Rowley Shoals Marine Park Management Plan

2007–2017
Management Plan No 56

Department of Environment and Conservation

MPRA
MARINE PARKS & RESERVES AUTHORITY

ROWLEY SHOALS MARINE PARK MANAGEMENT PLAN

2007-2017

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Vision

In the year 2027, the marine flora and fauna, habitats and water quality of the Rowley Shoals Marine Park will be in the same or better condition than in the year 2007. The area will support ecologically sustainable recreation and nature-based tourism and the Park will be considered to be an important ecological and social asset by the local, national and international community. It will be a highly valued scientific reference area to compare the health of intensively used reefs in the Indo-West Pacific region.

Cover photographs courtesy of Western Australian Tourism Commission (insert 1), David Harasti, Environment Australia (insert 2), Clay Bryce/Lochman Transparencies (insert 3).

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EXECUTIVE SUMMARY

The *Rowley Shoals Marine Park Management Plan 2007-2017* was formally released by the Minister for the Environment. It was produced on behalf of the Marine Parks and Reserves Authority (MPRA), by the Department of Environment and Conservation (DEC)[1] and fulfils the Minister's requirements under the *Conservation and Land Management Act 1984* (CALM Act). The management plan details the management arrangements for the Park for a period of ten years from the date the plan is approved however the plan will continue to have effect until a replacement plan is approved by the Minister for the Environment.

Lying approximately 300km north-north-west of Broome, the Rowley Shoals comprise three oceanic reef systems approximately 30-40 km apart, namely Mermaid Reef, Clerke Reef and Imperieuse Reef. The Rowley Shoals Marine Park comprises the Clerke and Imperieuse Reefs which lie in State Waters. DEC has lead management responsibility for the Marine Park, in accordance with this management plan. The Rowley Shoals Marine Park was originally gazetted on 25 May 1990 as a Class A reserve and on 10 December 2004 the boundary was amended to extend the Park to the State Waters limit. The Park now covers approximately 87,632 ha. Mermaid Reef lies in Commonwealth waters and comprises the Mermaid Reef Marine National Nature Reserve managed by the Commonwealth Department of the Environment and Heritage.

The Rowley Shoals Marine Park is characterised by spectacular intertidal and subtidal coral reefs, exceptionally rich and diverse marine fauna and high water quality. These attributes and the low level of use of the area contribute to the Park's unique wilderness qualities, which are a significant drawcard for visitors. Lying in the headwaters of the Leeuwin Current, the Shoals are thought to provide a source of invertebrate and fish recruits for reefs further south and as such are regionally significant. The remoteness of the Shoals and low use have ensured that the marine environment of the Shoals is in a near natural state, particularly relative to other reefs in the Indo-West Pacific region which are subject to intense ongoing human pressures and destructive fishing practices. The Rowley Shoals are of national and international significance and provide an important global benchmark for Indo-West Pacific reefs.

The *Rowley Shoals Marine Park Management Plan 2007-2017* includes a range of strategies to preserve the unique marine environment, while maintaining the opportunity for sustainable use of this special area. Strategies include the establishment of an improved zoning scheme that contains significant and representative areas of the Shoals as sanctuary zones. The plan also details education programs, ongoing research and monitoring of the marine environment, public participation in management and, patrol and enforcement activities. This suite of complementary management tools will ensure the conservation of the Shoals.

While DEC is the agency with primary responsibility for management of marine parks, other agencies have ongoing responsibilities in the area. To facilitate effective management of the area, DEC, the Department of Fisheries and the Commonwealth Department of Environment and Heritage are signatories to a Memorandum Of Understanding which details a collaborative management regime for the region. The management plan highlights the importance of establishing collaborative working relationships with users, particularly commercial charter operators, to contribute to management and custodianship of the Shoals. Through working together, the beautiful and unique area of the Rowley Shoals can be preserved for present and future generations to appreciate.

