin Current from tropical northern waters and the latter carried north by the Capes Current from the cool temperate waters of the south coast of Western Australia. The fauna is regarded as being predominantly temperate; however, a survey by CALM indicated that tropical species comprise a significant proportion (35%) of the marine fauna found in the region (CALM, 1998). The Central West Coast bioregion has the highest diversity of seagrass species in Australia (Larkum & Hartog, 1989). Preliminary surveys indicate that the marine biota is very diverse and includes a number of endemic species, species that have their northern or southern distribution limits in the region, and species that are not yet described and are "new" to science.

The Jurien Bay region is dominated by five major marine habitat types: seagrass meadows; bare or sparsely vegetated mobile sand; shoreline and offshore intertidal reef platforms; subtidal limestone reefs; and reef pavement. Extensive seagrass meadows consisting of at least nine species of seagrass exist in the Jurien Bay Marine Park. The densest and presumably the most productive seagrass meadows are between the Jurien Bay town site and Black Rock and these areas are dominated by *Posidonia sinuosa* and *Amphibolis* species. The deeper basins support less dense seagrass meadows, while higher energy mobile sand areas support meadows of *Halophila ovalis*, which are often removed by winter storms. Intertidal rock platforms are dominated by small red and brown turf algae, with the large brown algae *Ecklonia radiata* occurring on the permanently submerged outer edges. The subtidal, high relief limestone reefs within the 20 m depth contour are dominated by large algae, particularly *Ecklonia radiata*. Deeper, offshore reef platforms are dominated by red algae. Although small

coral communities are relatively common in the Jurien Bay region, there are no coral reefs. The benthic habitats in the marine park are shown in Figure 3.

Marine wildlife includes 14 species of cetaceans (five of which are listed as rare or likely to become extinct), a variety of sea and shorebirds which nest on the islands and the Australian sea lion (*Neophoca cinerea*), a species which is specially protected under the *Wildlife Conservation Act 1950* (WC Act). North Fisherman Island to the north of Jurien Bay is one of the main breeding sites for sea lions in the Central West Coast region and it is believed this breeding population is genetically distinct from the southern coast population (Gales *et al.*, 1992). Of the total Western Australian population of 2,700 - 3,400 sea lions, approximately 800 - 1,000 are found on the west coast (Gales *et al.*, 1994).

Commercial fishing for western rock lobster (*Panulirus cygnus*) has the highest economic value of any single species commercial fishery in Australia and is the mainstay of the economy in the Jurien Bay region. Up to 140 commercial rock lobster fishing boats work out of the Jurien Bay area from bases at Green Head, Jurien Bay, Cervantes and Wedge, catching approximately 1.6 million kg live weight of lobster each season. Two rock lobster processing factories have been established at Jurien Bay and Cervantes, which process lobster in different ways to suit the various markets. In addition, commercial wetlining, abalone, shark netting, beach seining for mullet and collecting of specimen shells and aquarium fish are carried out within the marine park. Aquaculture operations do exist in the region and the opportunity for development of this industry is significant.

Recreational fishing is a popular activity in the area and it is likely to increase significantly during the life of the management plan. Recreational fishers target a variety of species, the most highly regarded being western rock lobster, Western Australian dhufish (*Glaucosoma hebraicum*), pink snapper (*Pagrus auratus*), baldchin groper (*Choerodon rubescens*) and abalone (*Haliotis* sp.). However, several other finfish and mollusc species are also taken. Recreational fishers employ a variety of methods including line, spear and net fishing, as well as diving and pots for western rock lobster.

The pleasant Mediterranean climate of the Jurien Bay region combined with its accessibility to Perth and its sheltered waters have resulted in Jurien Bay being a popular place for a variety of watersports including SCUBA diving, surfing, snorkeling, water-skiing and windsurfing. These same factors, in addition to the natural sites of interest on the adjacent mainland, also contribute to the substantial tourism potential of the area. The establishment of the Lancelin-Cervantes coastal road link will make the Jurien Bay region even more accessible from Perth and, together with the major coastal developments proposed for this area, will lead to a significant growth in tourism in the near future.

As human activity in the relatively pristine marine environment of the Jurien Bay region is increasing, the recreational, commercial and tourism uses need to be managed to ensure compatibility with, and to minimize impact on, the conservation values of the marine park. The ecological and social values of the marine park are listed below.

Summary of Ecological Values

- ***Geomorphology****: A complex seabed and coastal topography consisting of islands, sub-tidal and inter-tidal limestone reefs, protected inshore lagoons and deeper basins, beaches and headlands.*
- ***Intertidal reef platforms****: A diverse range of intertidal reef platforms occur in the marine park ranging from highly protected reefs to reefs fully exposed to the action of swell waves.*
- ***Water and sediment quality****: The waters and sediments of the marine park are largely pristine and are essential to the maintenance of a healthy marine ecosystem.*
- ***Seagrass meadows****: Extensive and diverse perennial seagrass meadows are an important habitat and nursery area for marine life and are important primary producers.*
- ***Macroalgal communities****: Extensive subtidal macroalgal communities with high floral diversity occur in the marine park. These communities are important primary producers and refuge areas for diverse fish and invertebrate assemblages.*
- ***Seabirds****: Islands within the marine park are nesting areas for at least 15 species of seabirds and these birds are a major feature of the coastal environment of the Central West Coast region.*
- ***Invertebrate communities****: A diverse marine invertebrate community, which includes a number of endemic species.*
- ***Finfish****: A rich finfish fauna, which includes an interesting mix of tropical, sub-tropical and temperate species.*

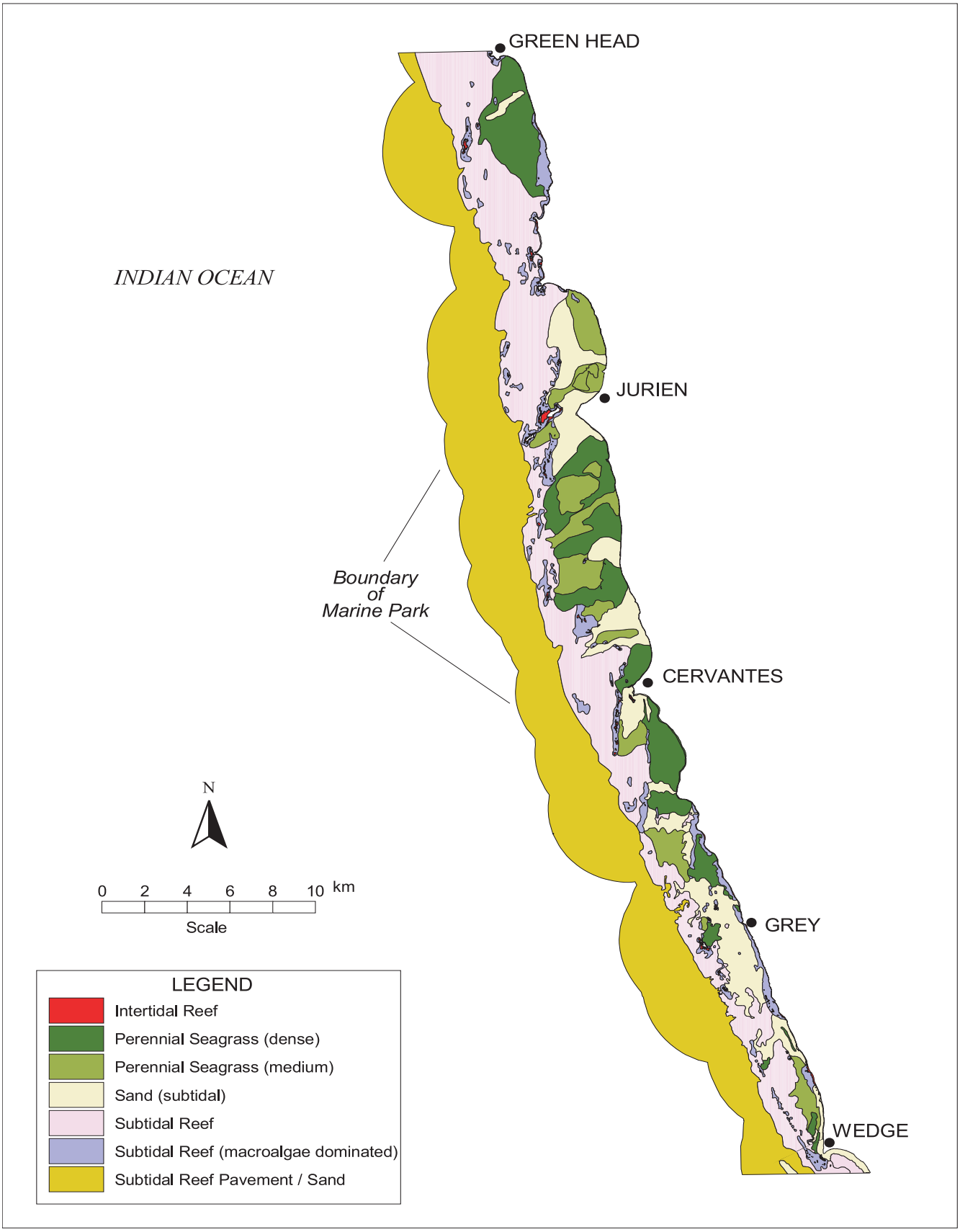

Figure 3: Major benthic habitats within the Jurien Bay Marine Park

- ***Sea lions****: The Australian sea lion (*Neophoca cinerea*), which is endemic to Australia and specially protected under the WC Act, breeds on Buller and North Fisherman islands and uses islands in the Jurien Bay region as haul-out sites.*
- ***Cetaceans and turtles****: Six species of toothed whale and eight species of baleen whale are recorded from the marine park area. However, the bottle-nosed dolphin (*Tursiops truncatus*) and humpback whale (*Megaptera novaeangliae*) are the only cetaceans that are regularly seen in marine park waters. Three species of sea turtles have also been reported in the marine park.*

Summary of Social Values

- ***Indigenous heritage****: A historical link with indigenous culture.*
- ***Maritime heritage****: Significant maritime history including four historic shipwrecks between Cervantes and North Head.*
- ***Commercial fishing****: Commercial fishing for western rock lobster, abalone, shark, a variety of finfish and minor commercial collecting activities for shells and aquarium fish.*
- ***Aquaculture****: The pristine, sheltered waters of the Central West Coast region provide significant potential for development of the aquaculture industry.*
- ***Coastal use****: Recreational use of headlands, dunes and long white beaches for walking, swimming, surfing and fishing are a major value of the marine park.*
- ***Seascapes****: Panoramic vistas of turquoise lagoon waters, offshore islands, reefs, beaches, breaking surf and the blue open ocean beyond the reef line are major attractions of the marine park.*
- ***Recreational fishing****: Excellent recreational fishing opportunities for local and visiting fishers targeting a number of finfish species, abalone and western rock lobster.*
- ***Water sports****: The pristine nature and diversity of the natural environment of the Central West Coast provides opportunities for swimming, boating, windsurfing, snorkeling, SCUBA diving, free-diving, surfing, wake-boarding and numerous other water sports.*
- ***Marine nature-based tourism****: Natural values and accessibility of the area ensure significant tourism potential and opportunity for a variety of marine nature-based tourism activities.*
- ***Petroleum drilling and mineral development****: Significant onshore reserves of hydrocarbons are being produced in the northern Central West Coast area around Dongara. The hydrocarbon potential of the area encompassing the marine park is not well known.*
- ***Scientific research****: An interesting and unusual mixture of tropical and temperate marine plants and animals of particular scientific interest in an area within easy access of Perth.*
- ***Education****: Easy access and the close proximity of the marine park to Perth and regional centres provide opportunities for community education about the marine environment.*

5 MANAGEMENT FRAMEWORKS

5.1 International and National Context

At a national level, the conservation of marine biodiversity, maintenance of ecological processes and the sustainable use of marine resources are addressed by the Intergovernmental Agreement on the Environment. This agreement is implemented through actions developed under national strategies such as the *National Strategy for Ecologically Sustainable Development (*Commonwealth of Australia, 1992*)*, the *National Strategy for the Conservation of Australia's Biological Diversity* (Commonwealth of Australia, 1996a), *Australia's Oceans Policy* (Commonwealth of Australia, 1998) and the *Strategic Plan of Action for the National Representative System of Marine Protected Areas: A Guide for Action by Australian Governments* (ANZECC TFMPA, 1999). The requirement for demonstrated ecologically sustainable development of export fisheries under the Commonwealth's *Environment Protection and Biodiversity Conservation Act 1999* also contributes to the conservation of marine biodiversity.

The Jurien Bay Marine Park is part of the National Representative System of Marine Protected Areas (NRSMPA). The NRSMPA is being developed cooperatively by the Commonwealth, State and Northern Territory governments responsible for the conservation, protection and management of the marine environment (ANZECC TFPMA, 1999). The primary goal of the NRSMPA is to establish and manage a comprehensive, adequate and representative system of marine protected areas to contribute to the long-term ecological viability

of marine and estuarine systems, to maintain ecological processes and systems and, to protect Australia's biological diversity at all levels. The development of an NRSMPA helps fulfil Australia's international responsibilities and obligations as a signatory to the Convention on Biological Diversity, to provide a means of meeting obligations under the Convention on Migratory Species (Bonn Convention) and to satisfy responsibilities under bilateral agreements for migratory birds with Japan and China. In addition, it supports the World Conservation Union (IUCN) World Commission on Protected Areas Program, which has the aim of promoting the establishment and management of a global representative system of Marine Protected Areas (ANZECC TFPMA, 1998b).

5.2 State Policy Context

In 1984, the new CALM Act provided the first State legislation to create marine conservation reserves, and between 1984 and 1990 seven marine conservation reserves were created. In 1994, the State Minister for the Environment released a report entitled *A Representative Marine Reserve System for Western Australia* that identified about 70 areas in the coastal waters of Western Australia that were worthy of consideration for marine reservation under the CALM Act. In 1997, legislative changes were made to the CALM Act to alter the mechanisms by which marine conservation reserves were established, vested and managed. These changes revised statutory consultative protocols for the establishment of marine reserves, provided clear guidance for commercial activities in marine reserves, and established the MPRA. The New Horizons policy released in June 1998 (Government of Western Australia, 1998a) provided policy guidance in respect to the establishment and management of marine conservation reserves. The Jurien Bay Marine Park is the eighth marine conservation reserve to be created under the CALM Act.

5.3 Legislative Framework

Marine parks are vested in the MPRA and CALM is responsible for their management in accordance with the CALM Act. The WC Act provides legislative protection for flora and fauna across the State's lands and waters. The Department of Fisheries (DoF) is responsible for the management and regulation of recreational and commercial fishing, aquaculture and pearling in CALM Act marine conservation reserves in accordance with the FRM Act. The *Fishing and Related Industries Compensation (Marine Reserves) Act 1997* provides the mechanism by which the holder of an existing DoF authorisation for commercial fishing, fish processing, aquaculture or pearling may seek compensation if the market value of the authorisation is reduced as a result of the establishment of a marine nature reserve, or an exclusion zone in a marine park. The *Western Australian Marine Act 1982* and *Navigable Waters Regulations* regulate boating in State waters and continue to apply within marine parks. These Acts are administered by the Department for Planning and Infrastructure (DPI). In addition, any development that may have a significant impact on the environment in or adjacent to a marine park, is assessed in accordance with the *Environmental Protection Act 1986* (EP Act) by the Environmental Protection Authority (EPA). The Department of Environment (DoE) is responsible for controlling pollution to marine waters.

The Jurien Bay Marine Park lies within State territorial waters. Waters seaward of this limit and extending to the 200 nm limit, fall under the jurisdiction of the Commonwealth Government. The marine park surrounds several islands that are A class nature reserves vested in the Conservation Commission of Western Australia (CC) and managed by CALM. These reserves do not form part of the marine park and are not covered by this management plan, but management of the marine park and islands will be integrated wherever appropriate. A separate management plan will cover these island nature reserves.

5.4 Responsibilities of Authorities and Government Agencies

CALM is responsible for the overall management of marine conservation reserves under the marine conservation reserve provisions of the CALM Act. CALM also collaborates with other agencies and authorities (i.e. MPRA, CC and local government authorities) that have responsibilities within marine reserves and/or in the surrounding waters and coastal areas, to ensure the various regulatory and management practices are complementary. In some cases Memoranda of Understanding (MOUs) are developed to facilitate co-operation and promote operational efficiency.

The MPRA is the Authority in which all marine conservation reserves in the state are vested. The MPRA plays an important role in the development of marine conservation policy, management plans and in auditing CALM's management of marine conservation reserves. The audit function is an important role to ensure that CALM's

management of these reserves is meeting stated objectives and targets. The management plan provides the principal framework by which the MPRA will carry out this function.

The State agencies with statutory responsibilities in the Jurien Bay Marine Park are listed in Table 1.

Table 1: State authorities and agencies with responsibilities in the Jurien Bay Marine Park

Marine Parks and Reserves Authority	• body in which marine conservation reserves are vested; • provides policy advice to the Minister for the Environment; and • audits management plan implementation by CALM.
Department of Conservation and Land Management	• manages marine conservation reserves vested in the MPRA. This includes: a) preparation of management plans; b) implementation of the management plan; c) co-ordination with other agencies; d) implementation of education and monitoring programs; e) wildlife research and management; f) management of nature-based tourism; and g) taking a lead role in enforcement (non-fisheries issues); and • ensures integrated management of marine conservation reserves with adjoining mainland and island conservation reserves.
Department of Fisheries	• manages and regulates commercial and recreational fishing, aquaculture and pearling in marine conservation reserves; and • takes a lead role in enforcement of fisheries legislation within marine conservation reserves.
Department for Planning and Infrastructure	• responsible for all boating regulations including licensing, safety standards, marker buoys, moorings, jetties and support facilities such as navigation markers, navigation charts and harbour facilities (NB mooring controls can be delegated to other agencies); • chairs and supports the State Co-ordinating Committee which provides the mechanism to coordinate the management of marine pollution incidents; and • responsible for management of vessel navigation and development and management of support facilities.
Department of Environment	• assists the Environmental Protection Authority in the process of assessing proposals that may significantly affect the marine environment, including inside marine conservation reserves; and • administers pollution control legislation.
Environmental Protection Authority	• assesses reports and makes recommendations on proposals that may significantly affect the marine environment, including inside marine conservation reserves.
Western Australian Maritime Museum	• protects pre-1900 shipwrecks and artifacts under the *Maritime Archaeology Act 1973*. Shipwrecks over 75 years old are declared and protected under the Commonwealth *Historic Shipwrecks Act 1976.*
Department of Industry and Resources	• administers legislation that control mineral and petroleum exploration and development; and • regulates petroleum industry operations.

6 DESCRIPTION OF MANAGEMENT ISSUES

Management of the marine park aims to maintain the ecological and social values of the marine park in the long-term, while providing for recreational and commercial activities where these activities are compatible with maintaining the values of the marine park. An important step is to undertake a risk assessment by considering the range of existing and potential pressures on the marine park's key values and their associated ecological and social implications. The level of risk posed by existing and/or potential pressures on the values of the marine park can be assessed by considering the following factors:

- the *probability* of a pressure occurring;

- the *temporal* scale of the pressure - pressures that continue over a longer time frame are often of greater concern than short-lived pressures;
- the *spatial* scale of the pressure - pressures that affect a large area are often of greater concern than localised pressures;
- the *trophic* level and conservation status of the species affected by the pressure - pressures that impact both lower trophic levels (i.e. primary producers) and higher trophic levels (i.e. secondary consumers) can significantly affect ecosystem function; and
- the *consequences* - acknowledges that different pressures have different social and political consequences.

It is therefore necessary to determine how each value is, or is likely to be, affected by existing or future pressures. The natural attributes and the major uses of the Jurien Bay region are well known. The short-term, long-term, and cumulative ecological effects of these pressures on the environment are, however, not fully understood. For the purposes of the management plan, pressures on the values are confined to pressures likely to occur during the life of the management plan and considered to be manageable within a marine park context. By definition this excludes such threats as the worldwide global warming phenomenon. The vision and strategic objectives of the plan (Section 3) provide the longer term (>10 years) direction for management of the marine park.

The pressures on the values of the marine park are either a primary or secondary impact of user activities. Therefore, the management plan's strategies for the marine park focus primarily on alleviating the detrimental effects of human activities. These can be direct effects such as damage to seagrass habitats by indiscriminate mooring and anchoring, or diminution of fish stocks through localised over-fishing. Indirect effects on the values of the marine park can arise from activities such as littering, inappropriate sewage disposal and downstream effects of activities such as dredging or nutrient enrichment from aquaculture projects. An assessment of activities and practices in the marine park during preparation of this plan showed that localised impacts have occurred on seagrass habitats, contaminant inputs are low and anecdotal evidence suggests that the abundance of some popular target reef fish species has declined in the more readily accessible locations of the marine park (CALM, 1998; BSD Consultants, 1999). However, with the projected rise in the number of users of the marine park in the next decade, the pressures on the conservation values of the marine park will increase significantly and conflicts between users are likely to emerge. Pro-active strategies involving education and extension programs, active participation by users of the marine park and the local community in the on-going management of the marine park, and monitoring of the marine park's values will be important strategies in ensuring management objectives are met and conflicts minimised.

7 MANAGEMENT OF ECOLOGICAL AND SOCIAL VALUES

The conservation of marine biodiversity and sustainable management of human activities in the marine environment of Western Australia are achieved through a number of complementary mechanisms that include marine conservation reserves, fisheries regulations, pollution control, environmental impact assessments of development proposals and maritime safety regulations. The management of marine conservation reserves employs both specific management strategies (outlined in Section 7) to address the existing pressures on marine park values and generic strategies to ensure the undesirable effects of future pressures on the marine environment are minimised (outlined in Sections 8 – 9).

This section is based on the best practice principles outlined in the report entitled *Best Practice in Performance Reporting in Natural Resource Management* (ANZECC, 1997). The model is also broadly consistent with the performance assessment framework developed in the *Strategic Plan of Action for the National Representative System of Marine Protected Areas: A Guide for Action by Australian Governments* (ANZECC TFMPA, 1999). The objectives, strategies, performance measures and management targets outlined in Section 7 reflect an outcome-based "best practice" approach from which the effectiveness of management can be better assessed. This model has been adopted by the MPRA to facilitate better conservation and management outcomes and a more objective and effective approach to auditing CALM management.

Management Objectives

Management objectives identify **what** the primary aims of management are and reflect the statutory responsibilities of the CALM Act. Objectives have been developed for all of the ecological and social values of the marine park. Where significant pressure/s on an ecological value has been identified, the management objective addresses the specific pressure/s. When there is not an obvious existing pressure or threat, the

management objective provides broader direction to management in relation to protecting the value from the most likely future threats. Management objectives for social values address, where appropriate, the effect of the activity on other marine park values and the complementary interests of other statutory management arrangements or activities that exist in the marine park.

Management Strategies
Management strategies provide specific direction on **how** the management objective/s for each value might be achieved. All strategies outlined in this plan have been defined as either high **(H)**, medium **(M)** or low **(L)** priority to provide an indication of their relative importance. The **(H)** strategies considered to be critical to achieving the long-term objectives of the marine park are also designated as *key management strategies* (**H – KMS)**. These strategies will also form part of the performance assessment of marine park management by the MPRA, particularly during the initial years of establishing the marine park (Section 10). It should be noted that management priorities are likely to alter in response to changes in usage patterns or to new knowledge acquired during the life of the management plan.

Performance Measures
Performance measures are **indicators of management effectiveness** in achieving the marine park's objectives and targets. They are developed for both the ecological values and "passive" social values (i.e. those social values that are unlikely to impact negatively on the ecological values of the marine park such as maritime heritage). Performance measures should be quantitative, representative and, where possible, simple and cost-effective. Performance measures for indirect (e.g. nutrient enrichment impacts on seagrass meadows) and direct (e.g. mooring impacts on seagrass meadows) impacts should focus on surrogate (e.g. changes in phytoplankton biomass and species composition) and direct (e.g. changes in seagrass biomass) measures of the value respectively. Performance measures for some passive social values have not been developed due to inadequate existing information. These will be developed during the early phase of the implementation of this plan.

In regard to the "active" social values (i.e. those social values that have the potential to impact negatively on the ecological values of the marine park such as fishing and mining) a different approach to performance assessment is required. This has been termed "reporting", and incorporates information on the nature, level and trend of the human activity. This information is important in monitoring human activities to assist in determining trends in use, and to assist in assessing impacts of the social values on the ecological values of the marine park.

Management Targets
Management targets represent the **end points of management**. Targets should be measurable, time bound and expressed spatially. Ecological targets will be set as either the "natural state" or some acceptable departure from the "natural state". The long-term target provides a specific benchmark to assess the success or otherwise of management action within the life of the management plan. The short-term target provides a benchmark for management to achieve within a specified time period and, in most cases, is a step to achieving the long-term target. Targets have been developed for all ecological and social values. The targets for "active" social values (e.g. recreational and commercial fishing, aquaculture, coastal use, water sports, nature-based tourism, petroleum and Mineral development, and scientific research) are process-based and are generally stated as "Implementation of management strategies within agreed timeframes". This ensures that the strategies for the social values are implemented in accordance with the management objectives.

Key Performance Indicators
Key performance indicators (KPIs) are **measures of the overall effectiveness** of management in relation to the strategic objectives of the marine park. KPIs relate specifically to the management targets for key ecological and social values and reflect the highest conservation (from biodiversity and ecosystem integrity perspectives) and management (social) priorities of the MPRA, CALM and the community. KPIs are a key element of the MPRA audit process (Section 10).

Given the key values and pressures on the area, the KPI's for the Jurien Bay Marine Park will be based on the management targets for *sea lions*, *water quality, finfish* and *seagrass* values and for *coastal use* and *seascape* values.

7.1 Ecological Values

Ecological values are the physical, geological, chemical and biological characteristics of an area. Ecological values are significant in terms of their biodiversity (i.e. representative, rare or unique) and ecosystem integrity role. Ecological values also have a social significance in that many social values are functionally dependent on the maintenance of ecological values.

7.1.1 Geomorphology

Ecological value	***Geomorphology:*** *A complex seabed and coastal topography consisting of islands, sub-tidal and inter-tidal limestone reefs, protected inshore lagoons and deeper basins, beaches and headlands*.

Background	The marine and coastal geomorphology and geology of the Jurien area has been described in some detail in CALM (1998). The coastline of the Jurien Bay Marine Park has a general north-south alignment and consists of curved beaches backed by low dunes interrupted by dune covered sand promontories or points, rocky headlands and low cliffs of Tamala limestone. In some sections, erosion forces have resulted in wide wave-cut platforms at sea level with undercut intertidal notches along the shoreward boundary. There is a series of medium-sized, offshore limestone islands with well-developed intertidal rock platforms (usually on the seaward side) and these afford protection from swell waves and provide sheltered, inshore lagoonal environments. Wave refraction around these islands and reefs has been responsible for the development of the two major sand spits (or tombolos) at Island Point and Thirsty Point adjacent to the Jurien Bay and Cervantes townsites respectively. Other shallow sandbanks have formed and these divide the nearshore waters into lagoons, which are generally less than 10 m in depth. Two deeper areas or "basins", where depths exceed 10 m, occur just north and south of Island Point. Between the sheltered lagoons and the 20 m depth contour are a series of prominent elongate offshore limestone reefs, which are approximately parallel to the coast. Ocean swells break on many of these reefs in moderate weather some are exposed at low tide, while others bear emergent rocks and islands. Algae dominated reef platforms interspersed with sand patches and reef occur westward of the 20 m depth contour as part of the gently sloping inner continental shelf. The complex geomorphology of the area supports a wide diversity of habitats and ecological niches that in turn contribute to the high marine biodiversity of the area. Within habitats, benthic diversity is positively correlated with seabed "roughness". The most significant pressure on the geomorphology is increasing recreational use of coastal landforms and coastal development. Coastal facilities such as groynes and marinas have the potential to significantly affect sedimentation patterns resulting in major changes to beaches. Uncontrolled recreational use of fragile coastal dunes and headlands can also lead to considerable erosion of these features. Management of the marine park and the adjoining coastal land reserves needs to be integrated and focus on protecting sensitive areas from inappropriate use. This may be achieved by the provision of coastal facilities (i.e. boardwalks and roads) or through excluding access to specific areas. Given the robust nature of much of the subtidal geomorphology and the nature of existing activities in the area, there were no major pressures on this component of the ecosystem identified during preparation of this management plan.
Current status	The geomorphology is generally in an undisturbed condition, apart from some localised disturbance from coastal infrastructure in the vicinity of coastal towns.
Existing and potential uses and/or pressures	• Recreational use of coastal landforms. • Coastal development (e.g. groynes and marinas). • Commercial and recreational fishing activities. • Aquaculture (infrastructure). • Navigation (e.g. installation of markers and removal of hazards). • Dredging and blasting of shipping channels.

	• Installation of telecommunication cables.
Current major pressure/s	None.
Management objective/s	1. To ensure the structural complexity of the marine park's geomorphology is not significantly reduced by human activities. 2. To ensure coastal landforms within the marine park are not degraded by use.
Strategies	1. Ensure effective management of coastal recreation through liaison with coastal land managers to control access and use of beaches and headlands adjacent to the marine park (CALM, local government authorities). **(M)** 2. Control recreational use of coastal features within the marine park where these activities are likely to result in degradation of coastal landforms (CALM). **(M)** 3. Ensure coastal and offshore development activities do not have significant impacts on the geomorphology of the marine park through the provision of advice to the EPA regarding environmental assessment of proposals (CALM). **(M)** 4. Ensure potential developers are informed of relevant management objectives and targets of the marine park in relation to the geomorphology (CALM, local government authorities). **(M)** 5. Develop short-term management targets as required (CALM). **(M)** 6. Educate marine park users about the ecological importance of the marine park's geomorphology (CALM). **(L)**

Performance measure/s	1. Area of seabed disturbance (ha). 2. Area of coastal degradation (ha).	**Desired trend/s**	1. Negative. 2. Negative.
Short-term target/s	To be developed as required.		
Long-term target/s	1. That there is no change to the structural complexity of the geomorphology of the marine park due to human activities. 2. That the coastal landforms within the marine park are not significantly altered by human activities.		

7.1.2 Water and sediment quality

Ecological value	***Water and sediment quality**: The waters and sediments of the marine park are largely pristine and are essential to the maintenance of a healthy marine ecosystem.*

Background	The waters of the temperate coastal ecosystems of Western Australia are, by world standards, nutrient-poor as a result of both low riverine inputs and the absence of significant upwelling of nutrient-rich waters from the deeper ocean. Low concentrations of dissolved inorganic nitrogen limit biological productivity in these waters which, as a result, are characterized by a low standing crop of phytoplankton (measured as chlorophyll *a* concentration) and high water clarity. Primary production in these ecosystems is driven by benthic plant communities, which typically consist of extensive macroalgal communities and perennial seagrass meadows. The coastal waters of the marine park are a representative example of the temperate coastal waters of Western Australia and display all of the above characteristics. Nutrient enrichment of these waters by human activities, such as sewage discharge, contaminated groundwater inputs, surface run-off and some types of aquaculture, can stimulate phytoplankton blooms which "cloud" the water as well as promoting excessive growth of "nuisance" macroalgae. The reduced light penetration through the water column and the shading effects of excessive algal growth can result in severe degradation of benthic plant communities as a result of light starvation. Seagrass meadows, which generally occur in relatively sheltered, poorly flushed lagoon waters or embayments are particularly vulnerable to nutrient pollution. Accidental and deliberate spills from boats, hull anti-fouling, industrial discharges and contaminated surface drainage and groundwater flows are common sources of toxic contaminants (e.g. heavy metals, pesticides), pathogenic substances (e.g. faecal bacteria) and litter to the marine environment. The resulting decline in water and sediment quality can have ecological impacts, reduce amenity value and contaminate seafood. Organic enrichment of waters can result in a build-up of organic material on the seabed and de-oxygenation of sediments causing changes to sediment in-fauna communities. Sewage discharge from vessels has the potential to increase nutrient levels and to cause health problems for direct contact recreational activities due to elevated bacterial levels. The impact of sewage discharge from vessels will vary considerably from place to place and seasonally as a consequence of environmental parameters (e.g. water circulation) and human usage patterns (e.g. number of vessels and number of passengers). In the Jurien Bay Marine Park, vessel usage is relatively low and relates mainly to commercial fishing vessels with two to three crew and small recreational vessels operating for short day trips. The environmental and health risk is considered very low at this stage and restrictions on sewage discharge from vessels will relate mainly to public health issues. The State Government adopted a policy for the discharge of sewage from vessels in 2004. The basis of this policy is that three zones will apply in State coastal waters: • Zone 1 - No discharge; • Zone 2 - Discharge only using approved treatment systems; and • Zone 3 - Open for discharge of untreated vessel sewage. The policy outlines a number of guidelines but allows some flexibility in applying the zones in marine conservation reserves. In respect to the marine park, sanctuary zones, and waters within 500 m of land and islands will be designated as no discharge i.e. *Zone 1* (see Figure 4). No controls are considered necessary on the seaward side of the marine park (greater than 20 m depth) due to very low vessel sewage inputs and extremely high dispersal factors (i.e. high energy environment) and this area will subsequently be classified as *Zone 3*. All other areas of the marine park are proposed to be designated as *Zone 2* i.e. only allow sewage discharge using approved treatment systems. The sewage discharge boundaries will be finalised and a notice gazetting the restrictions published during the life of the management plan. Although comprehensive water and sediment quality surveys have not been undertaken, the limited data that exists and the absence of significant input of nutrient, toxic or pathogenic

	contaminants (BSD Consultants, 1999) suggests that the water and sediment quality of the marine park is high. The risk of oil pollution due to accidental oil spills in the area is significant given the volume of commercial shipping that passes along the coast. The most recent incident involved the vessel Kirki, which resulted in a spill of 20,000 tonnes of crude oil. An oil spill in the Jurien Bay Marine Park would not only have detrimental effects on water quality but could also have significant ecological impact on sea lions, birds and intertidal communities within the marine park. DPI is responsible for coordination of oil spill incident response and remediation. State coordination of incidents is achieved through the operation of the State Committee for Combating Marine Oil Pollution. Whilst the management of shipping is outside the scope of this plan, the preparation for an incident is not. It is recommended that the ecological and social values of the marine park be mapped and be readily available to aid decision-making in the advent of an incident in or adjacent to the marine park. Another potential source of pollution and introduced pests is ballast water; however, there are no existing or proposed large ports or harbours within the marine park. As at 2004, large commercial ships do not access the area and nor is access possible given the shallow lagoons and reefs. There is therefore no existing risk of ballast water discharge and associated problems with introduced marine pests or pollution from this source. However, there is a possibility, albeit small, of marine pests being introduced to the marine park on the hulls of fishing or pleasure craft arriving from other areas.
Current Status	Water and sediment quality of the marine park is high with no major threatening pollutant inputs.
Existing and potential uses and/or pressures	• Nutrient inputs from: ▪ sewage discharge from vessels; ▪ septic tanks via groundwater flows; ▪ agricultural catchments (e.g. Hill River); ▪ aquaculture feeding; ▪ rock lobster processing outfalls; and ▪ urban stormwater runoff. • Toxicant inputs from: ▪ accidental spillages of fuel and oils from boating activity; ▪ hull antifouling of commercial and recreational boats; ▪ agricultural catchments (e.g. pesticides from Hill River); ▪ urban stormwater runoff; and ▪ oil spills from passing shipping. • Pathogen inputs from: ▪ sewage discharge from vessels; ▪ urban stormwater runoff; and ▪ septic tanks via groundwater flows. • Litter from: ▪ commercial and recreational boating/fishing activities ▪ urban stormwater runoff. • Introduced pests from hulls of fishing or pleasure craft.
Current major pressure/s	None.
Management objective/s	To ensure the water and sediment quality of the marine park is not significantly impacted by the input of contaminants.

Strategies	1. Establish and maintain a pollutant inputs database for the marine park (CALM). **(H - KMS)** 2. Develop an appropriate understanding of the circulation and mixing of the marine park's waters (CALM). **(H - KMS)** 3. Establish baseline water quality monitoring programs in relation to nutrient enrichment (CALM). **(H - KMS)** 4. Map ecological and social values of the marine park that are particularly sensitive to oil spills and provide this information to the State Committee for Combating Oil Pollution (CALM, DPI). **(H)** 5. Inform users of the marine park about government policy and regulations on boat sewage disposal (CALM, DPI). **(M)** 6. Liaise with the relevant authorities to promote the need to reduce pollutant inputs to the Hill River (CALM, DoE, local government authorities, AgWA). **(M)** 7. Liaise with the relevant authorities to reduce the risk of introduced species (CALM, DoF). **(L)**

Performance measure/s	1. Nutrients: Chlorophyll *a* and inorganic nitrogen concentration in seawater. 2. Toxicants: concentration in seawater. 3. Pathogens: Faecal coliform concentration in seawater. 4. Litter: Mass (kg) of litter at selected monitoring sites. 5. Introduced pests: number present.	**Desired trend/s**	1. Constant or negative. 2. Negative. 3. Negative 4. Negative. 5. Negative.
Short-term target/s (KPI)	To be developed as required.		
Long-term targets (KPI)	The targets for water and sediment quality will be as noted below. i. *Sanctuary, special purpose (scientific reference), special purpose (shore-based activities)* and *special purpose (puerulus monitoring)* zones – no change from background$^{\Omega}$ levels, as a result of human activity in the marine park. ii. *General use* and *special purpose (aquaculture)* zones -no change from background$^{\Omega}$ levels, unless approved by the appropriate government regulatory authorities.		

$^{\Omega}$*background* conditions are determined from an appropriate unimpacted reference site.

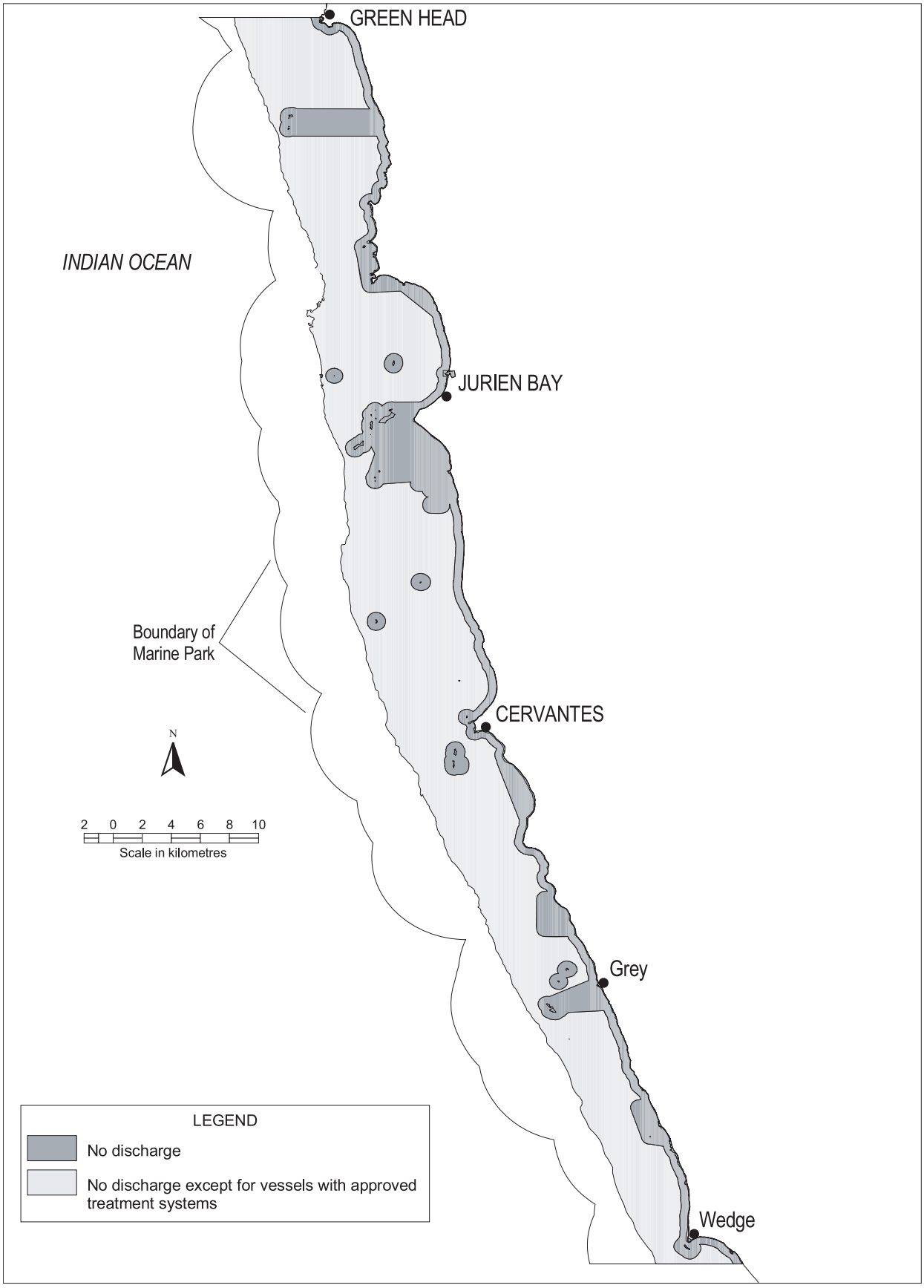

Figure 4: Proposed controls on sewage discharge from vessels within the Jurien Bay Marine Park.

7.1.3 Intertidal reef platforms

Ecological value	***Intertidal reef platforms**: A diverse range of intertidal reef platforms occur in the marine park ranging from highly protected reefs to reefs fully exposed to the action of swell waves.*

Background	Intertidal reef platforms are a major feature adjacent to the coastline and islands of the area. Significant areas of intertidal reef platforms are located between Green Head and North Head and between Cervantes and Wedge. These areas contribute significantly to the variety of habitats and therefore the biological diversity of the marine park. The shoreline intertidal reef at North Head is of particular biological interest due to similarities with the intertidal reefs of Rottnest Island. The intrinsic biological attributes and accessibility of shoreline intertidal reefs often attract a variety of commercial (e.g. abalone fishing) and recreational (e.g. collecting, fishing, reef-walking) uses as well as providing a range of educational and scientific opportunities. Unfortunately these characteristics also make these reefs amongst the most vulnerable habitats in the marine park to human degradation. Reef-walking and recreational fishing, for example, can have an affect on the flora and fauna on these reef platforms through trampling. Similarly commercial and recreational collecting activities have the potential to deplete local populations. These pressures are generally greatest on shoreline intertidal platforms due to the ease of access, with intertidal platforms around islands generally not utilised.
Current status	Relatively good condition but with some high use areas likely to have been impacted by human use.
Existing and potential uses and/or pressures	• Recreational and commercial fishing. • Physical disturbance (e.g. trampling). • Educational tours. • Tourism. • Scientific research.
Current major pressure/s	1. Recreational and commercial fishing. 2. Physical disturbance (e.g. trampling).
Management objective/s	To ensure the species diversity and abundance of marine flora and fauna on the intertidal reef platforms of the marine park are not significantly impacted by fishing and reef-walking activities.
Strategies	1. See ZONING strategies (Section 8.1.1). **(H - KMS)** 2. Initiate research programs to characterise the flora and fauna of selected intertidal reef platforms within the marine park in relation to establishing management targets (CALM, DoF). **(H - KMS)** 3. Assess the nature, level and potential impacts of human activities on intertidal reef platforms within the marine park (CALM). **(H)** 4. Educate marine park users about the potential detrimental effects of fishing, collecting and reef-walking (CALM). **(H)**

Performance measure/s	1. Diversity. 2. Abundance (non-targeted species). 3. Abundance (targeted species).	**Desired trend/s**	1. Constant or positive. 2. Constant or positive. 3. Constant or positive.
Short-term target/s	To be developed within three years.		
Long-term target/s	1. That the diversity of flora and fauna on intertidal reef platforms of the marine park is not significantly altered from baseline levels (to be determined) as a result of human activities. 2. That the abundance of protected flora and fauna on intertidal reef platforms is not significantly different to levels within sanctuary zones in comparable habitats. 3. That the abundance of targeted flora and fauna species on intertidal reef platforms is maintained at sustainable levels (to be determined).		