[1] *The Department of Environment and Conservation (DEC) was formed on 1 July 2006 through the amalgamation of the Department of Conservation and Land Management and the Department of Environment. Reference to DEC prior to this date is to be interpreted to mean the former Department of Conservation and Land Management (CALM).*

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 13,500 km in length and comprises about 40 per cent 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 warm tropical water from the northwest to the southwest of the State's coastal zone. Waters from the Indo-Pacific Flowthrough and from Indian Ocean currents flood the Indonesian-Australian Basin (which contains the Rowley Shoals) off northwest Australia, and feed into the headwater region of the Leeuwin Current. The Leeuwin Current then carries these waters and associated tropical marine fauna and flora southwest and around to the southern Australia coastal zone, particularly during winter and spring. Hence, there is a strong connectivity of biological communities around the State (including the Rowley Shoals) via these large current systems.

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. The three major marine biogeographical zones which occur around Western Australia are: a *tropical* zone north of North West Cape (including the Rowley Shoals); 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 influences combine to produce diverse marine ecosystems and habitats. 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 recreation, nature-based tourism, fishing and potentially, pharmaceutical industries.

The Rowley Shoals (including the Commonwealth-managed Mermaid Reef Marine National Nature Reserve) are located approximately 300 km west-northwest of Broome, lying between 17°07'S, 119°36'E and 17°35'S, 118°56'E, on the edge of one of the widest continental shelves in the world (Figure 1). They are located in the Oceanic Shoals marine bioregion which is characterised by relatively undisturbed, clear-water environments.

The Rowley Shoals comprise three reef systems 30-40 km apart. These, in order from north-east to south-west, are Mermaid Reef, Clerke Reef and Imperieuse Reef, and they have been described as the most perfectly formed shelf atolls in Australian waters. The marine reef fauna of the Rowley Shoals is considered to be exceptionally rich and diverse, including species typical of the oceanic coral reef communities of the Indo-West Pacific. As many of these species are not found in the inshore tropical waters of northern Australia, such populations are of regional significance. The Rowley Shoals are also regionally significant as their position in the headwaters of the Leeuwin Current suggest they are an important source of invertebrate and finfish recruits to areas further south. The Shoals are also of international significance as, given the low level of pressures on the Shoals, they are an important global benchmark for Indo-West Pacific reefs. The major activities in the area are nature-based tourism and recreational fishing, primarily by charter.

The Rowley Shoals Marine Park was gazetted on 25 May 1990 as a Class A Marine Park. It comprised Clerke and Imperieuse Reefs and extended 100m seaward from the perimeter of the reef, encompassing approximately 21,912 ha. Bedwell and Cunningham Island were gazetted on 24 April 1992 as 'A' Class Marine Parks with a total area of 133 ha. The draft management plan for the Park, which was prepared in consultation with community stakeholders and in liaison with relevant government departments, was released together with a proposal (i.e. indicative management plan) to extend the Park. It was released for a statutory three month public submission period on 5 January 2004 and amendments were made to the plan based on the submissions. Cabinet later approved the management arrangements and zoning scheme for the Park. The proposed extensions to the Park were subsequently gazetted on 10 December 2004, increasing the area of the Park to approximately 87,674 ha with the seaward boundaries extending to the limit of State Water (three nautical miles from the territorial baseline). The final management plan was released after approval from the Minister for the Environment.

The management plan has been developed to complement management of the nearby Mermaid Reef Marine National Nature Reserve, which is managed by the Commonwealth Government in accordance with the

Mermaid Reef Marine National Nature Reserve Plan of Management (Commonwealth of Australia, 2000). A Memorandum of Understanding (MOU) (Commonwealth of Australia, 1999) between the Commonwealth and State Government outlines cooperative arrangements to facilitate efficient use of resources in the management of the Park and the Marine National Nature Reserve. In addition, DEC and DOF work closely, consistent with the *Memorandum of Understanding between the Ministers for the Environment and Fisheries to Establish Principles of Cooperation and Integration Between the Department of Conservation and Land Management and the Department of Fisheries in the Management of the State's Marine Protected Areas*.

The management plan details a range of key management strategies, including the application of a zoning scheme and implementation of key programs of management such as public participation programs, patrol and enforcement, education and interpretation, research, monitoring and management intervention and visitor infrastructure. These comprise a suite of complementary management strategies which will ensure the conservation of the marine environment of the Shoals while maintaining opportunities for sustainable human use. However the management plan for the 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 Park. These include fisheries regulations, wildlife protection, pollution control, environmental impact assessment, and maritime transport and safety measures. It should be noted that many marine species move in and out of the Park during different stages of their lifestyles and water quality within the Park may be affected by activities outside the Park. It is therefore critical that the environmental management objectives for the marine environment external to and within the Park are compatible. The 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.

The *Rowley Shoals Marine Park Management Plan 2007-2017* was 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 accordance with the Minister's requirements under the CALM Act and directs the management arrangements for the Park over 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. At the completion 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, the Minister for Fisheries, the Minister for Mines and the Minister for Tourism for consideration. The CALM Act specifies that in the event of such a revision not occurring by the end of the plan's specified lifespan, the plan will remain in force in its original form, unless it is either revoked by the Minister or until a new plan is approved.

2 MANAGEMENT CONTEXT

2.1 State Context

The Department of Environment and Conservation (DEC) was formed on 1 July 2006 through the amalgamation of the Department of Conservation and Land Management and the Department of Environment. Reference to DEC prior to this date is to be interpreted to mean the former Department of Conservation and Land Management.

The CALM Act provides the State legislation to create marine conservation reserves and seven marine conservation reserves were created between 1987 and 1990. In 1994, the Minister for the Environment released a report entitled *A Representative Marine Reserve System for Western Australia* that identified about 70 areas in the State 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 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, 1998) provided policy guidance in respect to the establishment and management of marine conservation reserves.

2.2 Legislative Framework

The CALM Act provides the legislative mechanism to create and manage marine conservation reserves in Western Australia. Marine conservation reserves are vested (i.e. legally entrusted) in the MPRA, and DEC has lead responsibility for their management. The *Wildlife Conservation Act 1950* (WC Act), which is also administered by DEC, provides legislative protection for flora and fauna across the State's lands and waters. The *Conservation and Land Management Regulations 2002* provide a mechanism to manage human impacts in

marine conservation reserves through enforcement and licensing. The *Wildlife Conservation Regulations 1970* regulate interaction with fauna and flora through a licensing system. The Department of Fisheries (DoF) is responsible for the management and regulation of recreational and commercial fishing, aquaculture and pearling throughout the State, including in CALM Act marine conservation reserves in accordance with the *Fish Resources Management Act 1994* (FRM Act) and *Pearling Act 1990*. The *Fishing and Related Industries Compensation (Marine Reserves) Act 1997* provides the mechanism by which the holder of an existing authorisation for commercial fishing, aquaculture, pearling or fish processing may seek compensation if the commercial value of the authorisation is apparently diminished as a result of the creation of a marine park and its zoning scheme or a marine nature reserve. Events that can give rise to compensation are the establishment of a marine nature reserve, or the classification of an area of a marine park as sanctuary area, recreation area or special purpose area (in which commercial fishing activity is incompatible with the purpose of that area).

The *Western Australian Marine Act 1982* and *Navigable Waters Regulations* regulate boating in State Waters and apply within marine conservation reserves. These Acts are administered by the Department for Planning and Infrastructure (DPI). In addition, any development that may have a significant effect on the environment in or adjacent to a marine conservation reserve is assessed in accordance with the EP Act by the Environmental Protection Authority (EPA).

The Rowley Shoals Marine Park lies within State Waters, which extend to 3 nm from the reef edge. Waters seaward of this limit and extending to the 200 nautical mile limit fall under the jurisdiction of the Commonwealth Government. The islands within the Park are classified as Class "A" marine park, and are also vested in the MPRA and managed by DEC in accordance with this plan. Management strategies for the waters have been developed to ensure integrated management of the marine and adjacent terrestrial environments.

2.3 National and International 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 Marine Park will become part of the National Representative System of Marine Protected Areas (NRSMPA). The NRSMPA is being developed cooperatively by the Commonwealth, State and Northern Territory government agencies responsible for the conservation, protection and management of the marine environment (ANZECC TFPMA, 1998a). The primary goal of the NRSMPA is to establish and manage a comprehensive, adequate and representative (CAR) 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, provides a means of meeting obligations under the Convention on Migratory Species (Bonn Convention) and under bilateral agreements for migratory birds with Japan and China. In addition, it supports the World Conservation Union's World Commission on Protected Areas Program that promotes the establishment and management of a global representative system of marine protected areas (ANZECC TFPMA, 1998b).