7.1.4 Seagrass meadows

Ecological value	***Seagrass meadows:*** *Extensive and diverse perennial seagrass meadows are an important habitat and nursery area for marine life and are important primary producers.*

Background	Seagrass meadows are an extensive and ecologically significant habitat in the more sheltered areas in the lagoonal environments of the marine park. Habitat mapping by CALM indicates that these meadows cover an area of over 215 square kilometres or about 25% of the total area of the marine park. The area has a high diversity of seagrass with nine species recorded. Most of the seagrass meadows in the marine park consist of perennial (i.e. long-lived) genera, such as *Posidonia* and *Amphibolis* that may take decades to recover if lost. Ephemeral (i.e. short-lived) genera, such as *Halophila*, also occur but are not abundant. Seagrasses are a vital component of temperate coastal ecosystems in Western Australia. Seagrass is a primary producer, meaning that it converts light energy from the sun to plant material, which is subsequently used as food and habitat. In addition seagrass meadows are important habitat and nursery areas and support a high diversity of marine species, including important commercial (e.g. rock lobsters) and recreational species. Seagrasses also trap and bind sediments thereby helping to maintain water clarity and in turn, light penetration to the seabed, a key process in coastal ecosystems dependent upon benthic (i.e. seabed) plant communities. The seagrass meadows in the Jurien Bay region are generally in good condition with some localised damage from boat moorings and anchoring evident in Ronsard Bay, which has between 40-50 permanent moorings. Other permanent moorings exist at Grey (five to six), Wedge (approximately 20) and Sandy Cape (less than ten). The majority of these moorings are used by commercial fishers. Although other existing pressures on seagrasses communities in the marine park are likely to be relatively minor, no comprehensive assessment has been made to date. These pressures include nutrient enrichment of marine park waters from both diffuse and point sources. Even though this input is likely to be relatively low and localised, the possibility exists that, with further planned development of the Jurien Bay region, inputs could become higher. Excessive nutrient enrichment of waters results in increases in phytoplankton concentrations in the water and epiphyte (i.e. algae) loads on seagrass leaves, reducing the amount of light reaching the leaves, causing the seagrasses to die of light starvation.
Current status	Apart from localised mooring damage, the extent and condition of seagrass meadows is considered as close to pristine.
Existing and potential uses and/or pressures	• Mooring and anchoring. • Nutrient inputs from diffuse (e.g. the Hill River catchment) and point (e.g. urban drains) sources. • Propeller scour. • Groundwater discharges (e.g. nutrients and pesticides). • Industrial discharges (e.g. rock lobster processing outfall). • Aquaculture.
Current major pressure/s	Mooring and anchoring.
Management objective/s	To ensure seagrass meadows in the marine park are not permanently damaged by existing and future mooring and anchoring activities.
Strategies	1. Ensure all existing moorings meet a specified environmentally acceptable standard within three years, and that all new moorings meet the specified environmentally acceptable standard and are consistent with the Moorings Policy (CALM & MPRA, 2003) (CALM, DPI). **(H – KMS)** 2. Educate users of the important ecological role of seagrass communities and the potential impacts of human activities, particularly boat moorings and nutrient pollution, on these communities (CALM). **(H - KMS)** 3. Assess proposals for new moorings. Moorings will not be permitted if they compromise vessel safety/navigation or if the installation and use of the mooring is likely to have significant impact on the ecological values (CALM, DPI). **(H)** 4. Monitor seagrass meadows in areas at most risk of mooring and anchoring damage (CALM). **(H)** 5. Gazette restricted anchoring areas where this activity is resulting in significant impact on benthic communities (DPI, CALM). **(H)** 6. See ZONING strategies (Section 8.1.1). **(H)**

Performance measures/s	Aboveground biomass (extent and density) of perennial seagrass meadows.	**Desired trend/s**	Constant or positive.
Short-term target/s (KPI)	No permanent loss in the aboveground biomass of perennial seagrasses from 2004 levels in defined areas of highest existing risk.		
Long-term target/s (KPI)	No permanent loss in the aboveground biomass of perennial seagrass from 2004 levels as a result of human activities in the marine park.		

7.1.5 Macroalgal communities

Ecological value	***Macroalgal communities**: Extensive subtidal macroalgal communities with high floral diversity occur in the marine park. These communities are important primary producers and refuge areas for diverse fish and invertebrate assemblages.*

Background	The macroalgal (seaweed) communities in the marine park consist of at least 125 species of algae. This rich diversity occurs mainly on intertidal reefs, on shallow and deep (>20 m depth) subtidal limestone reefs and platforms and, to a lesser extent, as small algae growing on seagrass leaves (i.e. epiphytes). Intertidal rocky platforms in the marine park are dominated by small red or brown turf algae, with the large brown alga *Ecklonia radiata,* occurring on the permanently submerged outer edges. The subtidal limestone reefs are overwhelmingly dominated by red algae (95 species), with brown algae (22 species) and green algae (8 species) also occurring. Macroalgae are the dominant plant communities in terms of biomass and therefore are a key primary producer in the marine park. The large fleshy algae provide food and shelter for a variety of marine organisms. Unlike perennial seagrass communities, most algal communities can quickly recover from human disturbance. There are no identified major pressures on the macroalgal communities within the marine park. Algae that detach from reefs often form drifts on the water's surface before accumulating on the seabed or shore as algal wrack. This wrack is ecologically significant in that it contains large numbers of invertebrates, which are prey for surf zone fishes and birds. The decomposition of the wrack also has ecological benefits by releasing nutrients and suspended organic particles into the water. Commercial collection of algal wrack should not be permitted and private collection should be monitored and controls introduced where it is believed to be having a significant impact on the nearshore ecology of the marine park.
Current status	Very good condition.
Existing and potential uses and/or pressures	• Damage from the use of rock lobster pots. • Collection of algal wrack as a soil conditioner for gardens.
Current major pressure/s	None.
Management objective/s	To develop an increased understanding of the distribution and diversity of macroalgal habitats in the marine park.
Strategies	1. See ZONING strategies (Section 8.1.1). ***(*H - KMS*)*** 2. Initiate research programs to quantify the floral and faunal diversity in major subtidal macroalgal habitats in the marine park in relation to developing management targets (CALM). **(H)** 3. Educate marine park users about the ecological importance of macroalgal communities (CALM). **(M)** 4. Quantify the level of private algal wrack collection and introduce controls where this is having a significant impact on the nearshore ecology of the marine park (CALM). **(L)**

Performance measure/s	1. Diversity. 2. Extent of habitat (ha).	**Desired trend/s**	1. Constant or positive. 2. Constant or positive.
Short-term target/s	To be developed as required.		
Long-term target/s	No reduction in macroalgal species diversity or macroalgal habitat below 2004 levels as a result of human activities in the marine park.		

7.1.6 Seabirds

Ecological value	***Seabirds:*** *Islands within the marine park are nesting areas for at least 15 species of seabirds and these birds are a major feature of the coastal environment of the Central West Coast.*

Background	At least 15 species of seabirds breed within the marine park. Breeding colonies no longer exist on the coast, but rather on the island nature reserves and rocky outcrops that are scattered throughout the marine park. These breeding colonies are protected from introduced ground predators, such as foxes and feral cats, which occur on the mainland but not on the islands. Twelve species of seabirds have been recorded breeding on North and South Fisherman Islands alone. In addition to the seabirds, four species of shorebirds are common to the area. The number of tropical birds, including the globally threatened Roseate Tern, using the islands in the marine park for breeding has increased significantly in recent years (R. Johnson, pers. comm.). As well as being of ecological significance, these seabird colonies are one of the attractions for people who visit these islands. As a result the most significant pressure on these populations is disturbance by humans landing on the islands and, to a lesser extent, by general boating activities around the islands. The Turquoise Coast Island Nature Reserves Management Plan addresses management of activities on the islands.
Current status	Very good condition.
Existing and potential uses and/or pressures	• Boating activities close to islands within the marine park. • Entanglement in fishing gear. • Oil spills/pollution.
Current major pressure/s	None.
Management objective/s	To ensure that human activity does not significantly disturb seabird populations in the marine park.
Strategies	1. Educate marine park users about the ecological significance of the marine park's seabird populations and the potential detrimental impacts of human disturbance (CALM). **(H)** 2. Implement the Turquoise Coast Island Nature Reserves Management Plan (CALM). **(H)**

Performance measures	See Turquoise Coast Island Nature Reserves Management Plan.	**Desired trend/s**	See Turquoise Coast Island Nature Reserves Management Plan.
Short-term target/s	See Turquoise Coast Island Nature Reserves Management Plan.		
Long-term target/s	See Turquoise Coast Island Nature Reserves Management Plan.		

7.1.7 Invertebrate communities

Ecological value	***Invertebrate communities**: A diverse marine invertebrate community, which includes a number of endemic species. (Commercial and recreational fishing of invertebrate species are considered in Sections 7.2.3 and 7.2.7).*

Background	Marine invertebrates are those marine animals without a backbone and include such animals as rock lobster, squid, cuttlefish, abalone, sponges, corals, shells, jellyfishes and anemones. A 1997 biological survey by CALM of visually obvious species in the marine park recorded 205 invertebrate species, with the highest diversity of invertebrates being recorded in the subtidal limestone reef habitats. A mixture of tropical and temperate species was recorded. The rich sponge fauna recorded are of particular interest because of the likely high endemicity of the group and the potential of this group to contain substances of value to the pharmaceutical industry. Although the 1997 survey was the first to systematically document the invertebrate assemblages in the marine park, it is likely that many more species will be recorded when more comprehensive surveys are undertaken. Apart from the high diversity of invertebrate species, many invertebrates have their northern or southern distribution limits within the marine park area. A number of endemic southwest molluscs including the turban shell, *Turbo jourdani* and the abalone, *Haliotis scalaris,* are at, or close to their northern distribution limits. An endemic midwest coast sand dollar species, *Ammotrophus arachnoides*, is at the northern limit of its distribution. Two coral species of the genus *Acropora* are, with the exception of a few colonies of *A. yongei* at Rottnest Island, the most southerly Western Australian records of living *Acropora.* The distribution of three endemic south west coral species also covers the area of the marine park and the rare cowrie, *Cypraea (Zoila) venusta*, is found in these waters. Invertebrate communities are amongst the most diverse and ecologically important groups within the marine park and are found throughout the habitats of the marine park. Many crustacean, mollusc, seastar and brittlestar species inhabit bare sand areas and so these sand areas are important habitats to protect. Several invertebrate species are the basis of major commercial (i.e. rock lobster, abalone) and recreational (i.e. rock lobster, squid, abalone) fisheries in the marine park. The management of invertebrate species that are taken for recreational and commercial purposes under the FRM Act needs to consider the viability of the populations of these species in the context of maintaining the values of the marine park. Fisheries management scales are rarely reconciled with the spatial scales of marine reserves. Consequently, populations of some species in a reserve could become locally depleted even though the fishery is still being managed on a sustainable basis at the broader scale. For example, long lived species that have relatively low abundance (e.g. Baler Shells), as well as uncommon (e.g. low abundance tropical species in Jurien Bay) and localised endemic species are particularly vulnerable to over exploitation. This is clearly undesirable from a marine reserve perspective. To overcome this potential problem, consideration is required as to the appropriateness of recreational and/or commercial extraction of these species and whether specific invertebrate species should be protected in part, or in all, of the marine park. This decision should be based on a number of factors including species distribution, abundance, life history and an assessment of the ecological and social importance of the species in the context of the marine park (e.g. tropical and endemic species). Extraction patterns would need to be established to anticipate the likely effects on the species in question, as well as the level of protection that will be afforded through the zoning scheme. It would also be necessary to assess the impact of extraction on the social values of the marine park, as localised depletion may reduce the opportunity for nature appreciation (e.g. viewing of "icon" species), nature photography and the quality of the recreational fishing experience. Species for which extraction is considered appropriate (given the above criteria), will be managed by DoF in accordance with Ecologically Sustainable Development Principles (see Sections 7.2.3. Commercial Fishing and 7.2.7 Recreational Fishing). The remaining species will be protected throughout the marine park using appropriate legislation.
Current status	Non target invertebrate species are likely to be in a close to "natural state"; however, the abundance and state of all targeted invertebrates is not known.

Existing and potential uses and/or pressures	• Recreational and commercial fishing. • Incidental recreational and commercial extraction (i.e. by-catch). • Activities which degrade critical habitats. • Trophic interactions. • Pollution.
Current major pressures	Fishing.
Management objective/s	1. To ensure that management of fishing in the marine park by DoF is consistent with the management targets for invertebrates. 2. To develop an increased understanding of the invertebrate diversity and abundance throughout the marine park.
Strategies	1. See ZONING strategies (Section 8.1.1). ***(*H - KMS*)*** 2. Undertake research programs to characterize invertebrate diversity and abundance in different zones in the marine park (CALM). ***(*H - KMS*)*** 3. Identify invertebrate species which will be protected from recreational or commercial fishing in the marine park and provide the necessary legislative protection to achieve this (DoF, CALM). **(H-KMS)** 4. Quantify the level and significance of by-catch for recreational and commercial fishing activities in the marine park and, if necessary and in accordance with DoF By-catch Action Plans, implement measures to progressively reduce the by-catch of invertebrate species in the marine park. (DoF, CALM). **(M)**

Performance measure/s	1. Diversity. 2. Abundance.	**Desired trend/s**	1. Constant or positive. 2. Constant or positive.
Short-term target/s	To be developed as required.		
Long-term target/s	1. No loss of invertebrate diversity as a result of human activity in the marine park. 2. No loss in protected invertebrate species abundance[Ø] as a result of human activities in the marine park. 3. Abundance and size composition of invertebrate species in sanctuary zones to be at natural[Ω] levels. 4. Management targets for abundance of targeted invertebrate species in other areas to be determined in consultation with Department of Fisheries and peak bodies.		

[Ø]In this context a loss or change in "*abundance" or "biomass*" excludes losses of a minor, transient or accidental nature. This qualification does not apply to seabirds, marine reptiles and marine mammals where minor or transient losses would be unacceptable (but does not apply to losses due to accidents).

[Ω] 'Natural' in this context refers to the abundance that would occur in areas that are undisturbed and/or unexploited by human activities

7.1.8 Finfish

Ecological value	***Finfish**: A rich finfish fauna, which includes an interesting mix of tropical, sub-tropical and temperate species. (Commercial and recreational fish species are considered in Sections 7.2.3 and 7.2.7).*

Background	Due to the tropical Leeuwin Current which influences the waters off the Western Australian coastline, the fish fauna which is found in the marine park is composed of a mixture of warm-temperate, subtropical and tropical species. According to Hutchins (1994) there are 171 fish species found on the limestone reefs in the marine park; however, this does not include the fish fauna that is found in the extensive seagrass habitats or in deep waters. If these habitats are taken into account, the number of fish species in the marine park is at least 250. Included in the fish fauna of the marine park are two species which are totally protected in Western Australian waters under the FRM Act, these being the white shark (*Carcharodon carcharias)* and the leafy sea dragon (*Phycodorus eques).* The rich fish fauna is not only of intrinsic ecological value, but is also important in that it has significant tourism and recreation potential. Divers and snorkellers have the opportunity to view a wide diversity of temperate, subtropical and tropical species in an area that is readily accessible. The ten most abundant reef fishes in the marine park waters are listed below and consist of one tropical species, six subtropical species and three warm temperate species (Hutchins, 1994). Western king wrasse (C*oris auricularis)* Brownfield's wrasse (*Halichoeres brownfieldi)* McCulloch's scalyfin (*Parma mccullochi)* Miller's damselfish (*Pomacentrus milleri)* Black spotted wrasse (*Austrolabrus maculatus)* Western buffalo bream (*Kyphosus cornelii)* Orange spotted wrasse (*Notolabrus parilus)* Western scalyfin (*Parma occidentalis)* Baldchin groper (*Choerodon rubescens)* Red-striped cardinalfish (*Apogon victoriae)* The management of finfish species that are taken for recreational and commercial purposes under the FRM Act also needs to consider the viability of the populations of these species in the context of maintaining the values of the marine park. Fisheries management scales are rarely reconciled with the spatial scales of marine reserves. Consequently populations of some species in a reserve could become locally depleted even though the fishery is still being managed on a sustainable basis at the broader scale. For example, long-lived species that have relatively low abundance, as well as uncommon (e.g. low abundance tropical species in Jurien Bay) and localised endemic species are particularly vulnerable to over exploitation. This is clearly undesirable from a marine reserve perspective. To overcome this potential problem, consideration is required as to the appropriateness of recreational and/or commercial extraction of these species and whether specific finfish species should be protected in part, or in all of the marine park. This decision should be based on a number of factors including species distribution, abundance, life history and an assessment of the ecological and social importance of the species in the context of the marine park (e.g. tropical and endemic species). Extraction patterns need to be established to anticipate the likely effects on the species in question, as well as the level of protection that will be afforded through the zoning scheme. It would also be necessary to assess the impact of extraction on the social values of the marine park, as localised depletion may reduce the opportunity for nature appreciation (e.g. viewing of "icon" species), nature photography and the quality of the recreational fishing experience. Species for which extraction is considered appropriate (given the above criteria), will be managed by DoF in accordance with Ecologically Sustainable Development principles (see Sections 7.2.3. Commercial Fishing and 7.2.7 Recreational Fishing). The remaining species will be protected throughout the marine park using appropriate legislation. The major potential pressures on the diversity and abundance of non-target finfish in the marine park are incidental extraction by commercial and recreational fishing activities (i.e. by-catch),

	alteration or loss of critical habitats and declines in water quality. DoF are addressing the issue of by-catch through the development of By-catch Action Plans for each individual fishery. Whilst these plans relate to a fishery as a whole (i.e. statewide), the information and strategies arising from these plans will be relevant to fisheries which operate within the marine park in ensuring that the objectives of the marine park are being met. Finfish are totally protected from extractive activity in sanctuary zones of the marine park and in special purpose (scientific reference) zones (apart from authorised shore-based fishing activities).
Current status	Non target finfish species are likely to be in a close to "natural state". However, the abundance and state of all targeted finfish species is not known.
Existing and potential uses and/or pressures	• Recreational and commercial fishing. • Activities which degrade critical habitats. • Trophic interactions. • Pollution.
Current major pressure/s	Fishing.
Management objective/s	1. To ensure that management of fishing in the marine park by DoF is consistent with the management targets for finfish. 2. To develop an increased understanding of the finfish diversity and abundance throughout the marine park.
Strategies	1. See ZONING strategies (Section 8.1.1). **(H – KMS)** 2. Undertake research programs to characterize finfish diversity and abundance in different zones in the marine park (CALM). **(H – KMS)** 3. Identify finfish species that will be protected from recreational or commercial fishing in the marine park and provide the necessary legislative protection to achieve this (DoF, CALM). **(H-KMS)** 4. Quantify the level and significance of catch of target species and by-catch for recreational and commercial fishing activities in the marine park and, if necessary and in accordance with DoF, implement measures to progressively reduce the by-catch of finfish species in the marine park. (DoF, CALM). **(M)** 5. Educate reserve users about the detrimental impacts of human activities on finfish stocks in the marine park (CALM). **(M)**

Performance measure/s	1. Diversity. 2. Abundance.	**Desired trend/s**	1. Constant or positive. 2. Constant or positive.
Short-term target/s (KPI)	To be developed.		
Long-term target/s (KPI)	1. No loss of finfish diversity as a result of human activity in the marine park. 2. No loss in protected finfish species abundance[Ø] as a result of human activities in the marine park. 3. Abundance and size composition of finfish in sanctuary zones and special purpose (scientific reference) zones to be at natural[Ω] levels. 4. Management targets for abundance of targeted finfish species in other areas to be determined in consultation with Department of Fisheries and peak bodies.		

[Ø]In this context a loss or change in "*abundance" or "biomass*" excludes losses of a minor, transient or accidental nature. This qualification does not apply to seabirds, marine reptiles and marine mammals where minor or transient losses would be unacceptable (but does not apply to losses due to accidents).