The Mermaid Reef Marine National Nature Reserve encloses Mermaid Reef, the most north-easterly of the atolls of the Rowley Shoals. Since it contains no land above high-water mark, it is under Commonwealth jurisdiction. Mermaid Reef was proclaimed a Marine National Nature Reserve in March 1991 under the Commonwealth *National Parks and Wildlife Conservation Act 1975*, for the purposes of conservation and protection of habitats, scientific research and education. The Reserve is approximately 53,984 ha in area and is managed by the Department of Environment and Heritage (Commonwealth), under the *Environment Protection and Biodiversity Conservation Act 1999*. A MOU is in place between DEC, DoF and the Department of Environment and Heritage to allow collaborative management of the Park and the Marine National Nature Reserve.

This management plan relates specifically to the areas of State Waters encompassing Clerke and Imperieuse reefs, which are reserved under the CALM Act as the Rowley Shoals Marine Park, and Bedwell and Cunningham Islands which are crown reserves declared under the *Land Administration Act 1997* with the

purpose of marine park. The management strategies for all three reefs are compatible and complementary, to ensure that the natural conservation values of this unique environment are managed appropriately. The management plan for the Mermaid Reef Marine National Nature Reserve, released in 2000, addresses the management issues relating to Mermaid Reef (Commonwealth of Australia, 2000).

2.4 Responsibilities of Authorities and Government Agencies

DEC is responsible for the overall management of marine conservation reserves under the marine conservation reserve provisions of the CALM Act. DEC also collaborates with other authorities and agencies (i.e. Department of Fisheries, MPRA, Conservation Commission of Western Australia, Environmental Protection Authority and local government authorities) that have responsibilities within marine conservation reserves and in the surrounding waters and coastal areas, in order to ensure the various regulatory and management practices are complementary. The MPRA plays a pivotal role in the establishment of marine conservation reserves and their management plans, and in auditing the management of marine conservation reserves vested in the Authority. The MPRA audit function is fundamental in ensuring that management of these reserves is achieving stated objectives and targets. The management plan provides the principal framework to enable the MPRA to carry out this function.

In some cases Memoranda of Understanding (MOUs) are developed to facilitate co-operation and promote operational efficiency. An MOU has been developed between the Minister for the Environment and the Minister for Fisheries to establish principles of cooperation and integration between DEC and DoF in the management of the State's marine protected areas. Under this MOU, DEC works closely with DoF through joint working plans for efficient and effective delivery of the strategies contained within the management plan for which there is a lead or shared agency responsibility of mutual interest.

The agencies with statutory responsibilities in marine conservation reserves in Western Australia are listed in Table 1.

Table 1: Agencies with responsibilities in the Rowley Shoals Marine Park and adjacent areas

Marine Parks and Reserves Authority	• vesting body for marine conservation reserves; • provides policy advice to the Minister for the Environment; and • audits management plan implementation by DEC.
Department of Environment and Conservation	• manages marine conservation reserves vested in the MPRA. This includes the: a) preparation of management plans; b) implementation of the management plan; c) co-ordination with other agencies; d) implementation of education, public participation, and monitoring programs; e) wildlife research and management; f) management of nature-based tourism; and g) lead role in enforcement (non-fisheries issues). • ensures integrated management of marine conservation reserves with adjoining mainland and island conservation reserves. • assists the Environmental Protection Authority in the process of assessing proposals that may significantly affect the marine environment, including marine conservation reserves; and • administers pollution control legislation.
Department of Fisheries	• manages and regulates commercial and recreational fishing, aquaculture and pearling in all State waters including marine conservation reserves; and • leads enforcement of fisheries legislation within marine conservation reserves. • signatory to the MOU with DEC in regard to the day-to-day management of the Rowley Shoals Marine Park.
Department for Planning and Infrastructure	• responsible for all boating regulations including licensing, safety standards, vessel navigation, marker buoys, moorings, jetties and support facilities such as navigation marks, 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 in the development and management of support facilities.
Environmental Protection Authority	• assesses reports and makes recommendations on proposals that may significantly affect the marine environment, including marine conservation reserves.
Western Australian Maritime Museum	• protects pre-1900 shipwrecks and artefacts under the *Marine 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 Acts that control mineral and petroleum exploration and development; and • regulates petroleum industry operations.
Department of the Environment and Heritage (Commonwealth)	• manages the Mermaid Reef Marine National Nature Reserve; and • signatory to the MOU with DEC in regards to the day to day management of the Rowley Shoals Marine Park and Mermaid Reef Marine National Nature Reserve.
CoastWatch (Commonwealth)	• collaborates with DEC and the Department of Environment and Heritage in the surveillance of Rowley Shoals Marine Park and Mermaid Reef Marine National Nature Reserve.
Australian Maritime Safety Authority (Commonwealth)	• manages the Imperieuse Reef light and radio beacon on Cunningham Island.

3 MANAGEMENT FRAMEWORK

3.1 'Best Practice' Management Model

The conservation of marine biodiversity and management of human activities to maintain their sustainability are achieved through a number of complementary mechanisms that include marine parks, fisheries regulations, pollution control, environmental impact assessments of development proposals and maritime safety regulations. In this way, the management of the Marine Park will employ both generic strategies (provided in Section 7) and specific management strategies (provided in Section 9) to ensure that human activities are carefully managed to meet conservation and sustainable use objectives.

The content of 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 being 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 values, objectives, strategies, performance measures and management targets provided in Section 9 reflect an outcome-based best practice approach from which the effectiveness of management can be 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 management effectiveness.

Ecological and Social Values

The conservation of marine biodiversity and the provision of sustainable human use and enjoyment are the major objectives for the Marine Park. These broad objectives need to be defined operationally to be used in a management context. This is achieved by identifying the key ecological and social values of the Marine Park and setting management objectives, strategies and targets in relation to these values.

Ecological values are the intrinsic physical, chemical, geological and biological characteristics of an area. For management purposes, the major ecological values are listed individually in this plan. However, in reality the marine environment of the Marine Park is a structurally and functionally complex array of relationships between the plants and animals interacting with their physical environment.

The ecological values (where appropriate) include:

- species and communities that have special conservation status;
- key species endemic to the reserves;
- key structural components of the ecosystem (e.g. seagrass and macro-algae reef communities);
- exploited species and communities (e.g. targeted fish populations);
- key physical-chemical components of the ecosystem (e.g. geomorphology and water quality).

Social values are the major cultural, aesthetic, recreational and economic attributes of the area. The social values are listed individually in the plan and provide information on the importance of the area to the community. They also provide the opportunity for development of visitor opportunities within the Marine Park.

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 a significant pressure on an ecological value has been identified, the management objective addresses the specific pressure. 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, as well as the provision for ongoing sustainable of the Park.

Management Strategies

Management strategies provide specific direction on **how** the management objective/s for each value will be achieved. All strategies provided in this plan have been defined as 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 form part of the performance assessment of Marine Park management by the MPRA (see Section 10 – Performance Assessment). It should be noted that management priorities may alter in response to changes in usage patterns or to new knowledge acquired during the 10 year 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 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). 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 may 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. 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 negatively affect the ecological values of the Marine Park) the performance assessment approach incorporates information on the status and level of the human activity. This information is important in monitoring human activities to assist in determining trends in use, and in assessing impacts of these social values on the ecological values of the Marine Park. Performance measures in this plan are indicative only and will be finalised during the design of monitoring programs.

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 targets provide specific benchmarks to assess the success or otherwise of management action within the life of the management plan. The short-term targets, where identified, provide a benchmark for management to achieve within a specified time period and, generally, are used where the value is currently not meeting the long term target and remediation or rehabilitation is required. Short term targets are thus a step to achieving the long-term targets if the current condition of the value does not reflect the long-term target. The targets for *active* social values (e.g. nature-based tourism, commercial fishing, recreational fishing, mining, water sports, wildlife experiences, coastal use, scientific research, and education) are process-based and are generally stated as '*Implementation of management strategies within agreed timeframe*'". This ensures that strategies for the social values are implemented in accordance with the management objectives.