[Ω] 'Natural' in this context refers to the abundance that would occur in areas that are undisturbed and/or unexploited by human activities

7.1.9 Sea lions

Ecological value	***Sea lions:*** *The Australian sea lion (*Neophoca cinerea*), which is endemic to Australia and specially protected under the WC Act, breeds on Buller and North Fisherman islands and uses islands in the Jurien Bay region as haul-out sites.*

Background	The Central West Coast region is significant for the endemic Australian sea lion, *Neophoca cinerea,* because of the key sea lion breeding sites on several islands in the region. Of the estimated 2,700-3,400 Australian sea lions in Western Australia, about 21% reside and breed in or near the marine park. The species breeds on Buller, North Fisherman and Beagle (not in the marine park) islands and these are the only sea lion breeding sites on the west coast apart from some small colonies on the Abrolhos Islands. Even though there are seal haul-out sites on islands adjacent to the Perth metropolitan area, breeding has not occurred on these islands for over 100 years. However, males from this area are known to migrate north to the Jurien Bay area for breeding. As the next breeding area to the south for sea lions is at Haul Off Rock, east of Albany (off the south coast of Western Australia), it is thought that the Central West Coast sea lion colonies may be a genetically distinct sub-population and, if so, worthy of particular protection. The Australian sea lion is an uncommon animal and populations of this animal are thought to have declined significantly since European settlement. As a result they are specially protected under the WC Act. Pup estimates obtained through regular monitoring over the last ten years indicate that the breeding population may be stable, with approximately 150 pups born every 17-18 month breeding cycle. However the relatively small numbers and low fecundity of the Central West Coast sea lion population and the cessation of breeding on metropolitan islands since European settlement, suggests this species is very vulnerable to human disturbance. A major pressure on Australian sea lions is human disturbance from boating activities adjacent to, and recreational activities on, the breeding islands or haul-out sites. It should be noted that this also represents a potential threat to marine park visitors as sea lions can be aggressive if approached, particularly females with pups, and attacks have occurred in the past in the marine park area. Sea lions are also at risk of entanglement in discarded litter and fishing gear and sea lion pups can become caught in lobster pots and drown. Despite some records of this, the frequency of entanglement and entrapment is not known. DoF monitors by-catch as part of their ongoing fisheries management. Existing pressures on the sea lion population in the marine park in 2005 were considered to be low and monitoring supported this conclusion. However, with the projected increases in recreational use of the marine park over the coming years this situation is likely to change. Artificial feeding of sea lions needs to be minimised as this is likely to be detrimental to sea lions that become habituated to accepting food from people. Educational strategies should aim to minimise this activity.
Current status	The small West Coast population is stable, however due to size of the population and slow breeding, is highly vulnerable to human disturbance.
Existing and potential uses and/or pressures	• Boating activities. • Recreational activities on or near breeding islands and haul-out sites. • Feeding. • Entrapment in lobster pots and nets. • Litter (e.g. entanglement in bait bands, discarded fishing line). • Competition for marine resources (i.e. food). • Oil spill/pollution.
Current major pressure/s	Human disturbance and entrapment.
Management objective/s	To ensure sea lion populations on breeding and haul-out sites in the marine park are not significantly disturbed by human activities.

Strategies	1. Increase awareness of marine park users about sea lion interaction controls in place under the *Wildlife Conservation (Close Season for Marine Mammals) Notice 1998*, the potential impacts of human activities on sea lion populations and the dangers of interacting with sea lions (CALM). **(H)** 2. Regulate access of recreational visitors to marine park areas adjacent to breeding grounds and haul-out sites (CALM). **(H)** 3. Monitor trends in sea lion pup production each breeding season (CALM). **(H)** 4. Quantify the level of sea lion entrapment and drowning in commercial fishing gear and, if necessary, investigate ways to reduce this, through the development of a By-catch Action Plan by DoF and in collaboration with the commercial fishing industry (CALM, DoF, WAFIC). **(H)** 5. Implement relevant strategies in the Turquoise Coast Island Nature Reserves Management Plan and the Pinniped Management Program 1999-2009 (CALM). **(M)**

Performance measure/s	1. Pup production per breeding season. 2. Number of reported sea lion entanglements/entrapment per year.	**Desired trend/s**	1. Positive. 2. Negative.
Short-term target/s (KPI)	1. No decline in pup production in the marine park as a consequence of human activities in the marine park. 2. To be developed as required.		
Long-term target/s (KPI)	Increase in sea lion pup production in the marine park from 1998 (last survey) levels.		

7.1.10 Cetaceans and turtles

Ecological value	***Cetaceans and turtles****: Six species of toothed whale and eight species of baleen whale are recorded from the marine park area. However, the bottle-nosed dolphin (*Tursiops truncatus*) and humpback whale (*Megaptera novaeangliae*) are the only cetaceans that are regularly seen in marine park waters. Three species of sea turtle have also been reported in the marine park.*

Background	**Cetaceans** Six species of toothed whale have been recorded from the Jurien Bay area while eight species of baleen whale have been recorded in the deeper waters offshore. Five of the eight species of baleen whale are threatened species declared to be specially protected under the WC Act due to over-exploitation during the whaling era. The bottle-nosed dolphin and humpback whale are the only cetaceans that are regularly seen in marine park waters. While the dolphins are probably resident in marine park waters, humpback whales are transient visitors to these waters during their annual migration northward along the Western Australian coastline each autumn (April/May). The humpback whales return to marine park waters in spring (September/October) during their southern migration to summer feeding grounds in Antarctica. As these migrations pass through the offshore waters of the marine park, there is a significant potential for nature-based tourism in the form of whale watching tours. As populations of humpback whales in Western Australia are recovering rapidly (Bannister, 1994), it is likely that increased numbers of whales will be seen in offshore areas of the marine park, leading to increased nature-based tourism opportunities. **Sea turtles** At least three species of marine turtle have been recorded in waters off the Central West Coast. Leatherback turtles (*Dermochelys coriacea*) are occasionally seen in these waters and although this species is usually a non-nesting migrant visitor, it is likely that some individuals are present off this coast all year round. Based on records of stranded dead turtles, it is probable that at least some green (*Chelonia mydas*) and loggerhead *(Caretta caretta*) turtles are also resident in the Jurien Bay region year round. Hawksbill turtles (*Eretmochelys imbricata*) may be occasional visitors to the area. Turtles have not been recorded breeding in the marine park area. Loggerhead and leatherback turtles are threatened species declared to be specially protected under the WC Act. Potential disturbance to cetacean and turtle populations in the marine park waters are mainly from boat noise and collisions. The incidence of entanglement of cetaceans and turtles in fishing gear or litter is considered to be low.
Current status	Stable or increasing populations of cetaceans. Sea turtle numbers are unknown but the species is threatened on a global scale.
Existing and potential uses and/or pressures	• Physical disturbance from: boat collisions; boat noise; and commercial whale-watching tours. • Entanglement (e.g. in litter, ropes, discarded fishing gear).
Current major pressure/s	None.
Management objective/s	To ensure cetaceans and turtles in the marine park are not significantly disturbed by human activities.
Strategies	1. Maintain records of the incidence of entanglement, boat collisions and strandings of cetacean and turtle species (CALM, WAM, WAFIC). **(M)** 2. Ensure cetacean interaction activities do not impact wildlife, through education programs and liaison with charter operators (CALM). **(L)**

Performance measure/s	1. Animal entanglements per year as a proportion of the population. 2. Animal-boat collisions per year as a proportion of the population.	**Desired trend/s**	1. Negative. 2. Negative.
Short-term target/s	To be developed as required.		
Long-term target/s	No significant disturbance to cetacean and turtles in the marine park from human activities.		

7.2 Social Values

Social values are defined here as those cultural, recreational and economic characteristics for which the area is significant or well known. Social values may be "active" or "passive". Active social values are those that potentially may impact the ecological values of the marine park e.g. commercial and recreational fishing, scientific research, mining. Passive social values are those that do not impact the ecological values e.g. indigenous and maritime heritage, education.

7.2.1 Indigenous heritage

Social value	***Indigenous heritage**: A historical link with indigenous culture.*
Background	The Amangu and Yued clans, two of the 14 tribes of the Nyungar, are believed to have occupied the Jurien Bay region for more than 30,000 years. To date there are 36 recorded Aboriginal sites between Dongara and Guilderton (CALM, 1998); however, no comprehensive study has been carried out and there are many more sites to be officially recorded. The location of many of these sites remains confidential to avoid disturbance and they are all covered by the provisions of the *Aboriginal Heritage Act 1972* (Department of Planning and Urban Development, 1994). There is evidence that Nyungars occupied limestone caves in the Jurien Bay region, with stone artifacts being found in some caves. The coastal dunes in the Jurien Bay region were used as burial sites and human skeletal remains have been exposed by dune blowouts. The Nyungars also collected yams from these areas and these yam grounds are still evident at Cockleshell Gully. The coastal area between Green Head and Jurien Bay has the largest number of midden deposits in the south-west of Western Australia. Most of these small middens consist of marine shells, including limpet, turban, whelk, abalone and chiton shells, plus some fish remains, particularly wrasses and leatherjackets. These sites are significant as they provide evidence that marine molluscs and fish were an important food source in the traditional Aboriginal diet. Despite the obvious links to the marine environment for food, the wider significance of the waters has not been documented. As at 2004, there was one Native Title claim (the Yued clan) registered with the National Native Title Tribunal that overlays the Jurien Bay region and extends into the marine environment. The marine park has been gazetted to the low watermark with the unvested intertidal component (i.e. not already vested in other reserves such as National Parks and Nature Reserves), proposed to be included in the marine park at a later date. Given the requirements of the *Native Title Act 1994*, it will be necessary to obtain the support of the registered native title claimants for this to occur. CALM will undertake consultation with the Native Title claimants in regard to this issue.
Requirements	• Equitable access to sites and the marine park. • Involvement of Aboriginal people in the management of the marine park. • Recognition of heritage value and traditional activities. • Protection of any heritage sites found within the marine park.
Management objective/s	To involve local indigenous people in the management of the marine park.
Strategies	1. Develop, in collaboration with the local indigenous population, an understanding of the significance of the area to Aboriginal people (CALM, local Aboriginal groups). **(H)** 2. Ensure that there is Aboriginal representation on the Management Advisory Committee (CALM). **(H)** 3. Undertake consultations with representatives of the Yued native title claimants to facilitate the support for the vesting for the unvested intertidal areas adjoining the marine park (CALM). **(H)**

Performance measure/s	To be developed as required.	**Desired trend/s**	To be developed as required.
Short-term target/s	To be developed as required.		
Long-term target/s	To be developed as required.		

7.2.2 Maritime heritage

Social value	***Maritime heritage:*** *Significant maritime history including four historic shipwrecks between Cervantes and North Head.*

Background	The Jurien Bay area has an interesting maritime history. It is thought that the first white people to live on the Central West Coast were survivors from the Gilt Dragon, a Dutch East Indies ship wrecked in 1656. The Watch Buoy, another Dutch East Indies ship, was subsequently sent to look for the Gilt Dragon. During the search, thirteen crew including the Dutch navigator Abraham Leeman were washed aground in a small vessel on a reef near the Fisherman Islands. The Watch Buoy left without the crew, after unsuccessfully searching for them. The stranded crew eventually repaired their small boat and returned to Batavia (now Jakarta). The town of Leeman is named after the navigator. It was not until 150 years later that a French exploratory and scientific expedition investigated and charted much of the Central West Coast. The expedition leader named Jurien Bay in honour of Charles Marie Jurien of the French Naval administration. The settlement of the Swan River in 1829 led to an increase in shipping along the Western Australian coastline. Poor charts, unknown currents and violent winter storms took their toll on ships, as did the islands around Jurien Bay that were considered to be a major navigation hazard. There are four recorded historic shipwrecks along 30 km of coast between Cervantes and North Head: • the American whaling ship *Cervantes*, wrecked off Cervantes Island in 1844; • the *Maid of Lincoln* wrecked off Jurien Bay in 1891; • the *Europa* wrecked offshore from the Hill River mouth in 1891; and • the *Lubra* which foundered adjacent to the Jurien Bay townsite in 1898. Pre-1900 shipwrecks are protected under the *Maritime Archaeology Act 1973* (State legislation) and the *Historic Shipwrecks Act 1976* (Commonwealth legislation). The Western Australian Maritime Museum has statutory responsibility for management of these wrecks. The "First Jetty" at Cervantes is listed on the local council's Municipal Inventory of Heritage Places as a place of local cultural heritage significance.
Requirements	Not applicable.
Management objective/s	To ensure that, in collaboration with the Western Australian Maritime Museum, human activity does not significantly impact historic shipwrecks in the marine park.
Strategies	1. Ensure marine park users are aware of the relevant regulations under the *Maritime Archaeology Act 1973* (WAMM, CALM). **(L)** 2. Distribute educational material relevant to conserving historic shipwrecks in Western Australia to marine park users (WAMM, CALM). **(L)**

Performance measure/s	To be developed as required.	**Desired trend/s**	To be developed as required.
Short-term target/s	To be developed as required.		
Long-term target/s	No significant impacts to historic shipwrecks due to human activities.		

7.2.3 Commercial fishing

Social value	***Commercial fishing**: Commercial fishing for western rock lobster, abalone, shark, a variety of finfish and minor commercial collecting activities for shells and aquarium fish.*

Background	The western rock lobster (*Panulirus cygnus*) fishery has the highest value of any commercial, single species fishery in Australia, with a total annual value typically exceeding $300 million. In Western Australia, the fishery extends from Exmouth to Augusta with most vessels working along the Central West Coast between Fremantle and Geraldton. The marine park is located in Zone "C" of the fishery. Of the approximately 230 boats licensed to operate within the zone, and which could potentially fish within the marine park, approximately 140 boats operate predominantly in the Jurien Bay region (based at Green Head, Jurien Bay and Cervantes) and catch approximately 1.6 million kilograms live weight of lobster each season. The industry is therefore of significant economic importance to the local economy of the Central West Coast and a major employer of the local population. The Marine Stewardship Council (MSC) assessed the Western Rock Lobster Fishery during 1999-2000. The MSC is a charitable, not-for-profit, non-government, international organisation set up to promote ecologically sustainable fisheries and responsible fishing practices. The MSC undertakes independent certification of fisheries against criteria established to assess the sustainable management of that fishery. The Western Rock Lobster Fishery was certified based on its overall compliance with the MSC principles and criteria. To strengthen the overall management of the fishery, the assessment team recommended a number of actions to provide for continued certification. A number of the MSC recommendations are consistent with the strategies relating to the Western Rock Lobster Fishery in this management plan. The western rock lobster fishery is a limited-entry fishery and the fishing season is from 15 November to 30 June each year. The recruitment of puerulus larvae (i.e. rock lobster larvae) along the coast is monitored and the results of this, along with juvenile sampling and the percentages of setose and large females, are used as indicators of future lobster stock densities with management strategies being adjusted accordingly. The area bordered by Boullanger Island and Osprey and Whitlock Islands is used for puerulus larvae monitoring in the Jurien Bay area. Rock lobster fishing is not permitted in this area. The West Coast Demersal Gillnet and Demersal Longline Managed Fishery includes 38 endorsements for the use of net drums. Approximately six vessels frequently fish in the marine park's waters, targeting gummy, whiskery and dusky whaler sharks using demersal nets and in some cases, longlines. West Australian dhufish (*Glaucosoma hebraicum*), pink snapper (*Pagrus auratus*) and baldchin groper (*Choerodon rubescens*) are also included in the incidental catch of shark fishers. An Open West Coast Fishing Boat Licence authorises fishermen to fish throughout the State using standard methods (i.e. those methods not otherwise covered by a managed fishery such as trawls and gillnets). There are approximately 1360 endorsements for these licences for the State (Crowe *et al.,* 1999), of which approximately 370-400 are used each year. Approximately fifty two licence holders access the marine park, which includes Zone C western rock lobster fishers who also hold endorsements to catch finfish. The largest live weight of catch by Open West Coast Fishing Boat licence holders is from dhufish followed by sea mullet and samsonfish. There are also significant amounts of pink snapper and baldchin groper caught in the area. Most sharks and finfish caught on the Central West Coast supply the domestic Perth market. Roe's abalone (*Haliotis roei*) is also harvested in the marine park with 12 licence holders in the State. Fishers generally target some shallow, nearshore reefs in the marine park. There are no local commercial shell or aquarium collectors based in the Jurien Bay region. However, there are 34 shell collecting and 13 aquarium fish collecting licences that allow collecting along the entire Western Australian coastline at any time of the year, so collectors sometimes visit the Jurien Bay area for short time periods. Commercial shark netting and beach seining for mullet also occurs in the marine park. Commercial rock lobster fishing is not permitted in sanctuary, recreation, and special purpose (puerulus monitoring) zones. It is permitted in special purpose (scientific reference) zones and

	in special purpose (aquaculture) zones (as long as it is compatible with the primary purpose of the zone), and in general use zones. Commercial fishing, for species other than rock lobster, is not permitted in sanctuary, recreation, special purpose (puerulus monitoring) and special purpose (scientific reference) zones of the marine park. It is permitted in special purpose (aquaculture) zones, as long as it is compatible with the primary purpose of the zone and in general use zones. DoF has the statutory responsibility for management of commercial fishing throughout the State, including the waters within marine parks. The primary role of marine park management in relation to commercial fishing is to help maintain the natural values of the marine park on which the industry depends and, in liaison with DoF, to ensure that commercial fishing activities in the marine park are socially and ecologically sustainable. In addition, the sanctuary zones and special purpose (scientific reference) zones within the marine park will provide research and monitoring opportunities through which the impacts of commercial fishing on marine park values can be assessed. A key strategy will be to undertake a research program to ascertain the effects of rock lobster fishing on the ecology of the Jurien Bay Marine Park. This program will be undertaken jointly with DoF and be overseen by a steering committee. The results of this program will be used in the future review of the zoning scheme for the marine park.
Requirements	• High water quality. • Maintenance of key habitat. • Equitable access to fishing grounds within the marine park (in appropriate zones). • Maintenance of target fish stocks.
Management objective/s	1. To ensure that, in collaboration with the industry and DoF, commercial fishing activities in the marine park are managed in a manner that is consistent with maintaining the marine park's values. 2. To maintain the ecological values of the marine park that are important to commercial fisheries. 3. Cooperate with the industry and DoF in the maintenance of a viable commercial fishing industry in the marine park.
Strategies	1. See ZONING strategies (Section 8.1.1). **(H-KMS)** 2. Investigate the level of impact of the rock lobster fishery on the habitats, flora and fauna of the marine park (DoF, CALM). **(H-KMS)** 3. Determine the effects of commercial fishing activity on the marine park's values and review management controls as required (DoF, CALM). **(H-KMS)** 4. Ensure commercial fishers are aware of the zoning scheme and any restrictions, which may apply to their operations (DoF, CALM). **(H)** 5. Liaise with the MPRA in regard to proposed new fisheries and major changes to existing fisheries within the marine park (DoF). **(H)** 6. Monitor commercial fishing catch/effort within the marine park (DoF). **(H)**

Reporting	To be developed as required.
Targets	Implementation of management strategies within agreed timeframes.

7.2.4 Aquaculture

Social value	***Aquaculture**: The pristine, sheltered waters of the Central West Coast provide significant potential for development of the aquaculture industry.*

Background	The pristine sheltered waters of the Central West Coast are considered to have significant potential for the development of the aquaculture industry. As at 2004, there are two aquaculture licences and one application for an aquaculture licence in the marine park. Recent overseas developments in sub-surface technology in this industry suggest that the offshore waters of the marine park may be suitable for aquaculture in the near future. Aquaculture is a job-rich industry and, therefore has significant potential to contribute to regional employment. The management of human activities that affect the ecological values (i.e. high water quality and healthy habitats) which are critical requirements of this industry, is a key issue. The primary role of marine park management in relation to aquaculture is to ensure aquaculture activities in the marine park are socially and ecologically sustainable and to help maintain the natural values of the marine park on which the industry depends. Management of the aquaculture industry in the marine park is the statutory responsibility of DoF. Ministerial Policy Guideline No 8 (MPG 8) (FWA, 1998) sets out guidelines for the assessment of aquaculture proposals. In marine parks this involves the referral of the application to the DoE/EPA for determination of the level of environmental assessment required under the EP Act. The application is also referred to CALM and the MPRA, plus a range of other Government, community and industry groups. Following the consultation process outlined in MPG 8, the Executive Director of DoF then makes a proposal either to grant or refuse the application. Any proposal by the Executive Director to approve an application requires the Minister for the Environment's approval. License conditions (see strategy 5 below) would be developed primarily by DoF via existing statutory procedures, in collaboration with DoE and CALM. Aquaculture is not permitted in sanctuary or special purpose (puerulus monitoring) zones. It is permitted in special purpose (scientific reference) zones only where it is deemed compatible with the primary purpose (scientific reference) of the zone. Proposals that do not cause significant changes to water quality, to the key marine habitats or to the diversity and abundance of flora and fauna within special purpose (scientific reference) zones will be permitted. Aquaculture is permitted in special purpose (aquaculture) and general use zones subject to the approval process outlined above.
Requirements	• High water quality. • Provision of designated areas for aquaculture. • Equitable access to other areas of the marine park (in appropriate zones). • Detailed knowledge of ecological and social values and processes to assist aquaculture planning and monitoring programs.
Management objective/s	1. To ensure that, in collaboration with the industry and DoF, the aquaculture industry in the marine park is managed in a manner that is consistent with maintaining the marine park's values. 2. To maintain the ecological values of the marine park that are important to the aquaculture industry. 3. Cooperate with the industry and DoF in the maintenance of a viable aquaculture industry in the marine park.

Strategies	1. See ZONING strategies (Section 8.1.1). ***(*H - KMS*)*** 2. Ensure that due consideration is given to activities which would unnecessarily exclude future aquaculture opportunities in appropriate zones in the marine park (CALM). **(M)** 3. Provide formal advice to EPA and DoF (as appropriate) in relation to the environmental assessment of proposed aquaculture activities in the marine park (MPRA, CALM). **(M)** 4. In collaboration with the ACWA and DoF, assess the need for *Codes of Practice* for aquaculture in the marine park to ensure social and ecological sustainability (CALM, ACWA, DoF). **(M)** 5. Ensure aquaculture licences include: • conditions requiring environmental monitoring to the satisfaction of DoE and CALM; and • conditions relating to lighting, navigational marking and site utilisation to the satisfaction of DPI and DoF (DoF). **(M)** 6. Provide an annual status report on the aquaculture activity in the marine park in accordance with the MPRA's auditing requirements (DoF, CALM, ACWA). **(M)**

Reporting	To be developed as required.
Targets	Implementation of management strategies within agreed timeframes.