Key Performance Indicators
Key performance indicators (KPIs) are a **measure 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, DEC and the community. KPIs are a key element of the MPRA audit process (Section 10). KPIs for the Rowley Shoals Marine Park are water quality, intertidal coral reef communities, subtidal coral reef communities, invertebrates, finfish, seascapes and wilderness.

3.2 Determining Management Priorities

The Rowley Shoals comprise three reef systems 30 - 40 km apart. These, in order from north-east to south-west, are Mermaid Reef, Clerke Reef and Imperieuse Reef, and they have been described as the most perfectly formed shelf atolls in Australian waters. The marine reef fauna of the Rowley Shoals is considered to be exceptionally rich and diverse, including species typical of the oceanic coral reef communities of the Indo-West Pacific. As many of these species are not found in the inshore tropical waters of northern Australia, such populations are of regional significance. The Rowley Shoals are also regionally significant as their position in the headwaters of the Leeuwin Current suggest they are an important source of invertebrate and finfish recruits to areas further south. The Shoals are also of international significance as, given the low level of pressures on the Shoals, they are an important global benchmark for Indo-West Pacific reefs. These marine biodiversity values make the Rowley Shoals Marine Park a key component of Australia's network of marine protected areas.

The management of the Rowley Shoals Marine Park aims to conserve the marine biodiversity of the Park, while maintaining opportunities for people to appreciate and enjoy the Park (where these activities are compatible with maintaining the values of the Marine Park). A pro-active and precautionary approach to conserving marine biodiversity is used to determine management priorities. A risk assessment was undertaken by considering the likelihood of existing and potential pressures affecting the ecological and social values and their associated ecological and social consequences. The relative level of risk posed by existing and/or potential pressures on the values of the Marine Park were assessed by considering the following factors:

- the *biological intensity* of the pressure - pressures that impact lower trophic levels (i.e. primary producers such as seagrasses and macro-algal communities) are often of greater concern than pressures on higher trophic levels;
- the *temporal* scale of the pressure - ongoing pressures are generally of greater management concern than pressures that are short-lived;
- the *spatial* scale of the pressure - pressures that occur over a greater spatial extent are often of greater management concern than localised pressures;
- the *social consequence* - acknowledges that different pressures have different social and political consequences. A high socio-economic/political consequence is often of greater management concern; and
- the *probability* of a pressure occurring within the timeframe of the management plan.

The natural attributes and the major uses of the Rowley Shoals are well known. However, the short-term and long-term cumulative ecological effects of pressures are not fully understood. For the purposes of developing management priorities, pressures on the values are confined to current pressures and pressures likely to occur during the life of the management plan and considered to be manageable within a marine conservation reserve context. By definition, this excludes global pressures such as climate change. The potential impact of these global pressures is however considered in the development of the strategies for the management of the Park. The vision and strategic objectives of the plan (Section 6) provide the longer term (>ten years) direction for management of the reserves.

4 REGIONAL PERSPECTIVE

4.1 Biogeographical setting

The Rowley Shoals Marine Park lies within State Waters of the Oceanic Shoals marine bioregion and is located in the southern end of this bioregion (ANZECC TFMPA, 1998a). This bioregion is characterised by clear tropical oceans and submerged and emergent reefs that act as a stepping stone for a range of reef biota between Australian and Indonesian waters (Commonwealth of Australia, 2000).

4.2 Geology and Geomorphology

The Rowley Shoals are elliptical atolls, with a rim of reef-flat that is exposed at low tide. They are orientated north-south and measure 14 to 18 km long and 7.5 to 9.5 km wide. These coral atolls have developed directly from the shelf, rising almost vertically. Mermaid Reef rises from a depth of approximately 440 m, Clerke Reef from approximately 390 m and Imperieuse Reef from approximately 230 m. They have been described as the most perfectly formed shelf atolls in Australian waters (Fairbridge, 1950). However they are not “classical” atolls, since they do not rise from volcanoes.

Mermaid Reef, which is managed under Commonwealth legislation as the Mermaid Reef Marine National Nature Reserve (*Environment Protection and Biodiversity Conservation Act 1999*), comprises a reef-flat approximately 500 to 800 m wide, shelving into shallow back-reefs rich in corals, and subsequently into a large lagoon, up to 20 m deep. It has no landforms above high-water mark. The reef platform and small sandbank at the northern end of the lagoon are both completely covered at high water, the latter being dry for only about 1.5 hours either side of low water. A single entrance channel in the northeast provides boats with access to a safe anchorage, however sea conditions through this access are characterised by regular strong tidal flows, making navigation difficult and often dangerous.

Clerke and Imperieuse reefs are similar to Mermaid Reef, but their lagoon systems are shallower and more complex. Clerke Reef, approximately 30 km south-west of Mermaid Reef, contains a small sandy cay, Bedwell Island, which is a nesting site for the red-tailed tropic bird. The deepest basin of the reef’s lagoon system has a maximum depth of 10 m and is connected to the sea via three narrow passages in the north-east. This and adjacent crescent-shaped basins have numerous coral atolls and patch reefs that increase in number towards the south. The largest and shallowest basin contains many living coral pinnacles and extensive staghorn growth. Gorgonians and soft corals are found on the lower sides of the ridges of the outer reef slope. Imperieuse Reef lies approximately 40 km south-west of Clerke Reef and is the largest of the three atolls, having dimensions of 17.8 km in length and 9.5 km in width. Satellite imagery suggests that its largest basin appears to be filling with sand and patch reefs (Berry & Marsh, 1986). The basin opens to the sea via a narrow shallow passage in the north-east. There is a small, unvegetated sand cay, Cunningham Island, near the northern end of the atoll. Imperieuse Reef is the least frequently visited of the three reefs, due to the difficult nature of navigation into the lagoon.

The three atolls appear to be in varying stages of development. They rise from the Scott Reef/Rowley Shoals platform on their landward sides and drop away to deeper water on the seaward side (Berry & Marsh, 1986). Their exposure to a large tidal range and oceanic swell results in a very high-energy environment, which influences the atolls' structure, height and floral and faunal diversity.

The Rowley Shoals and their environment have been described in Berry & Marsh (1986).

4.3 Climate

The Rowley Shoals experiences a tropical monsoonal climate, subject to cyclonic activity between December and April. This is associated with mild summers and winters with westerly to north-westerly rain-bearing winds from November to March. (Commonwealth of Australia, 2000). Strong easterly to south-easterly trade winds occur continuously from May to October.

4.4 Oceanography

The Rowley Shoals Marine Park is surrounded by clear oceanic waters compared to the more turbid headwaters of the inner shelf closer to the mainland. The area is strongly influenced by the Indonesian Throughflow and the Leeuwin Current. Water temperature is approximately 24^{o}C in the southern sector of the Oceanic Shoals bioregion where the Rowley Shoals are located. There is little annual variation in sea temperature and minimal stratification. Surface salinities average 34-35 parts per thousand.

The Rowley Shoals experience a semi-diurnal tidal cycle and have an unusually high tidal range of about 5 m. However, the tidal range within the lagoons of the Shoals is considerably less than on the outside of the reefs due to the restricted flow out of the lagoon, a result of water becoming impounded by the emergent reef rim (Commonwealth of Australia, 2000).

4.5 Ecology

The marine environments of the Rowley Shoals are typical of clear-water environments and include both resident organisms and migrants. The major habitats of the area include intertidal and subtidal reefs that comprise the typical coral atoll formation and are home to many reef associated species. Drop off areas at depths greater than 50m also occur within the Park and include a range of migratory pelagic species. The area is considered species rich. Surveys carried out by the Western Australian Museum identified 184 species of corals, primarily Indo-West Pacific species, indicating the strong affinity of the Rowley Shoals communities with Indonesia. In terms of other species, at least 264 species of molluscs, 82 species of echinoderms and 389 species of finfish were also identified. Many of these records were new to Western Australia, reflecting the significant differences between the offshore Indo-Pacific fauna and inshore WA coastal fauna. The faunal assemblages of the Rowley Shoals Marine Park are regionally significant as they contain large numbers of species not found in the more turbid coastal environments of tropical Western Australia.