7.2.5 Coastal use

Social value	***Coastal use:*** *Recreational use of headlands, dunes and long white beaches for walking, swimming, surfing and fishing are a major value of the Jurien Bay Marine Park.*

Background	The headlands and beaches within and adjacent to the Jurien Bay Marine Park are one of the most prized and utilized community resources on the Central West Coast. The marine park has 102 km of mainland beaches and swimming, surfing, sunbathing, walking, beach fishing and use by recreational vehicles (RVs) have been a tradition on these beaches for many years. These activities are generally benign when use is low and sporadic. However with increasing use, environmental degradation and conflicts can emerge, particularly on the more popular beaches if some of these activities are not regulated. It should be noted that most of the coastline is already reserved to low or high water mark as either CALM managed conservation reserves or as local government managed coastal reserves. Over the last ten years there has been considerable CALM and local government resources allocated to develop coastal management plans in recognition of the sensitive nature of the coast and the increasing recreational use of the area. These plans incorporate a range of detailed strategies to conserve the coastal features. It is important that management of all coastal reserves is integrated with management of the marine park. Sandy shorelines are generally very unstable and can change significantly both seasonally and from year to year. Some sandy shorelines in the Jurien Bay region are quite mobile. For example, Island Point has not only retreated eastward for approximately 200 m in the last 150 years, but is currently migrating to the northwest. Beaches provide important social functions in that they provide a buffer against wave action, thereby protecting coastal structures and are an important focus for many recreational activities. Destruction of beach and dune vegetation by inappropriate vehicle use can lead to erosion and deterioration in the amenity value of beaches and disrupt nesting shorebirds. Similarly litter from recreational and commercial activities can significantly reduce amenity values. Increasing beach usage can also lead to conflict between incompatible uses (e.g. RVs and sunbathing). As visitor numbers and therefore recreational usage of the coast increases, the issues of RV use, litter and domestic animals on the beaches will become increasingly important. Strategies to manage RV use and domestic animals must be developed in liaison with the local government authorities for each beach area, as in many cases it is the local government authorities which manages the land immediately adjacent to the high-use beaches.
Requirements	• Vehicle access. • Facilities e.g. roads, toilets and walkways. • Control of beach activities e.g. RV use and dogs. • Clean beaches.
Management objective/s	1. To ensure the amenity value of beaches is not reduced by the inappropriate disposal of litter by marine park users. 2. To ensure vehicle use of marine park beaches does not cause conflict with other users.
Strategies	1. Increase awareness of marine park users about the ecological and social impacts arising from the inappropriate use of RVs on marine park beaches (CALM). **(M)** 2. Liaise with coastal land managers to control vehicle access to marine park beaches where significant environmental or social impacts by RVs cannot be avoided (CALM, local government authorities). **(M)** 3. Educate marine park users about the potential impacts of litter on the social values of the marine park (CALM, DoF). **(L)** 4. Identify popular beaches in the marine park and beaches that are potentially environmentally sensitive to RV use (CALM, local government authorities). **(L)**

Reporting	1. Amount (kg) of litter from local (known) sources on monitored beaches declines. 2. Number of complaints regarding RVs declines.
Targets	Implementation of management strategies within agreed timeframes.

7.2.6 Seascapes

Social value	***Seascapes**: Panoramic vistas of turquoise lagoon waters, offshore islands, reefs, beaches, breaking surf and the blue open ocean beyond the reef line are major attractions of the Jurien Bay Marine Park.*

Background	Panoramic vistas of turquoise lagoon waters, offshore islands, reefs, beaches, breaking surf and the blue open ocean beyond the reef line are major aesthetic attractions of the Jurien Bay Marine Park. These attributes can be appreciated from the shoreline of the marine park or from high vantage and lookout points along the coastal roads and hinterland where broader panoramic views can be enjoyed. The popularity of both natural and artificial lookouts with local residents and visitors alike indicates that the seascapes over the marine park are a prized natural value of the area and are important both socially and economically. Inappropriate structures along the coastline, on the islands and in the surrounding waters have the potential to degrade these aesthetic values of the marine park. Coastal developments and maritime infrastructure projects therefore must be planned with careful consideration of this issue.
Requirements	• Generally uninterrupted coastal vistas. • Sensitively designed and located offshore and coastal infrastructure.
Management objective/s	To identify designated seascapes of the marine park and seek to minimise degradation of these seascapes by coastal developments, island structures or marine infrastructure within the marine park.
Strategies	1. Identify and determine the key characteristics and spatial extent of the major seascapes of the marine park (CALM, local government authorities). **(H-KMS)** 2. Develop performance measures and management targets for designated seascapes (CALM, local government authorities). **(H)** 3. Provide formal advice to the WA Planning Commission, EPA and local government authorities in relation to ensuring development proposals along the coast adjacent to the marine park do not unnecessarily impact on the designated seascapes of the marine park (CALM, MPRA). **(M)** 4. Ensure potential developers are informed of relevant management objectives and targets of the marine park in relation to seascape values (CALM, local government authorities). **(M)**

Performance measure/s	To be developed as required.	**Desired trend/s**	To be developed as required.
Short-term target/s (KPI)	To be developed as required.		
Long-term target/s (KPI)	No significant change in the designated seascapes of the marine park from 2004 levels.		

7.2.7 Recreational fishing

Social value	***Recreational fishing:*** *Diverse range of quality recreational fishing opportunities for local and visiting fishers targeting several finfish species, abalone and western rock lobster.*

Background	Fishing is one of the most popular recreational activities for both residents and visitors to the Central West Coast region with an estimated 36% of the population participating. Over 99% of the coast is open to all forms of recreational fishing, but access to the coast by road is limited. The groynes at Jurien Bay boat harbour, plus the jetties at Jurien Bay and Cervantes provide convenient access to good fishing locations as do many of the local beaches. The most popular sites for boat fishing are in the lee of the offshore islands or near offshore reefs, weather permitting. Ramp or beach launching is available at Cervantes, Jurien Bay and Green Head and at many other spots along the coast and facilitate easy access to lagoon waters and offshore reefs. Beach anglers in the Jurien Bay region target tailor (*Pomatomus saltatrix*), whiting (*Sillago* sp.), Australian herring (*Arripis georgianus*), squid (*Sepioteuthis australis*) and skipjack (*Pseudocaranx dentex*). A survey of boat based fishing (line and spear) was conducted by DoF in 1996/1997. From this survey it is estimated that the recreational effort for boat fishers consisted of 37,000 boat hours or 46,000 fisher days (between Lancelin and Leeman) which represents approximately 12% of the total recreational boat fishing effort for the West Coast region. Of the boats surveyed, 98% were line fishers with only 2% spearfishers which indicates the principal recreational fishing effort is line fishing. Anglers originated mainly form rural WA (36%), local towns (34%) and Perth metropolitan area (29%) with less than 1% from interstate. Boat anglers targeted the above species as well as westralian dhufish (*Glaucosoma hebraicum*) pink snapper, snook, garfish, sweep, breaksea cod and baldchin groper (*Choerodon rubescens*). Estimates of numbers caught were calculated from the survey to enable comparisons of future catch and effort. Spearfishing in the Jurien Bay region occurs from shore and boat although it is a minor activity compared with line fishing. Diving for abalone (*Haliotis* sp.) and western rock lobster is popular. Recreational net fishing is permitted along the coast (with the exception of the Jurien Bay foreshore) and the main species targeted by net fishers are mullet (*Mugil* spp.) and whiting (*Sillago* sp.). Recreational fishers target western rock lobster (*Panuliris cygnus*) using pots and also catching the lobster by hand. The proposed Lancelin to Cervantes coastal road will significantly improve access to the marine park area. This will substantially increase recreational fishing pressures, which will need to be managed carefully to ensure target species are not fished below sustainable levels and conflicts with other users do not emerge. DoF has responsibility for management of recreational fishing throughout the State including waters in the marine park. The primary role of marine park management is to help to maintain the natural values of the marine park on which recreational fishing depends and, in liaison with DoF, ensure that recreational fishing activities in the marine park are socially and ecologically sustainable. In addition, the creation of sanctuary and special purpose zones within the marine park will provide research and monitoring opportunities which will contribute to assessing the sustainability and environmental impacts of recreational fishing in the marine park. Management of recreational fishing is achieved through gear restrictions, bag limits, size limits and seasonal and area closures, and needs to be consistent with the maintenance of the conservation values of the marine park. To achieve this, research and monitoring of the target species and the effects of recreational fishing on the marine park's values need to be undertaken. DoF has prepared a West Coast Recreational Fishing Management Strategy that outlines the management of recreational fishing on the West Coast (Augusta to Kalbarri) including issues such as bag and possession limits and spearfishing on compressed air. The Jurien Bay Marine Park plan does not therefore propose specific changes to recreational fishing management. Recreational fishing is permitted in general use zones. Some special restrictions apply in special purpose zones (refer to Table 2 section 8.1). Recreational fishing is not permitted in sanctuary zones.

Requirements	• High water quality. • Maintenance of target species habitat. • Equitable access to fishing grounds within the marine park (in appropriate zones). • Maintenance of recreational fish stocks in the marine park.
Management objective/s	1. To ensure that, in collaboration with DoF, recreational fishing in the marine park is managed in a manner that is consistent with maintaining the marine park's values. 2. To maintain the ecological values of the marine park that are important to maintaining recreational fishing in the marine park. 3. Cooperate with DoF in maintaining quality recreational fishing opportunities in the marine park.
Strategies	1. See ZONING strategies (Section 8.1.1). ***(*H - KMS*)*** 2. Evaluate the sustainability of existing recreational fisheries in the marine park (DoF). (**H-KMS**) 3. Formulate performance measures and targets for key recreational species that will maintain the quality of recreational fishing in the marine park (DoF, Recfishwest, RFAC). (**H- KMS**) 4. Determine the effects of recreational fishing activities on the marine park's values and review management controls as required (DoF, CALM). **(H - KMS)** 5. Ensure recreational fishers are aware of the zoning scheme and of restrictions, which apply to their activities within the marine park (CALM, DoF, Recfishwest, RFAC). **(H)** 6. Monitor recreational fishing catch/effort within the marine park (DoF). **(H)** 7. Undertake research that documents the oral history of fishing in the marine park (CALM). **(H)**

Reporting	1. Catch per unit effort for key species. 2. Catch composition.
Targets	1. To maintain the quality and diversity of recreational fishing in the marine park. 2. To have monitoring programs in place within three years. 3. Implementation of management strategies within agreed timeframes.

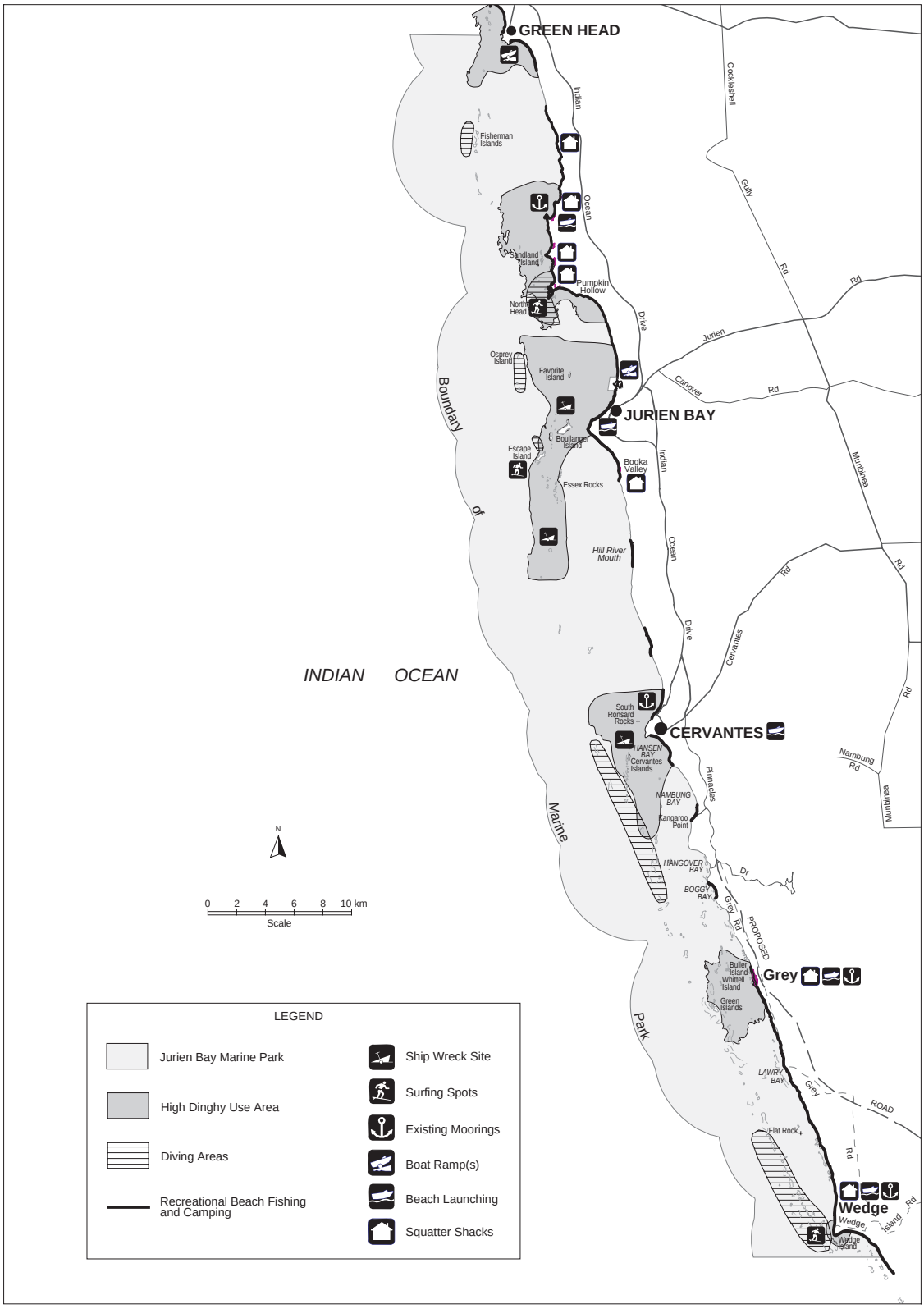

Figure 5: Recreational use between Green Head and Wedge prior to the establishment of the Marine Park. It should be noted that certain activities shown in this figure are now not permitted, in accordance with the zoning scheme.

7.2.8 Water sports

Social value	***Water sports**: The pristine nature and diversity of the natural environment of the Central West Coast provides opportunities for swimming, boating, windsurfing, snorkeling, SCUBA diving, free-diving, surfing, wake-boarding and numerous other water sports.*

Background	Watersports include direct (e.g. swimming) and secondary (e.g. boating) contact recreational activities. These activities are popular along the Central West Coast as a result of the mild Mediterranean climate and easy access to beaches, sheltered lagoons, offshore reefs and the open ocean environment. Swimming along the protected beaches is popular and snorkeling and SCUBA diving are increasing in popularity. The most popular dive areas in the region are off North Head, on the seaward side of Favorite Island, on the wreck of the Lubra and, weather permitting, on the overhangs, rock walls and caves at North Tail, Seaward Ledge and The Boomer. Surfing is increasing in the area and where this activity occurs on offshore reefs, it may lead to some conflicts with commercial rock lobster fishermen who also wish to access these areas. Boating is also popular within the region. To ensure public safety and minimise conflict between marine park users, the DPI has gazetted some restrictions relating to boating activity, which include speed restrictions and exclusion areas. This includes Dynamite Bay (Green Head) which was gazetted as a boating prohibited area on 12 February 2002 at the request of the Shire of Coorow. Other surface watersports which attract people to the Jurien Bay region include yachting, surfing, windsurfing, waterskiing and, to a lesser extent, jetskiing and parasailing. Windsurfing is most popular at Cervantes, which hosts a major annual windsurfing event, which is part of the "pro-am" circuit and includes the Asia Cup. This event attracts participants from all over the world. Nature appreciation and underwater photography are also popular activities amongst marine park visitors. Figure 5 indicates the recreational activity prior to establishment of the Marine Park. It should be noted that certain activities shown in this figure are not permitted in accordance with the zoning scheme..
Requirements	• High water quality. • Equity of access to appropriate areas within the marine park. • Separation of incompatible recreational activities.
Management objective/s	1. To ensure water sports are managed in a manner that is consistent with maintaining the marine park's ecological values. 2. To maintain the ecological values of the marine park that are important to recreational water sports. 3. To manage recreational activities in a manner that minimises conflict between marine park users.
Strategies	1. See ZONING strategies (Section 8.1.1). (**H – KMS**) 2. Determine the nature, spatial patterns, compatibility and potential environmental impacts of all existing water sports in the marine park (CALM). **(H)** 3. Use zoning and regulations to separate incompatible activities, as appropriate (CALM, DPI). **(M)** 4. In collaboration with user groups, develop *Codes of Conduct* to minimise environmental impacts of recreational activities, as appropriate (CALM, DPI, Western Australian Tourism Commission). **(M)**

Reporting	1. To be developed as required. 2. See Water Quality (Section 7.1.3).
Targets	Implementation of management strategies within agreed timeframes.

7.2.9 Marine nature-based tourism

Social value	***Marine nature-based tourism**: Natural values and accessibility of the area ensure significant tourism potential and opportunity for a variety of marine nature-based tourism activities.*

Background	The marine environs of the marine park provide for a diverse range of marine nature-based tourism activities. Marine tourism is a very substantial industry in Australia and is generally experiencing rapid growth. Australia's diverse and pristine marine environments makes the outlook for marine nature-based tourism very positive (AMISC, 1997). Marine tourism is a job-rich industry and, as such, has the potential to generate significant regional employment. The creation of a marine park on the Central West Coast is likely to provide significant impetus to marine tourism in the Jurien Bay area. The further development of marine tourism in the marine park is largely dependent on the maintenance of the key ecological values of importance to the marine tourism industry in the Jurien Bay area. The goal of marine park management in relation to marine tourism is to manage tourism activities in the marine park in a manner that is consistent with maintaining the marine park's values, to maintain the values of the marine park on which the industry depends and assist in maintaining a viable nature-based industry in the marine park.
Requirements	• Clean beaches • High water quality • Healthy benthic communities • High aesthetic quality of the marine environment • Provision of "undisturbed" areas for nature appreciation • Equitable access to the natural values of the marine park
Management objective/s	1. To manage marine tourism in the marine park in a manner that is consistent with maintaining the marine park's values. 2. To maintain the ecological values of the marine park that are important to the tourism industry. 3. Cooperate with industry and Western Australian Tourism Commission in maintaining a viable tourism industry in the marine park.
Strategies	1. See ZONING strategies (Section 8.1.1). (**H – KMS**) 2. License all commercial tourism operations within the marine park with appropriate conditions (CALM). **(H)** 3. Ensure equitable access for marine tourism within appropriate zones in the marine park (CALM). **(M)** 4. Develop *Codes of Practice* for commercial marine tourism operations in the marine park including: • performance measures; • desired trends; • short-term and long-term management targets; and • monitoring and reporting requirements (CALM, Western Australian Tourism Commission). **(M)**

Reporting	To be developed as required.
Targets	Implementation of management strategies within agreed timeframes.

7.2.10 Petroleum drilling and mineral development

Social value	***Petroleum drilling and mineral development****: Significant onshore reserves of hydrocarbons are being produced in the northern Central West Coast area around Dongara. The hydrocarbon potential of the area encompassing the marine park is not well known.*

Background	The Central West Coast of Western Australia overlaps with the Perth basin, an area of considerable interest to the petroleum industry. Exploration permits and production licences are held for almost the entire onshore and offshore areas between Lancelin and Geraldton. Major hydrocarbon fields have been discovered onshore near Dongara and Eneabba and these fields produce domestic gas supplies worth $11 million annually. Offshore Petroleum Exploration Permit WA-286-P abuts the coastal area of the marine park. While the petroleum potential within the marine park is not well known, recent petroleum discoveries both onshore and offshore in the general vicinity could generate further interest from the petroleum industry. The coastal waters from Lancelin north to Cliff Head have been released for bids for exploration permits. Mineral and petroleum exploration and extraction is regulated under the *Petroleum Act 1967*, *Petroleum (Submerged Lands) Act 1982*, *Pipelines Act 1969* and the *Mining Act 1978* and administered by the Department of Industry and Resources (DoIR). In marine parks, drilling for exploration or production is not permitted in sanctuary and recreation zones, or in special purpose zones where the Minister administering the CALM Act declares that drilling or production is incompatible with the conservation purpose specified in the classified area notice. It is permitted in general use zones and some special purpose zones. Exploration and production in marine conservation reserves are subject to environmental impact assessment by the Environmental Protection Authority.
Requirements	Equitable access to areas of the marine park within appropriate zones subject to environmental assessment.
Management objective/s	To ensure that, in collaboration with the petroleum industry and DoIR, petroleum industry activities in the marine park are managed in a manner that is consistent with maintaining the marine park's values.
Strategies	1. Provide formal advice to EPA and DoIR in relation to the environmental assessment of proposed petroleum activities in the marine park (MPRA, CALM). **(M)** 2. Ensure the license conditions of approved petroleum industry projects include: • appropriate environmental performance measures; • desired trends; • short-term and long-term management targets; and • monitoring and reporting requirements (CALM, DoIR, EPA). **(M)** 3. Ensure other uses of the marine park do not unnecessarily restrict future petroleum industry opportunities in appropriate zones in the marine park (CALM). **(M)**

Reporting	To be developed as required.
Targets	Implementation of management strategies within agreed timeframes.

7.2.11 Scientific research

Social value	***Scientific research**: An interesting and unusual mixture of tropical and temperate marine plants and animals of particular scientific interest in an area within easy access of Perth.*

Background	The marine biodiversity of the Jurien Bay Marine Park is broadly representative of the Central West Coast marine bioregion. This region is part of a broad zone of biogeograhic overlap that lies between the tropical waters to the north of North West Cape and the cool temperate waters off Western Australia's south coast. As a result the marine park contains an interesting and unusual mixture of tropical and temperate marine plants and animals. This feature makes the area of particular scientific interest. Despite the wide range of natural features and human uses in an environment that is near pristine and close to many of the academic and educational institutions in Western Australia, the level of knowledge about environmental processes and existing and potential pressures from human usage in the area is relatively limited. A good understanding of how the marine park functions and knowledge about the cumulative long-term impact of recreational and commercial uses on the ecological values of the marine park are fundamental for effective management. In addition such studies would also enhance the general understanding of the functioning of temperate west coast coastal ecosystems, thereby providing broader benefits to the general community. Research programs should, ideally, be designed to fill key gaps in existing knowledge. However any increase in knowledge is beneficial and all legitimate research projects will be encouraged. All research within the marine park requires the appropriate research permit issued under the CALM Act, WC Act or the FRM Act.
Requirements	• Access to representative sites free of major human influences for "scientific reference" sites. • Access to representative sites covering the range of major human activities in the marine park for "impact" sites. • Equitable access to the marine park for ecological and social research opportunities in appropriate zones.
Management objective/s	1. To provide access and opportunities for ecological and social research in the marine park. 2. To ensure ecological and social research is ethical and ecologically sustainable.
Strategies	1. See ZONING strategies (Section 8.1.1). **(H - KMS)** 2. Ensure proponents of research and monitoring programs in the marine park obtain and comply with appropriate permits (CALM, DoF). **(H)**

Reporting	To be developed as required.
Targets	Implementation of management strategies within agreed timeframes.

7.2.12 Education

Social value	***Education**: Easy access and the close proximity of the marine park to Perth and regional centres provide opportunities for community education about the marine environment.*

Background	Easy access and the proximity of the marine park to Perth and regional centres provide opportunities for community education about the marine environment. The marine park area is used by local schools and by Perth-based universities and schools for educational purposes. There is however, great potential for this use to be increased. Public education about the marine environment through active participation, greatly assists management. The desired outcome of public education is to increase public awareness and understanding of conservation and management issues in the marine park and of the marine environment in general. In a local sense, this increased understanding helps develop a real sense of community ownership, which subsequently leads to better protection of the ecological and social values of the marine park.
Requirements	• Access to sites free of major human influences. • Access to sites covering the range of major human activities in the marine park. • Equitable access to the marine park (in appropriate zones) for the full range of educational opportunities.
Management objective/s	To facilitate the use of the marine park for educational purposes.
Strategies	1. See ZONING strategies (Section 8.1.1). **(H - KMS)** 2. Support local schools that wish to develop a marine education program relating to the marine park (CALM, schools). **(M)** 3. Provide support, where possible, to institutions using the marine park for educational purposes (CALM). **(M)**

Performance measure/s	Visitor knowledge regarding the marine park.	**Desired trend/s**	Positive.
Reporting	To be developed as required.		
Targets	Implementation of management strategies within agreed timeframes.		

8 GENERIC MANAGEMENT STRATEGIES

The vision, strategic objectives, management targets and management objectives outlined in Section 7 provide the framework for the development of specific management actions designed to conserve ecological and social values. These actions are achieved by applying one or more of seven generic management strategies:

- the development of an appropriate administrative framework;
- education and interpretation;
- public participation;
- surveillance and enforcement;
- research;
- monitoring; and
- direct management intervention.

The Advisory Committee for the Proposed Jurien Bay Marine Reserve, in consultation with key stakeholders and the wider community, undertook the development of specific management actions based on these strategies. Public comment on these actions was sought before the management plan was finalised and adopted by the Government.

8.1 Development of an Administrative Framework

The development of an appropriate administrative framework is essential to ensure the marine park can be managed effectively over the long-term. This framework should include both statutory considerations such as reserve purpose, class and boundaries, a suitable zoning scheme and appropriate regulations as well as resource considerations in human, financial and infrastructure/plant terms.

For administrative purposes, CALM is divided into regions, which in turn are made up of districts. The Jurien Bay Marine Park is within the Mid-West Region and the day to day operational management of the marine park is the responsibility of the District Manager, Jurien District. CALM has management infrastructure and staff at Jurien Bay as well as facilities and staff at Cervantes. The District Office is supported by the Marine Conservation Branch, which has a central role in assisting Regional and District offices in the management of marine reserves throughout the State. A number of other specialist branches provide support, direction and assistance in relation to such areas as wildlife management and licensing of tourism operations.

The implementation of the zoning scheme is an important strategy for the conservation of marine biodiversity and the management of human use in the marine park. The zoning scheme assists in separating conflicting uses and provides for specific activities such as for aquaculture, nature-based tourism, scientific study, education and nature appreciation. The partial or total restriction of extractive activities in representative habitats is a key strategy in the long-term maintenance of marine biodiversity values of the marine park. Specifically, the establishment of sanctuary and special purpose (scientific reference) zones will play a key role in the protection of the representative areas of important habitat such as intertidal reef platforms, seagrass meadows and macroalgal communities. As well as providing a measure of management "insurance", these zones also provide areas where natural processes can be studied free of significant human influence. These zones provide the opportunity to improve understanding of the marine park's key ecological processes and to obtain critical baseline data to compare against areas of the marine park where extractive activities are permitted and/or where environmental impacts may be occurring.

Zoning is a flexible management tool that can accommodate evolving uses of the marine park during the period of the management plan. The nature and extent of zoning should be considered within the context of the other generic management strategies of education and interpretation, surveillance and enforcement, research, monitoring, public participation and direct management intervention (Sections 8.2 – 8.7).

8.1.1 Development of a zoning scheme

Zones are formally established as classified areas under Section 62 of the CALM Act. Section 13B(2) of the CALM Act requires that marine parks be zoned as one or a combination of specific management zones. These are *sanctuary*, *special purpose, recreation*, and *general use* zones.

Sanctuary zones provide for the maintenance of environmental values and are managed for nature conservation by excluding human activities that are likely to adversely affect the environment. They are used to provide the highest level of protection for vulnerable or specially protected species, and to protect representative habitats from human disturbance so that marine life can be seen and studied in a relatively undisturbed state. Specified passive recreational activities consistent with maintaining environmental values may be permitted, but extractive activities, including fishing and traditional fishing and hunting are not. Commercial tourism operations (such as for nature-based tours) will be considered where they do not conflict with other uses and will be regulated under the CALM Act.

Special purpose zones are managed for a particular priority purpose or use such as a seasonal event (e.g. wildlife breeding, whale watching) or a particular type of commercial activity (e.g. aquaculture). Uses that are incompatible with the specified priority purpose are not allowed in these zones.

Recreation zones provide for conservation and recreation, including recreational fishing where this is compatible with conservation values. Commercial fishing, aquaculture, petroleum drilling and production, and mining are not permitted in these zones.

General use zones are those areas of the marine park not included in sanctuary, special purpose or recreation zones. Conservation of natural values is still the priority of general use zones, but activities such as sustainable commercial and recreational fishing, aquaculture, pearling and petroleum exploration and production are permitted provided they do not compromise the ecological values of the marine park.

The combination of sanctuary, special purpose, and general use zones that comprises the zoning scheme for the Jurien Bay Marine Park have been developed as a key component of the strategies to contribute to the protection of the ecological and social values of the marine park. The zoning scheme was originally derived through an iterative consultative process with the Advisory Committee for the Proposed Jurien Bay Marine Reserve and key stakeholder groups. In finalising the zoning scheme, consideration was given to public submissions on the indicative management plan, consultations with key stakeholders, and practical aspects associated with marine park management (e.g. ease of compliance activities).

The development of the zoning plan for the Jurien Bay Marine Park was based on a number of key principles and assumptions. These included:

- that local community support is critical to achieving the strategic objectives of the marine park;
- that the maintenance of the ecological values of the marine park is of primary importance;
- that the maintenance of the social values of the marine park match community expectations;
- that rock lobster fishing, in relation to habitat impacts and by-catch issues, is not significantly detrimental to the values of the marine park;
- that the effects of rock lobster fishing on the marine park's values, in relation to trophic interactions (i.e. cascading ecological effects), was unknown and should be investigated;
- that the projected increase in recreational usage of the marine park represents the most significant long-term pressure on the ecological and social values of the region;
- that the zoning scheme should include "no take" and "limited take" areas as "insurance" against significant long term impacts of projected usage;
- that all habitats should be represented in sanctuary zones, or at a minimum, in special purpose (scientific reference) zones;
- that significant conservation and heritage features (e.g. key breeding areas, shipwrecks etc.) should be given a higher level of protection through zoning, if appropriate;
- that fewer, large zones are more appropriate from an ecological and enforcement basis than many small zones; and
- that the zoning scheme should be simple for the public to understand and to facilitate effective compliance with regulations.

The zoning scheme for the Jurien Bay Marine Park is shown in Figure 6. The activities permitted in each zone are outlined in Table 2. Six zone categories will be implemented in the Jurien Bay Marine Park. These are sanctuary, special purpose (scientific reference), special purpose (aquaculture), special purpose (shore-based activities), special purpose (puerulus monitoring), and general use zones.

The marine park's shoreward boundary is the low water mark. However, a large proportion of the coastal intertidal area adjacent to the marine park is vested as national park or nature reserve. To facilitate enforcement of the zoning scheme in the marine park, the regulations covering the marine park zones will be applied to the adjacent intertidal areas. It is anticipated that the remaining intertidal areas will be included in the marine park in the near future. Until this occurs, these areas will be managed consistent with the area of the marine park to which they adjoin. The purpose, names and sizes of the zones are detailed in Section 8.1.2.

The zoning scheme is an important strategy to achieve the strategic objectives of this plan. Specifically the implementation of the zoning scheme is a key strategy in achieving the management objectives for the following ecological (i*ntertidal reef platforms, seagrass meadows, macroalgal communities, invertebrate communities,* f*infish)* and social (c*ommercial fishing, aquaculture, recreational fishing, watersports, marine nature-based tourism, scientific research, education*) values.

Summary of Generic Administrative Objectives, Strategies and Targets

Management objective/s	1. To establish the statutory administrative framework for the marine park. 2. To include the mainland intertidal area (i.e. low water mark to high water mark) within the marine park.
Strategies	1. Gazette appropriate notices under the CALM Act and FRM Act to implement the zoning scheme of the marine park (CALM, DoF). **(H - KMS)** 2. Implement appropriate signage indicating zone boundaries and inform users about the types of zones, reasons for and restrictions on activities in the marine park (CALM, DoF). **(H - KMS)** 3. Undertake consultations with Native Title claimants to seek support for the inclusion of the mainland intertidal area into the marine park (CALM). **(H – KMS)** 4. Amend the boundary of the marine park to include the coastal intertidal in the marine park following resolution of *Native Title Act 1994* requirements (CALM). **(H – KMS)** 5. MPRA and CC to develop an appropriate vesting basis for the management arrangements of the intertidal areas of the reserves (MPRA, CC, CALM). **(H-KMS)**
Target	Implementation of management strategies within agreed timeframes.

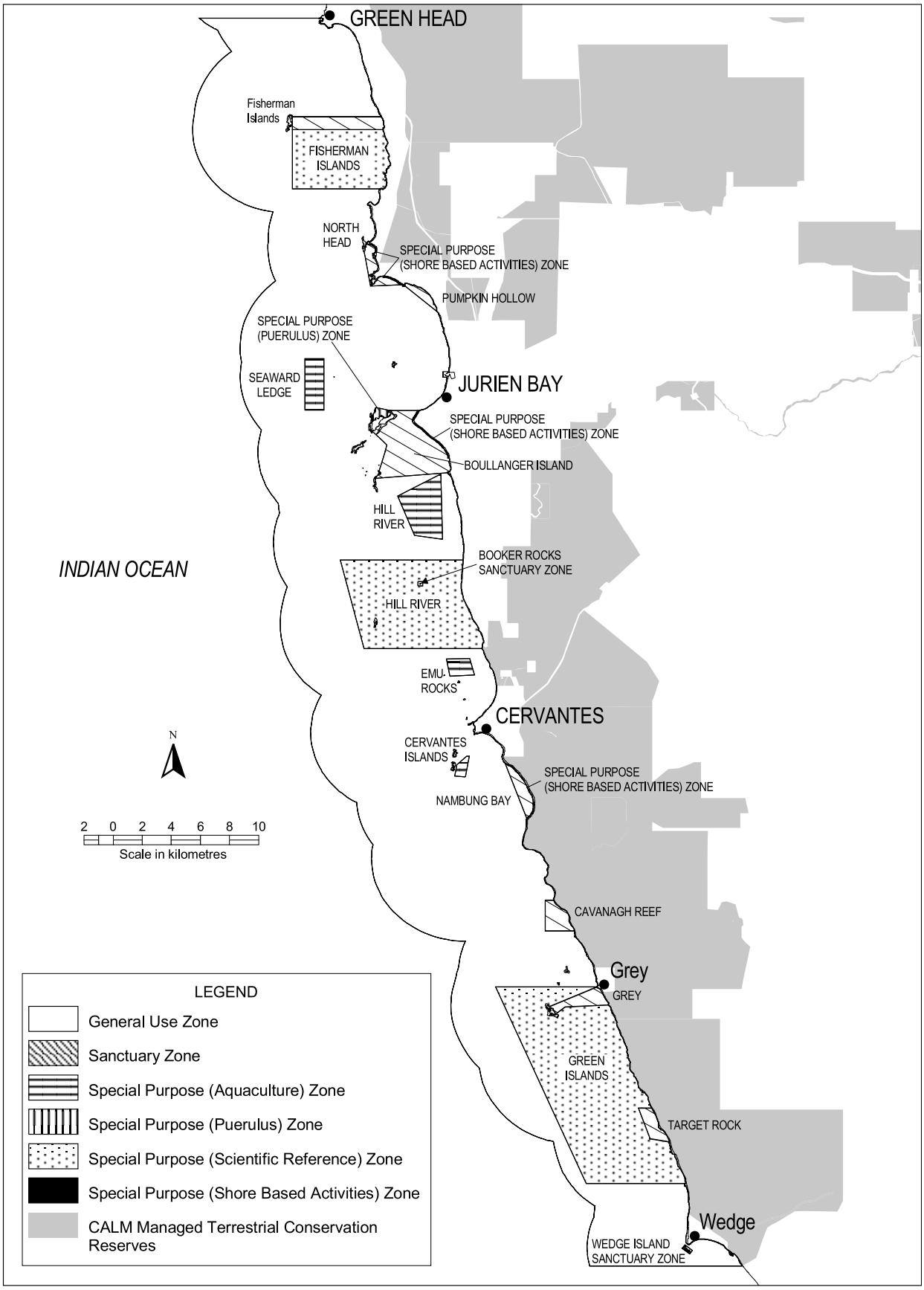

Figure 6: Zoning scheme within the Jurien Bay Marine Park

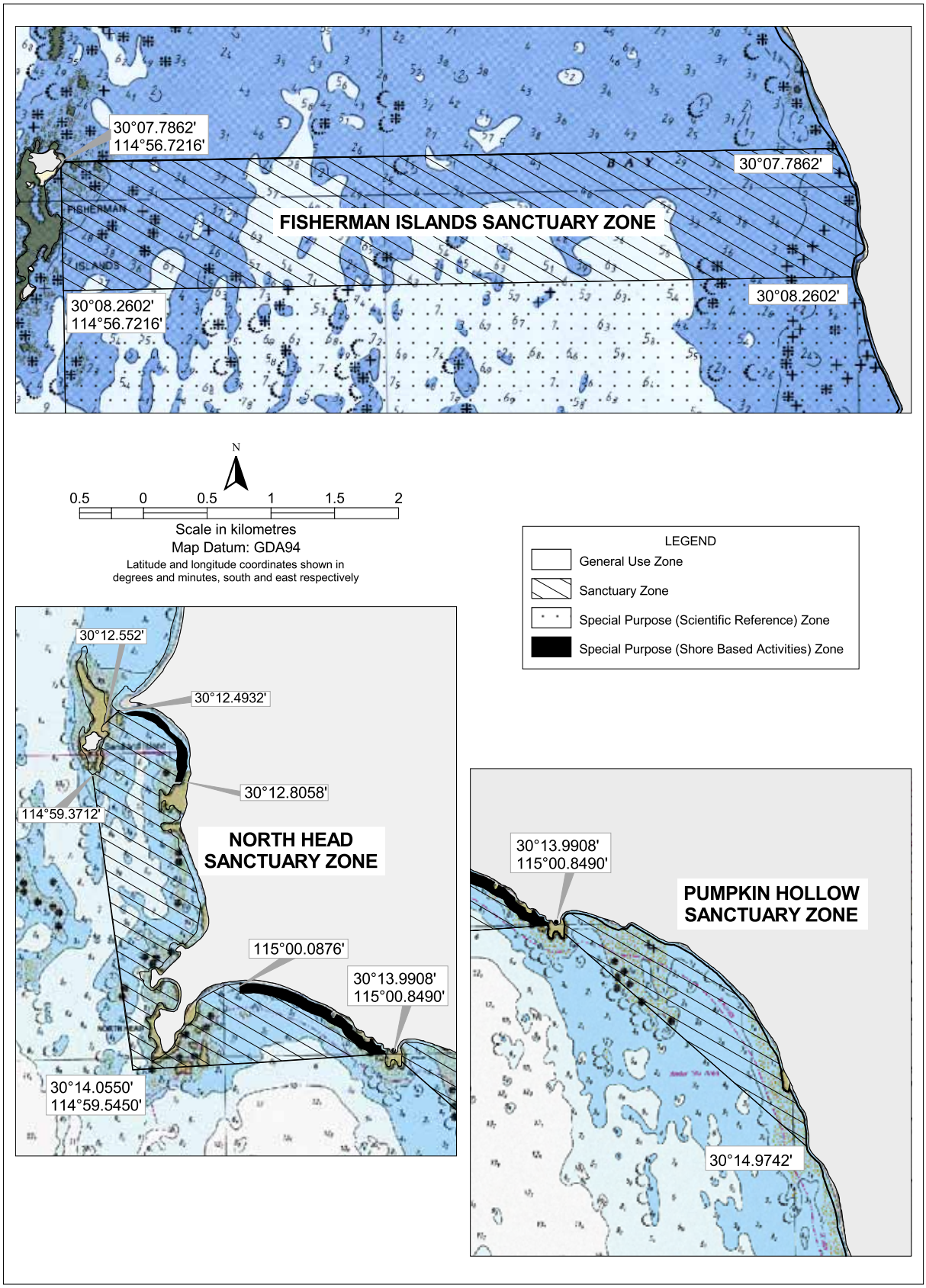

Figure 7a: Boundaries of the Fisherman Islands, North Head and Pumpkin Hollow sanctuary zones within the Jurien Bay Marine Park

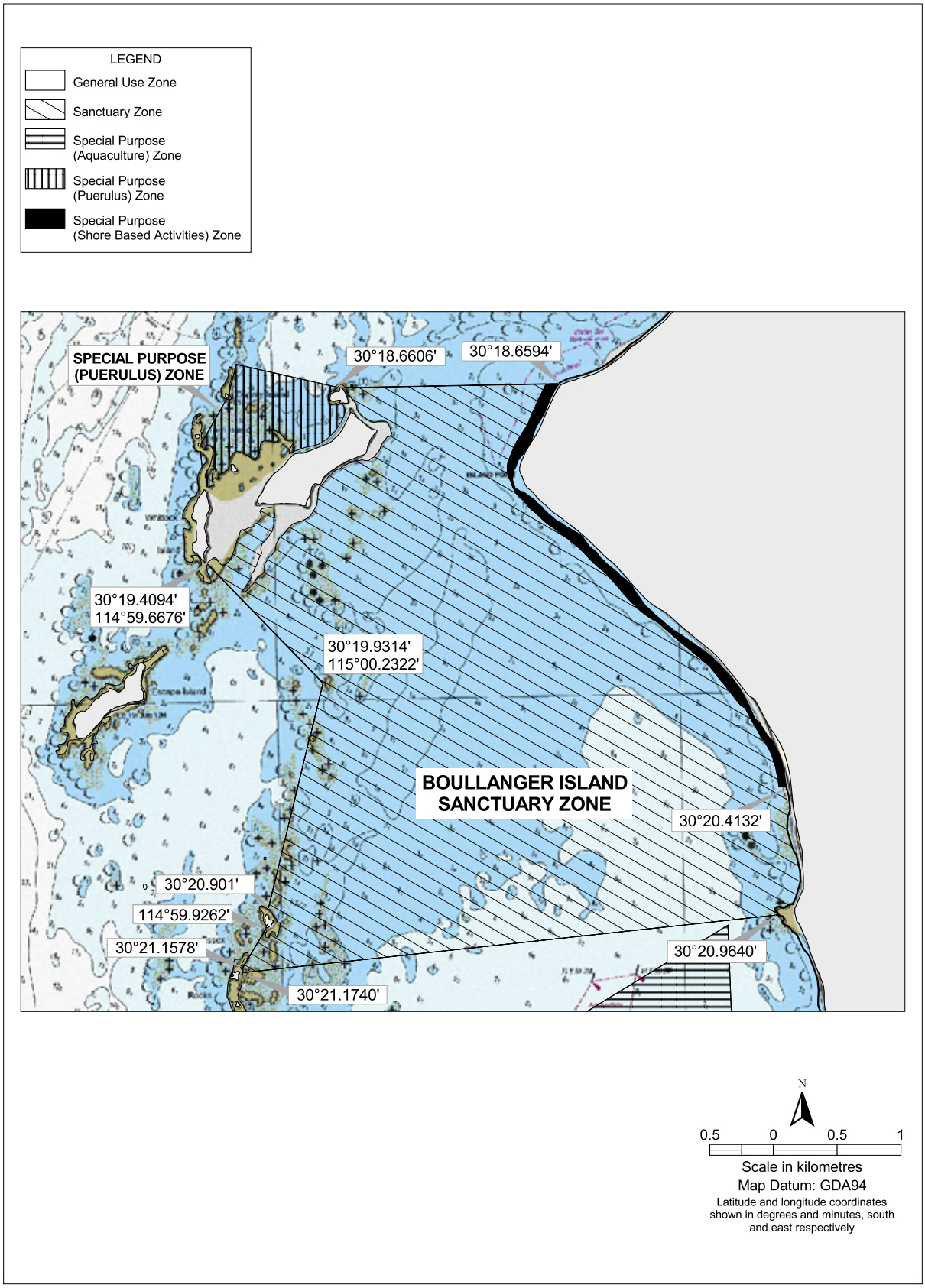

Figure 7b: Boundaries of the Boullanger Island sanctuary zone within the Jurien Bay Marine Park

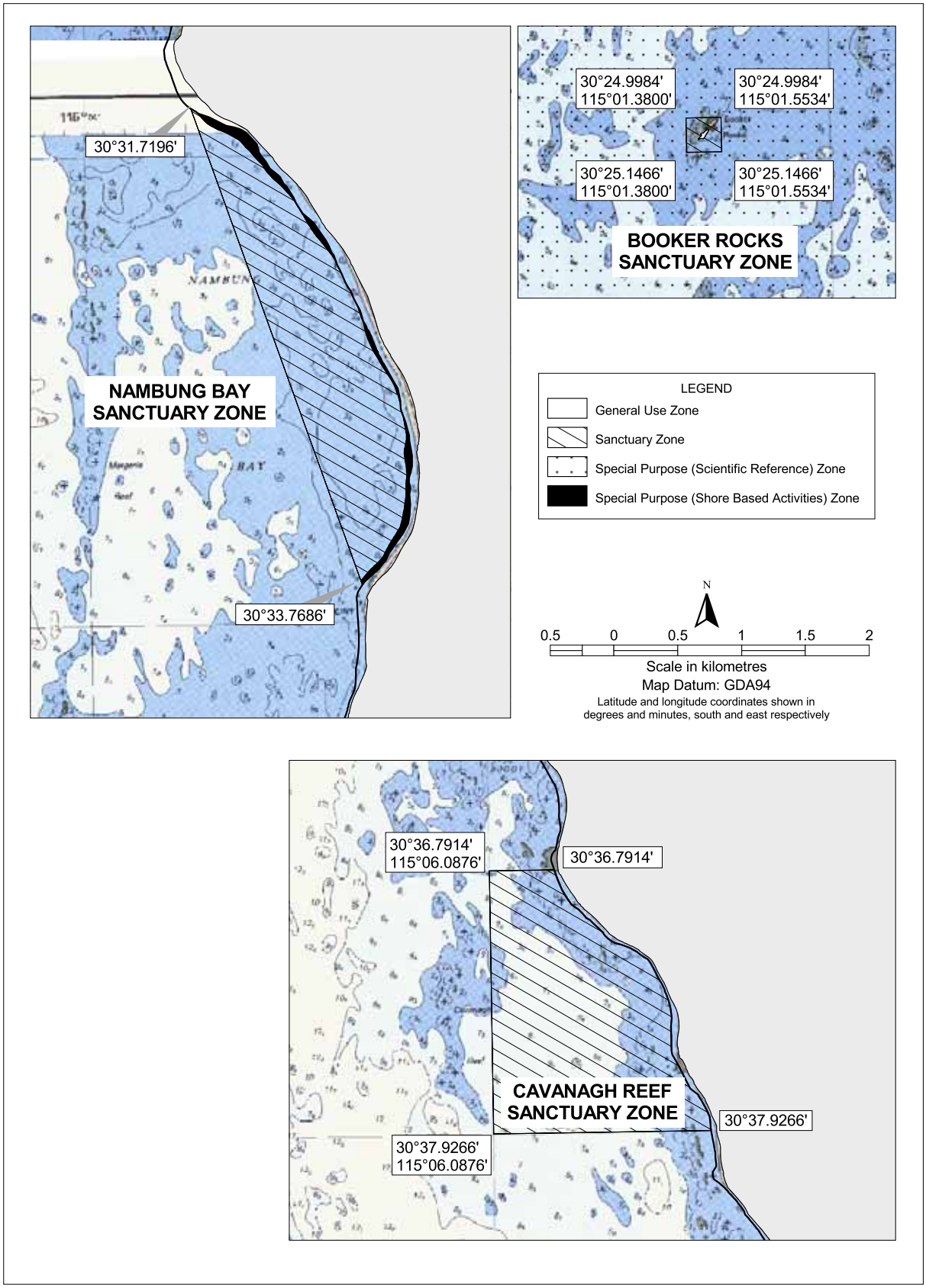

Figure 7c: Boundaries of the Nambung Bay, Booker Rocks, and Cavanagh Reef sanctuary zones within the Jurien Bay Marine Park

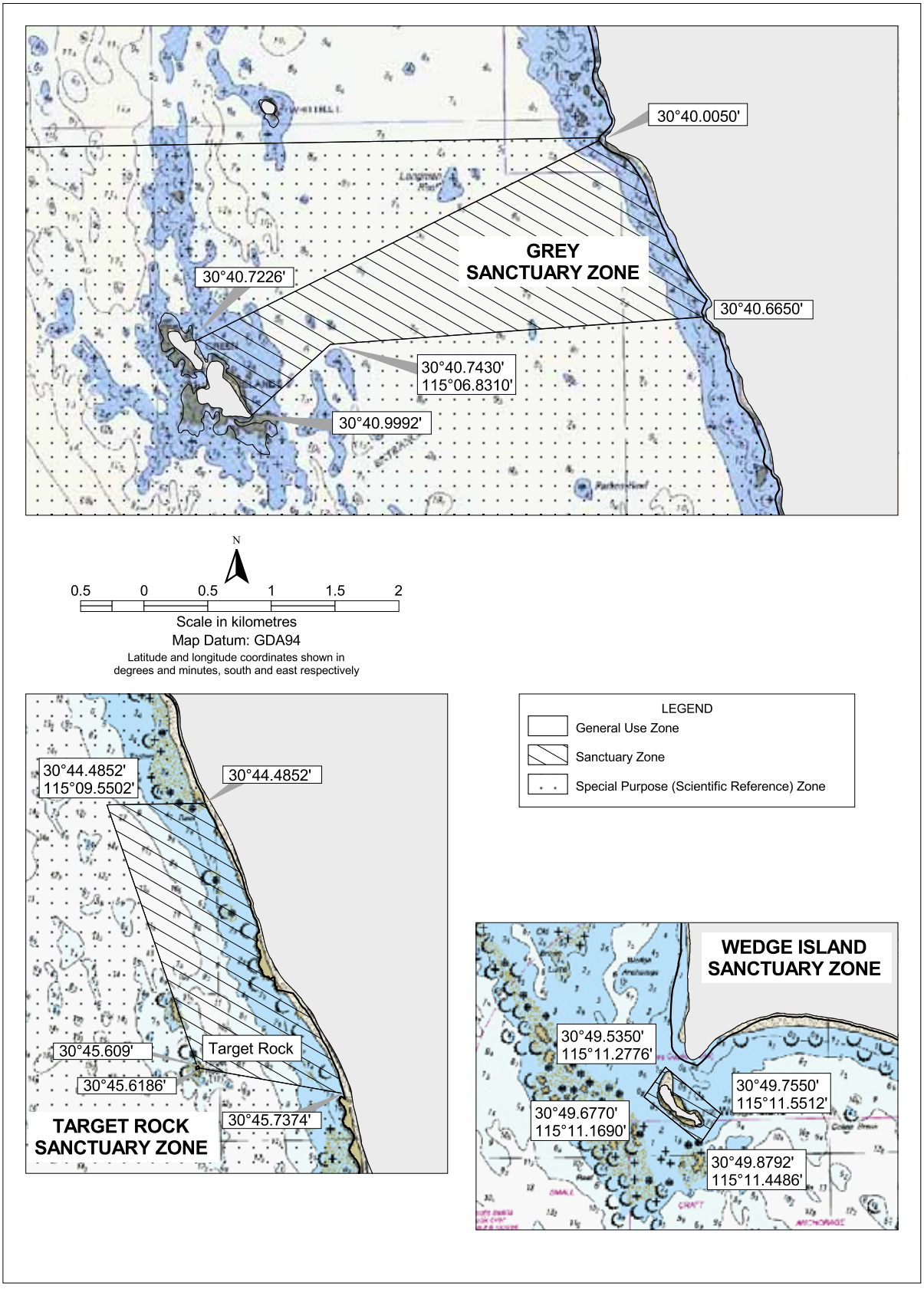

Figure 7d: Boundaries of the Grey, Target Rock, and Wedge Island sanctuary zones within the Jurien Bay Marine Park

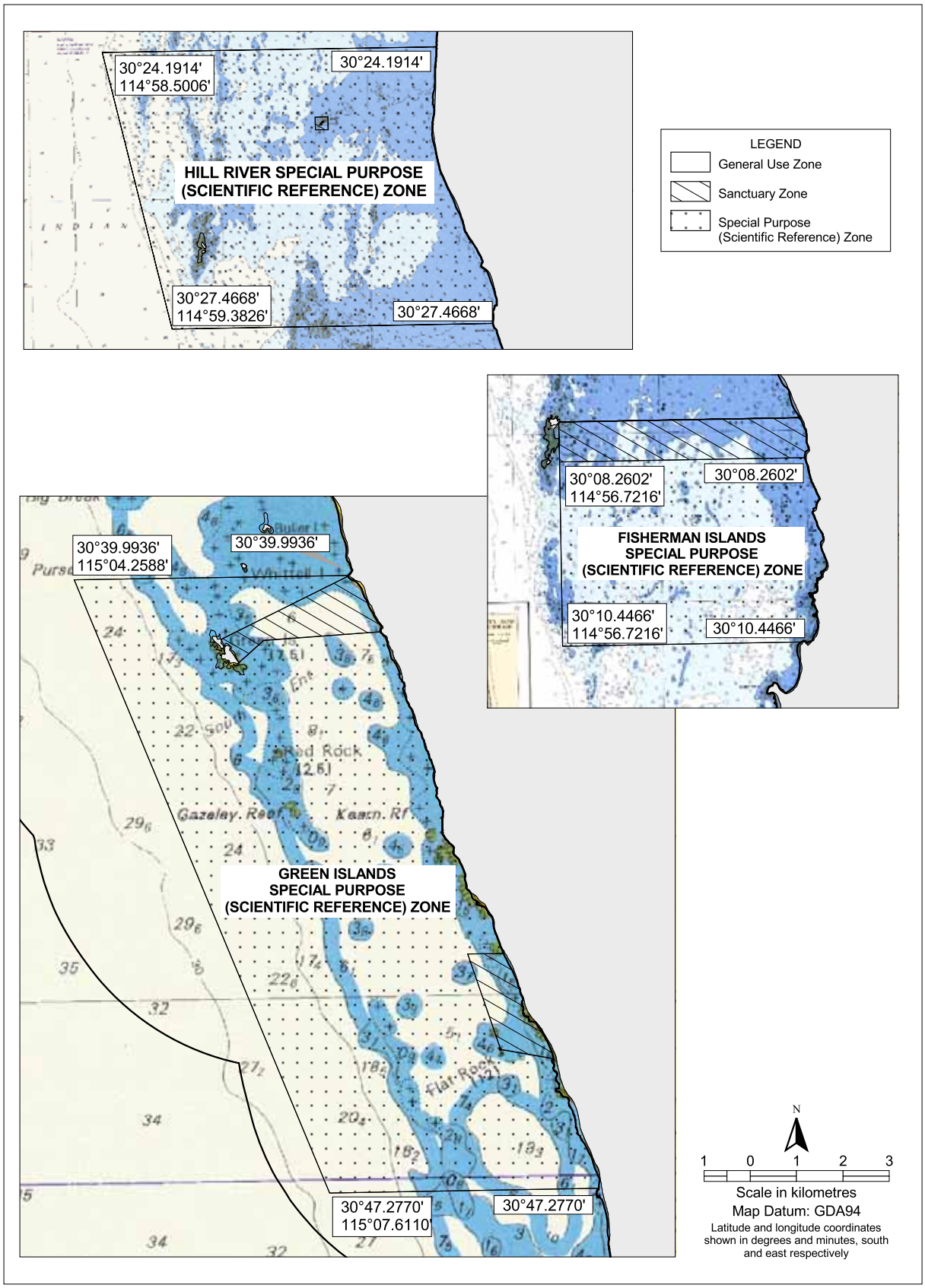

Figure 8: Boundaries of the Special Purpose zones

Table 2: Uses permitted in each zone of the Jurien Bay Marine Park

ACTIVITY	General use	Special purpose – aquaculture	Special purpose – shore-based activities	Special purpose – puerulus monitoring	Special purpose – scientific reference	Sanctuary
COMMERCIAL						
Commercial rock lobster fishing [bd]						
Non shore-based	Yes	Yes[e]	No	No	Yes	No
Shore-based	Yes	Yes[e]	Yes[h]	No	Yes	No
Commercial abalone fishing [bd]						
Non shore-based	Yes	Yes[e]	No	No	No	No
Shore-based	Yes	Yes[e]	Yes[h]	No	Yes	No
Commercial gill netting [bd]						
Non shore-based	Yes	Yes[e]	No	No	No	No
Shore-based	Yes	Yes[e]	Yes	No	Yes	No
Commercial long line [bd]	Yes	Yes[e]	No	No	No	No
Commercial beach seine [bd]	Yes	Yes[e]	Yes	No	Yes	No
Commercial wetlining [bd]	Yes	Yes[e]	No	No	No	No
Commercial aquarium collecting [bd] (NB Collection of 'live' rock & sand, and coral is not permitted in the Park)	Yes	Yes[e]	No	No	No	No
Commercial specimen shell collecting [bd]	Yes	Yes[e]	No	No	No	No
Other commercial fishing activities not mentioned above (e.g. octopus) [bd]	Yes	Yes[e]	No	No	No	No
Aquaculture [bd]	Assess	Assess	Assess	No	Assess	No
Mineral and petroleum exploration (seismic) [ef]	Assess	Assess	Assess	Assess	Assess	Assess
Petroleum drilling and mineral development [ef]	Assess	Assess	Assess	Assess	Assess	No
Charter vessels – fishing [bdg]	Yes	Yes[e]	No	No	No	No
Charter vessels – other [cdg]	Yes	Yes[e]	Yes	Yes	Yes	Yes
Watersports [acg]	Yes	Yes[e]	Yes	Yes	Yes	Yes
RECREATION						
Boating (motor and non-motorised) [ag]	Yes	Yes[e]	Yes	Yes	Yes	Yes
Surface water sports [ag]	Yes	Yes[e]	Yes	Yes	Yes	Yes
Recreational abalone [b]						
Non shore-based	Yes	Yes[e]	No	No	No	No
Shore-based	Yes	Yes[e]	Yes[h]	No	Yes	No
Recreational rock lobster fishing[b]						
Non shore-based	Yes	Yes[e]	No	No	Yes	No
Shore-based	Yes	Yes[e]	Yes[h]	No	Yes	No
Recreational line fishing [b]						
Non shore-based	Yes	Yes[e]	No	Yes	No	No
Shore-based	Yes	Yes[e]	Yes	Yes	Yes	No
Recreational netting [b]						
Non shore-based	Yes	Yes[e]	No	No	No	No
Shore-based	Yes	Yes[e]	Yes	No	Yes	No
Spearfishing [b]	Yes	Yes[e]	No	No	No	No
Recreational crabbing [b]	Yes	Yes[e]	No	No	No	No
Recreational specimen collecting [b]	Yes	Yes[e]	No	No	No	No
Other recreational fishing activities not mentioned above (e.g. octopus) [b]	Yes	Yes[e]	No	No	No	No
Diving	Yes	Yes[e]	Yes	Yes	Yes	Yes
Wildlife interaction [c]	Yes	Yes[e]	Yes	Yes	Yes	Yes
OTHER ACTIVITIES						
Proposals for marine infrastructure (e.g moorings and jetties) [adg]	Assess	Assess	Assess	Assess	Assess	Assess
Research[de]	Yes	Yes	Yes	Yes	Yes	Yes

a. Subject to the *Western Australian Marine Act 1982*.
b. Subject to the FRM Act.
c. Subject to the CALM Act and WC Act.
d. Licence required from CALM and/or DoF and/or DoIR and/or DoE/EPA.
e. Activities permitted unless the activity is shown to be incompatible with the specified primary purpose of the zone.
f. Subject to the EP Act.
g. Boating and associated activities (e.g. anchoring) may be restricted in specific areas where there is a clear need for such restriction.
h. All diver based fishing (e.g. rock lobster and abalone) is not permitted in special purpose (shore based activities) zones.
Assess Proposal will be assessed by relevant agencies in accordance with standard procedures

8.1.2 Zones in the Jurien Bay Marine Park

The zoning scheme for the Jurien Bay Marine Park comprises:

- ten sanctuary zones (approximately 3,061 ha or 3.7% of the marine park);
- three special purpose (scientific reference) zones (approximately 14,037 ha or 17% of the marine park);
- four special purpose (aquaculture) zones (approximately 1,427 ha or 1.7% of the marine park);
- four special purpose (shore-based activities) zones (approximately 52 ha or <1% of the marine park);
- one special purpose (puerulus monitoring) zone (approximately 57 ha or <1% of the marine park); and
- general use zone (approximately 63,742 ha or 77% of the marine park).

Sanctuary Zones

There are ten sanctuary zones covering approximately 3,061 ha or 3.7 % of the marine park. These are located at Fisherman Islands, North Head, Pumpkin Hollow, Boullanger Island, Booker Rocks, Nambung Bay, Cavanagh Reef, Green Island, Target Rock and Wedge Island (Figures 7a - d).

The primary purpose of sanctuary zones is to provide areas where natural processes can be studied or appreciated free of significant human influence. These zones provide the opportunity to improve the understanding of the key ecological processes of the marine park and to obtain critical comparative data with areas of the marine park where extractive activities are permitted and/or where environmental impacts may be occurring. These zones will also potentially provide other ecological benefits such as refugia for exploited species, replenishment areas, nature appreciation sites and "insurance" against the failure of the adaptive management approach adopted for the rest of the marine park. A detailed description of the role of "no take" (sanctuary) zones in Western Australia's marine conservation reserve system can be found in Colman & Simpson (1999).

All extractive activities are excluded from sanctuary zones. However, passive nature-based tourism, some recreational activities, boating and approved scientific research is permitted. The permitted activities are outlined in Table 2. The names and areas of each zone are shown in Table 3.

Table 3: Names and areas of sanctuary zones in the Jurien Bay Marine Park

Name	Area (hectares)
Fisherman Islands Sanctuary Zone	473
North Head Sanctuary Zone	204
Pumpkin Hollow Sanctuary Zone	99
Boullanger Island Sanctuary Zone	1,334
Booker Rocks Sanctuary Zone	7
Nambung Bay Sanctuary Zone	215
Cavanagh Reef Sanctuary Zone	261
Grey Sanctuary Zone	259
Target Rock Sanctuary Zone	198
Wedge Island Sanctuary Zone	11

Special Purpose (Scientific Reference) Zones

There are three special purpose (scientific reference) zones covering approximately 14,037 ha or 17% of the marine park. These are located at Fisherman Islands, Hill River and Green Islands (Figure 8).

The primary purpose of these zones is to provide large areas where natural processes can be studied relatively free of significant human influence. These zones provide the opportunity to improve the understanding of the marine park's key ecological processes and to obtain critical comparative data with areas of the marine park where extractive activities are permitted and/or where environmental impacts may be occurring. These zones will also provide many of the ecological benefits of sanctuary zones such as refugia, replenishment areas, nature appreciation sites and "insurance"

against the failure of the adaptive management approach adopted for the rest of the marine park. The zones provide replicated, representative areas of most of the key habitats of the marine park and are large enough to provide central "core" areas that are not significantly affected by human activities occurring on the periphery of these zones (i.e. so-called "edge effects").

All extractive activities are excluded from these zones with the exception of rock lobster fishing and shore-based fishing activities. Abalone fishing from shore is permitted along the shallow reefs adjacent to the shoreline of this zone but is not permitted in the offshore waters of the zone (NB most recreational and commercial abalone fishing occurs within 1-200m of the shoreline and this is a permissible activity in this zone). Proposals for aquaculture and petroleum exploration will be subject to environmental impact assessment and only permitted where it can be demonstrated that these activities are compatible with the designated purpose of the zone. More specifically, proposals that do not cause significant changes to water quality, key marine habitats or to the diversity and abundance of flora and fauna will be permitted. For example, the culture of filter-feeders and abalone is likely to be compatible with the primary purpose of this zone at appropriate sites. By contrast, species that require artificial feeding, such as tuna and snapper, may be incompatible with this zone. The permitted activities are outlined in Table 2.

The effectiveness of the special purpose (scientific reference) zones will be reviewed on the completion of relevant research and monitoring. This review should look at the extent to which these zones contribute to meaningful outcomes for conservation of the ecological values of the marine park.

The names and areas of each zone are shown in Table 4.

Table 4: Names and areas of special purpose (scientific reference) zones in the Jurien Bay Marine Park

Name	Area (hectares)
Fisherman Islands Special Purpose (Scientific Reference) Zone	2,266
Hill River Special Purpose (Scientific Reference) Zone	4,190
Green Islands Special Purpose (Scientific Reference) Zone	7,582

Special Purpose (Aquaculture) Zone

There are four special purpose (aquaculture) zones covering approximately 1,427 ha or 1.7 % of the marine park. These are located at Cervantes Islands, Emu Rocks, northwest of Boullanger Island (Seaward Ledge) and Hill River (Figure 6).

The priority purpose of these zones is aquaculture, however other existing activities are not automatically excluded. If other uses conflict in a significant and unavoidable way with aquaculture, then these activities will not be permitted to occur in these zones. It should be noted that the designation of these zones for the primary purpose of aquaculture does not provide automatic approval for aquaculture proposals. Any proposal will be assessed in accordance with Ministerial Policy Guideline No 8 (FWA, 1998) and only permitted where this use is compatible with the maintenance of the values of the marine park.

Permitted activities are shown in Table 2. The names and areas of each zone are shown in Table 5.

Table 5: Names and areas of special purpose (aquaculture) zones in the Jurien Bay Marine Park

Name	Area (hectares)
Seaward Ledge Special Purpose (Aquaculture) Zone	395
Hill River Special Purpose (Aquaculture) Zone	793
Emu Rocks Special Purpose (Aquaculture) Zone	162
Cervantes Islands Special Purpose (Aquaculture) Zone	77

Special Purpose (Shore-based Activities) Zone

There are four special purpose (shore-based activities) zones comprising approximately 52 ha or <1% of the marine park. These are located adjacent to the mainland coast in the Boullanger Island Sanctuary Zone, the Nambung Bay Sanctuary Zone and two in the North Head Sanctuary Zone (Figure 6).

These zones are shoreline areas in the marine park where activities such as beach fishing and other shore-based activities are the priority purpose. These zones are 100 m wide strips from the high water mark and adjoin sanctuary zones in the marine park. These zones acknowledge the social importance and the largely insignificant environmental impacts of most shore-based activities. Permitted activities are shown in Table 2. Shore-based fishing activities such as line fishing, and netting are permitted. All boat-based and diver-based fishing activities (e.g. spearfishing, and diving for rock lobster, abalone and crabs) are prohibited. This is necessary to protect the values of these zones but also is a

practical measure to facilitate effective compliance of the adjoining sanctuary zone.

Special Purpose (Puerulus Monitoring) Zone
There is one special purpose (puerulus monitoring) zone located at Boullanger Island that is approximately 57 ha or <1% of the marine park (Figure 6).

The priority purpose of this zone is for the monitoring of rock lobster (puerulus) larvae that settle on moored floating collectors of artificial seaweed. These provide a reliable index of future rock lobster catches and are an important management tool for the western rock lobster commercial fishery. This area is popular for line fishing given its proximity to Jurien Bay and because it is sheltered from the seabreeze. As such, this activity will be permitted to continue. Other activities are permitted in this zone provided they do not affect the priority purpose. Permitted activities are shown in Table 2.

General Use Zone
All waters of the marine park not zoned as sanctuary or special purpose zones will be zoned for general use (approximately 63,742 ha or 77% of the marine park). These areas provide for recreational and commercial activities to occur providing that these are compatible with the overall maintenance of the marine park's values. The permitted activities are outlined in Table 2.

8.1.3 Limitations of the zoning scheme

The zoning scheme considers the ecological and social values of the marine park and the pressures on these values. The zoning scheme, while recognising the importance of the marine ecology of the area, was developed through an iterative community consultative process, which attempted to strike a balance between existing uses and conservation of the marine flora and fauna of the marine park.

The zoning scheme has several limitations including:
- the lack of representation of deep water (>20 m depth) and "basin" lagoon habitats (>10 m depth) in sanctuary zones;
- limited replication of sanctuary zones;
- under representation of the sub-tidal reef habitat in sanctuary zones; and
- limited size and buffering from adjacent extractive activities of the sanctuary zones.

The major implication of these limitations is that the zoning scheme is unlikely to be adequate for a comprehensive scientific investigation into the potential impacts of rock lobster fishing (excluding by-catch and habitat impacts) on the diversity and abundance of marine flora and fauna of the marine park. However, it is not critical that this research is carried out within the marine park as the impacts of fishing can be established through research in comparable habitats outside the marine park.

8.2 Education and Interpretation

Developing community support for the marine park is critical to the effective implementation of this management plan. The level of public compliance in relation to management controls in the marine park will be related directly to the level of understanding of the values of the marine park and the reasons for regulation of activities in the marine park. Education programs will initially need to raise awareness of the creation of the marine park and the new restrictions on commercial and recreational activities as a result of the implementation of zoning and other management strategies. Other important and ongoing education programs (e.g. dive trails, interpretive centre) will be required to minimise human impacts on the ecological values. Specific education strategies are detailed for each ecological and social value in Section 7 and a summary of the generic education and interpretation objectives, strategies and targets is outlined below.

Summary of Generic Education and Interpretation Objectives, Strategies and Targets

Management objective/s	To enhance community understanding of and support for the marine park through education and interpretation programs.
Strategies	1. Develop and implement, in collaboration with DoF and other relevant agencies, education and interpretation programs to ensure users of the marine park are aware of and understand the values of the marine park, management zones and regulations and the reasons for these controls (CALM, DoF). **(H - KMS)** 2. Develop and distribute to the local community and visitors a range of education materials about the marine park's values and management (CALM, DoF). **(H)** 3. Provide talks and briefings about the marine park's values, uses and management to local and visiting groups (CALM). **(H)**
Targets	1. Implementation of management strategies within agreed timeframes. 2. 50% of visitors aware of the existence of the marine park, its values and of the restrictions applying to the area within three years of gazettal. 3. 90% of visitors aware of the existence of the marine park, its values and of the restrictions applying to the area within ten years of gazettal.

8.3 Surveillance and Enforcement

This management plan details a range of strategies relating to the management of particular human activities. The effectiveness of these strategies will be dependent on the extent to which the users of the marine park abide by these restrictions. The education program is critical to achieving a high level of compliance as in most cases users will support controls where they are clearly aware of what they are and why they have been implemented. There will, however, always be a need to monitor the level of compliance and, where users continue to undertake illegal activities, to take actions to stop inappropriate behaviour.

The implementation of the zoning scheme requires notices under the CALM Act and FRM Act. The FRM Act orders will in some cases vary from the CALM Act notices to facilitate effective compliance. Where zones adjoin the coast the FRM Act orders will generally use high water mark to facilitate effective compliance of zoning restrictions. A summary of the generic surveillance and enforcement objectives, strategies and targets is outlined below.

Summary of Generic Surveillance and Enforcement Objectives, Strategies and Targets

Management objective/s	Maximise public compliance of regulations related to the ongoing management of the marine park
Strategies	1. Develop an integrated surveillance and enforcement program with a particular focus on sanctuary and special purpose (scientific reference) zones. (CALM, DoF, DPI). **(H-KMS)** 2. Facilitate cross authorisation of government enforcement officers as appropriate (CALM, DoF, DPI). **(H - KMS)** 3. Develop and implement procedures to ensure coordination between government agencies to maximise efficiency and effectiveness of surveillance and enforcement activities (CALM, DoF, DPI). **(H - KMS)** 4. Appoint honorary enforcement officers as appropriate (CALM, DoF, DPI). **(M)**
Target	Implementation of management strategies within agreed timeframes.

8.4 Research

Research in marine conservation reserves is conducted to develop an understanding of the way in which human activities and natural process affect ecological values. Additionally, research is conducted to develop a predictive capacity to forecast the response of natural systems to existing and potential pressures from natural and human sources. Much of the information required to understand natural systems and make predictions does not yet exist and so research programs need to focus initially on understanding the "natural state" of key ecological values and the processes that sustain them. Specific research strategies are detailed for each ecological and social value and are outlined in Section 7 and scientific research as a value of the marine park is outlined in Section 7.2.11. A summary of the generic research objectives, strategies and targets is outlined below.

Summary of Generic Research Objectives, Strategies and Targets

Management objective/s	1. To obtain an appropriate understanding of the biodiversity and key ecological and social processes within the marine park. 2. To promote ecological and social research in the marine park that improves knowledge of the marine park and the technical basis for management decisions.
Strategies	1. Develop and progressively implement a coordinated and prioritised research program of key values and processes of the marine park (CALM, DoF). **(H - KMS)** 2. Identify and communicate high priority scientific and social research projects relevant to the management of the marine park to appropriate research organisations (CALM). **(H - KMS)** 3. Undertake research on the effectiveness of zoning as an aid to achieving the objectives of the marine park (CALM). **(H-KMS)** 4. Develop and maintain a database of historical and current research in the marine park (CALM). **(H)** 5. Facilitate scientific and social research in the marine park by research, academic and educational institutions by providing financial and logistical assistance (where possible) (CALM, DoF). **(H)**
Target	Implementation of management strategies within agreed timeframes.

8.5 Monitoring

Monitoring of key ecological values and human activities in marine conservation reserves is conducted with two purposes in mind. First, *surveillance* monitoring is conducted to: (i) keep a "check" on the system as it responds to natural and human pressures; (ii) provide a safety net to detect the system's response to unpredictable or poorly understood pressures and processes; and (iii) gain an understanding of the natural variability in key values at sites that are relatively undisturbed. Second, *compliance* monitoring is conducted to assess user compliance with agreed environmental management targets. As at 2004, the Jurien Bay Marine Park is in a relatively undisturbed condition. With the projected increase in human usage of this area there is potential for slow detrimental changes to occur over time that are difficult to recognise and quantify. Individual changes may be minor but the cumulative impact over time may be significant and difficult to reverse. A monitoring program is a key strategy in that it develops an understanding of the natural and social environment of the marine park and monitors the state of the marine park's environment. This allows the early detection of detrimental changes and provides the trigger for management action to ameliorate potential impacts before they lead to undesirable changes in the marine park's values. Where changes have occurred and remediation measures implemented a monitoring program will enable the measurement of the rate of recovery of an affected area. Specific monitoring strategies are detailed for each ecological and social value and are outlined in Section 7 and scientific research as a value of the marine park is outlined in Section 7.2.11. A summary of the generic monitoring objectives, strategies and targets is outlined below.

Summary of Generic Monitoring Objectives, Strategies and Targets

Management objective/s	1. To monitor key ecological values at risk and human usage in the marine park. 2. To promote ecological and social monitoring in the marine park that can detect changes to the ecological values and aid management decisions.
Strategies	1. Develop and progressively implement a coordinated and prioritised monitoring program of key values and processes of the marine park (CALM, DoF). **(H – KMS)** 2. Develop and maintain a database of human usage in the marine park (CALM, DoF). **(H - KMS)** 3. Ensure that proponents of development proposals or commercial activities with potential to impact on the marine park's values conduct appropriate compliance monitoring programs (CALM). **(H)**
Target	Implementation of management strategies within agreed timeframes.

8.6 Public Participation

Developing community support for the marine park is critical to the effective implementation of this management plan. The level of public compliance in relation to management controls in the marine park will be related directly to the level of understanding of the values of the marine park and the reasons for regulation of activities in the marine park. An important early step in the administration of the Jurien Bay Marine Park is the establishment of a community-based Management Advisory Committee (MAC). Its main function will be the provision of advice and assistance to CALM

and the MPRA in matters relating to the marine park's management, administration, zoning, conflicts of usage and other management-related issues that arise during the life of the management plan. A summary of the generic public participation objectives, strategies and targets is outlined in below.

Summary of Generic Public Participation Objectives, Strategies and Targets

Management objective	To facilitate on-going community participation in the management of the marine park.
Strategies	1. Establish and maintain a MAC (CALM). **(H - KMS)** 2. Encourage community involvement in education and interpretation programs (CALM). **(M)** 3. Encourage community involvement in monitoring programs (CALM). **(M)**
Target	Implementation of management strategies within agreed timeframes.

8.7 Direct Management Intervention

Direct management intervention includes those management strategies that are not related to administration, surveillance and enforcement, education and interpretation, research, monitoring, and public participation. Intervention management strategies generally relate to three aspects of management: rehabilitation of degraded areas; visitor facilities; and risk management.

Although the majority of the waters of the Jurien Bay Marine Park are in a relatively pristine condition, there may be areas that have suffered some localised disturbance from past human use. This may include accumulations of litter in some areas, impacts on seagrasses due to moorings and anchoring, or impacts on invertebrate or fish stocks. Other impacts may include, for example, damage to coastal vegetation due to visitor access. Such localised disturbances may negatively affect the ecological and social values of the marine park. Management response in this case would be to identify areas that have been disturbed prior to gazettal of the marine park and evaluate what, if any, rehabilitation measures should be undertaken. Decisions as to whether it would be appropriate to rehabilitate an area would be based on the ability of an area to recover naturally (i.e. if no further pressure is applied and with no management intervention), the level of disturbance of the area, ecosystem effects of not carrying out rehabilitation, aesthetic impacts of the disturbance and the cost of rehabilitation.

It is envisaged that the human use of the marine park will increase in the future. An increase in visitor numbers may require additional facilities to be provided, so as to protect the ecological values from human disturbance and to enhance the visitor experience (e.g. moorings, dive trails, pontoons). The level of use of the marine park and the areas which come under the highest visitor pressure should be monitored and consideration given to provision of visitor facilities where appropriate.

Some aspects of the marine park could pose a potential risk to visitors, for example, shallow submerged reefs, and strong winds could pose a risk to inexperienced boaters, while the rugged coastline of some of the islands and mainland could pose a risk to visitors. As the use of the marine park will increase during the life of the management plan, an ongoing visitor risk assessment should be undertaken to identify potential hazards and measures implemented to minimise these. A summary of the generic direct management intervention objectives, strategies and targets is outlined below.

Summary of the Generic Direct Management Intervention Objectives, Strategies and Targets

Management objective	1. To remediate, where necessary, existing human impacts on the ecological and socials values of the marine park. 2. To provide visitor facilities that minimise environmental impact to, and enhance visitor enjoyment of, the marine park. 3. To take reasonable steps to minimise visitor risk in the marine park, where possible.
Strategies	1. Identify areas of existing human impact in the marine park (CALM). **(M)** 2. Assess rehabilitation options and, where appropriate, implement these (CALM). **(M)** 3. Monitor human usage (visitor numbers and high use areas) and, consistent with available resources, provide visitor facilities where appropriate. (CALM). **(M)** 4. Implement a program of routine inspection, maintenance and report on infrastructure condition (e.g. zone markers, signage) in the marine park (CALM). **(M)**
Target	Implementation of management strategies within agreed timeframes.

9 PROPOSALS FOR MARINE INFRASTRUCTURE

All development proposals within the marine park are subject to the environmental impact assessment requirements of the EP Act and consideration by CALM in the context of the approved management plan. During the life of this plan there may be proposals for the installation or construction of marine infrastructure. This could be major development such as jetties, marinas and groynes, or minor works such as the installation of a mooring, Fish Aggregating Device or navigation marker. The nature of the development will determine the appropriate level of assessment. Any assessment should review the proposal in terms of its potential impacts on the marine park's ecological and social values.

The Mooring Policy (Policy Statement No. 59) for marine conservation reserves aims to (i) minimise the detrimental impacts of uncontrolled mooring and anchoring; (ii) enhance user safety, access and equity in relation to moorings; and (iii) provide a framework to accommodate present and future mooring usage patterns. The Mooring Policy requires that a mooring plan be developed for every marine conservation reserve and guides the management of moorings in the specific reserve.

In respect to the Jurien Bay Marine Park there are a number of existing moorings adjacent to coastal settlements and towns. The majority of these moorings are owned and used by commercial fisherman. There has been some historical seagrass loss due to moorings in the marine park, however, future impacts due to moorings can be avoided through sensible siting and use of appropriately designed moorings.

The Moorings Plan for the marine park will encompass the approach outlined below.

- The marine park will become a moorings control area to facilitate moorings management and moorings will require a licence with appropriate conditions.
- High use sites such as the area adjacent to Cervantes and Jurien will require the development of a detailed mooring site plan in conjunction with marine users and the DPI. This plan will consider the present and future moorings needs, taking into account environmental and social issues of the specific sites.
- At this stage there are no broadscale areas or zones where moorings should be excluded. However, moorings will not be permitted where the specific placement of a mooring will result in damage to marine habitats such as seagrass.
- The location and ownership of existing moorings will be established and an assessment of the appropriateness of the location and the design (from an environmental perspective) of the mooring will be undertaken.
- Where the location or design of an existing mooring is likely to result in additional habitat disturbance CALM will liaise with the owner to address the issue of concern within a reasonable timeframe. This could result in relocation of the mooring to a more suitable site or the owner being required to amend the mooring design appropriately. Implementing environmentally sound moorings management should take into account issues of safety and CALM will liaise with the DPI in regard to moorings management.

- Proposals for new mooring sites will be considered on a case-by-case basis in accordance with the Moorings Policy and this management plan, as well as any specific site plans that are developed during the life of this management plan.

The generic marine infrastructure proposals objectives, strategies and targets are outlined below.

Summary of Marine Infrastructure Proposals Objectives, Strategies and Targets

Management objective/s	To ensure that the impacts of infrastructure development and ongoing management on the ecological and social values are evaluated through an appropriate level of environmental assessment, and are consistent with this management plan.
Strategies	1. Manage moorings in accordance with the Moorings Plan, and the MPRA Mooring Policy. (CALM, DPI). **(H)** 2. Ensure appropriate advice is provided to relevant authorities with regard to proposed marine infrastructure and the defined ecological targets for the marine park (CALM, DoE). **(H)** 3. Assess mooring applications on a case-by-case basis and in relation to mooring criteria established in the Mooring Policy (CALM, DoE, MPRA). **(M)**
Target	Implementation of management strategies within agreed timeframes.

10 PERFORMANCE ASSESSMENT

The effectiveness of the management plan for the Jurien Bay Marine Park will be periodically reviewed through a formal auditing and review process. This will be undertaken through an annual assessment carried out by CALM and a formal audit by the MPRA every three years. The audits will include reports on the status of the key ecological values of the marine park and an assessment of the effectiveness of management strategies as well as provide feedback to marine park managers.

Overall management performance will be audited by the MPRA via a status report assessing compliance against the stated key ecological and social management targets (i.e. outcome-based approach) and against the progress of implementation of the key management strategies (i.e. activity-based approach) as outlined in Sections 7 - 9. Management targets of selected key ecological and social values of the marine park are used as *key performance indicators* (KPIs) of the effectiveness of marine park management. These are identified in Sections 7 by the symbol **(*KPI*)**. The KPIs reflect both the conservation priorities and the management imperatives of the MPRA, CALM and the community. *Key management strategies* (KMS) are identified in Sections 7 - 9 by the symbol **(H-KMS)**.

10.1 Annual performance assessment by CALM

The prioritised strategies outlined in Sections 7 - 9 of the management plan will be built into annual works programs of CALM's Jurien District that is responsible for the day to day management of the Jurien Bay Marine Park. Progress against the KPIs, KMSs and the remaining management targets and strategies will form the basis of an annual performance assessment report of the Jurien Bay Marine Park by CALM's Midwest Region to CALM's Corporate Executive, and the MPRA.

10.2 Audit by the MPRA

Progress against the KPIs and KMSs will form the basis of a formal MPRA audit of the Jurien Bay Marine Park every three years. CALM will provide annual performance assessment reports to the MPRA from the time of gazettal of the marine park, from which the MPRA can monitor annual progress of CALM's implementation of the management plan. The adequacy of the range of selected KPIs and KMSs will be reviewed following each MPRA audit and amended if appropriate.

10.3 Review of the Management Plan

The *Jurien Bay Marine Park Management Plan 2005 – 2015* will cover management of the marine park for a period of ten years from the date the plan is approved. This is the maximum allowable period that may be set for a management plan, as specified by the CALM Act.

At the end of the ten year period, the plan will be reviewed with full public consultation, re-submitted to the MPRA and then submitted to the Minister for the Environment and the Ministers for Agriculture, Forestry and Fisheries and State Development for approval. The CALM Act also specifies that in the event of such a revision not occurring by the end of the plan's specified life-span, the plan will remain in force in its original form, unless it is either revoked by the Minister for the Environment or until a new plan is approved.

10.4 Links with State Environment Reporting

The first Western Australian State of the Environment Report was prepared in 1992 and a second report published in 1998 (Government of Western Australia, 1998b). These reports provided an overview of the key marine and terrestrial environmental issues in the State. The EPA will be responsible for ongoing State of the Environment reporting based on the framework contained within the 1998 report. Relevant marine issues covered by this framework are the implementation of a statewide system of marine conservation reserves, biodiversity, degradation of marine habitats, contamination of the marine environment, the introduction of exotic marine species and tourism, fisheries, mining and petroleum industries. The performance assessment of the marine park as described above, is broadly consistent with the overarching State of the Environment reporting framework.

10.5 Links with National Environment Reporting

At a national level there are two major reporting mechanisms relevant to marine conservation reserves. These are the national State of the Environment Report and the performance assessment framework for the National Representative System of Marine Protected Areas (NRSMPA). A State of the Marine Environment Report (SOMER) was published in 1996 (Commonwealth of Australia, 1996b) and will form part of the national State of the Environment Report. A range of performance assessment criteria are being developed to assess whether the goals of the NRSMPA are being achieved. The performance assessment framework of this plan is broadly consistent with the performance assessment criteria being developed for the NRSMPA.

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13 APPENDICES

Appendix I: Technical Description of the Jurien Bay Marine Park Boundary

The Jurien Bay Marine Park is described as all that portion of the Indian Ocean, contained within and bounded by lines starting from the intersection of latitude 30 degrees 4 minutes 7.932 seconds south* with the seaward limit of Western Australia's Coastal Waters**; thence generally southerly along that seaward limit to its intersection with the parallel of latitude 30 degrees 50 minutes 20.004 seconds south; thence east along that parallel of latitude to the low water mark*** of Western Australia's mainland coastline; thence generally northerly along that low water mark to its intersection with the parallel of latitude 30 degrees 17 minutes 26 seconds south, thence west along that parallel of latitude to its intersection with the meridian of longitude 115 degrees 2 minutes 18 seconds east, thence north along that meridian of longitude to its intersection with the parallel of latitude 30 degrees 17 minutes 13 seconds south, thence east along that parallel of latitude to the low water mark, thence in a generally northerly direction along the low water mark of Western Australia's mainland coastline to its intersection with the parallel of latitude 30 degrees 4 minutes 7.932 seconds south; and thence west along that parallel of latitude to the starting point, excluding all unallocated land on islands above high water mark**** and contiguous with either the high or low water marks comprising existing water tenure boundaries, of allocated land on islands.

* All geographic coordinates are expressed in terms of the Geocentric Datum of Australia 1994 (GDA94).

** 'Western Australian waters' means all waters that (a) are within the limits of the State and, (b) that are 'coastal waters' of the State. 'Coastal waters of the State' has the meaning given to that term in the *Off-shore (Application of Laws) Act 1982*, section 2.

*** low water mark is the ordinary (mean of) low water mark at spring tides.

**** high water mark is the ordinary (mean of) high water mark at spring tides as defined by the *Land Administration Act 1997*.