The Rowley Shoals is ecologically significant in that these reefs form part of a series of important ecological "stepping stones" for a range of reef biota originating in Indonesian/west Pacific waters. Their position off the north-west Australian coast, an area of few offshore reef systems, provides an important upstream source for recruitment to reefs further south.

4.6 Social Context

Social values are those cultural, aesthetic, recreational and economic characteristics for which the area is significant or well known.

The Rowley Shoals Marine Park is considered to be in a relatively undisturbed condition largely as a result of the relatively low level of recreational and commercial activity. The low level use relates to the remoteness of the Shoals with access difficult from both Indonesia and mainland Australia. The Rowley Shoals Marine Park is renowned for its unspoilt coral gardens, giant clams and other spectacular shellfish, and abundant large reef fish. These attributes, combined with the sheer isolation of the area, are responsible for attracting an increasing number of visitors to the area from both Australia and overseas.

Fishers have visited the Rowley Shoals for many years. Today, the majority of visitors arrive at the Park aboard vessels operated by licensed marine nature-based tourism operators. Visitation to the Shoals is low, with 37 operators carrying 282 passengers during the 2004 visitor season. A limited number of visitors arrive at the Park aboard private recreational vessels. The most common visitor activities that occur at the Rowley Shoals are:

- SCUBA diving and snorkelling within the lagoon and on the outer reef slope;
- recreational fishing, targeting demersal fish fauna within the lagoon and on the outer reef slope;
- recreational game fishing, targeting pelagic fish fauna in the oceanic waters surrounding the Rowley Shoals;
- fish feeding;
- boating; and
- island-based activities such as beach walking and barbeques.

The Rowley Shoals Marine Park overlies the Rowley Sub-basin of the Canning Basin, in which limited petroleum exploration has occurred, but which is considered to be prospective for petroleum.

Human activity in the relatively undisturbed Rowley Shoals Marine Park is expected to increase and the recreational opportunities and commercial nature-based tourism uses need to be managed to ensure compatibility with maintaining the Park's ecological values.

5 DEFINITION OF THE AREA AND RESERVE TENURE

The Rowley Shoals Marine Park was gazetted on the 25 May 1990 as a Class A Marine Park. It comprised Clerke and Imperieuse reefs, and extended 100m seaward from the perimeter of each reef, encompassing an area of approximately 21,912 ha. Bedwell and Cunningham islands were gazetted on 24 April 1992, as a crown reserve declared under the *Land Administration Act 1997* with the purpose of marine park (No 42017) with a total area of approximately 133 ha. These islands are also vested in the Marine Parks and Reserves Authority (MPRA) and are covered by this plan. Extensions to the Park were gazetted on 10 December 2004, increasing the area of the Park to approximately 87,632 ha, with the seaward boundaries extending to the limit of State Waters (3 nautical miles) from the territorial baseline. The extension of the seaward boundaries to the limit of State Waters ensures that the range of habitats found within State Waters in the Rowley Shoals are more adequately included within the reserve (e.g. pelagic habitats) and will facilitate more effective management of the major activities that occur in the area. The boundaries of the Rowley Shoals Marine Park are shown in Figure 2.

The CALM Act 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 also states that a marine park *"… includes:*

(a) the airspace above such waters and land;

(b) in the case of waters, the sea-bed or other land beneath such waters and the subsoil below the 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."

Under the statutory classification of Class A reserves, the amendment of the purpose and boundaries of the Park requires the tabling of an order in both Houses of Parliament. Either House can resolve to disallow a reservation order and as such, class A vesting provides high security of tenure. By contrast, the zoning scheme and the management plan can be amended through a formal public consultation process and do not require Parliamentary consideration. This approach provides the flexibility to respond to changing management priorities and community aspirations, and new information on the values and uses of the area. Other than in exceptional circumstances, 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 Fisheries, and the Minister for Resources and Assisting the Minister for State Development.

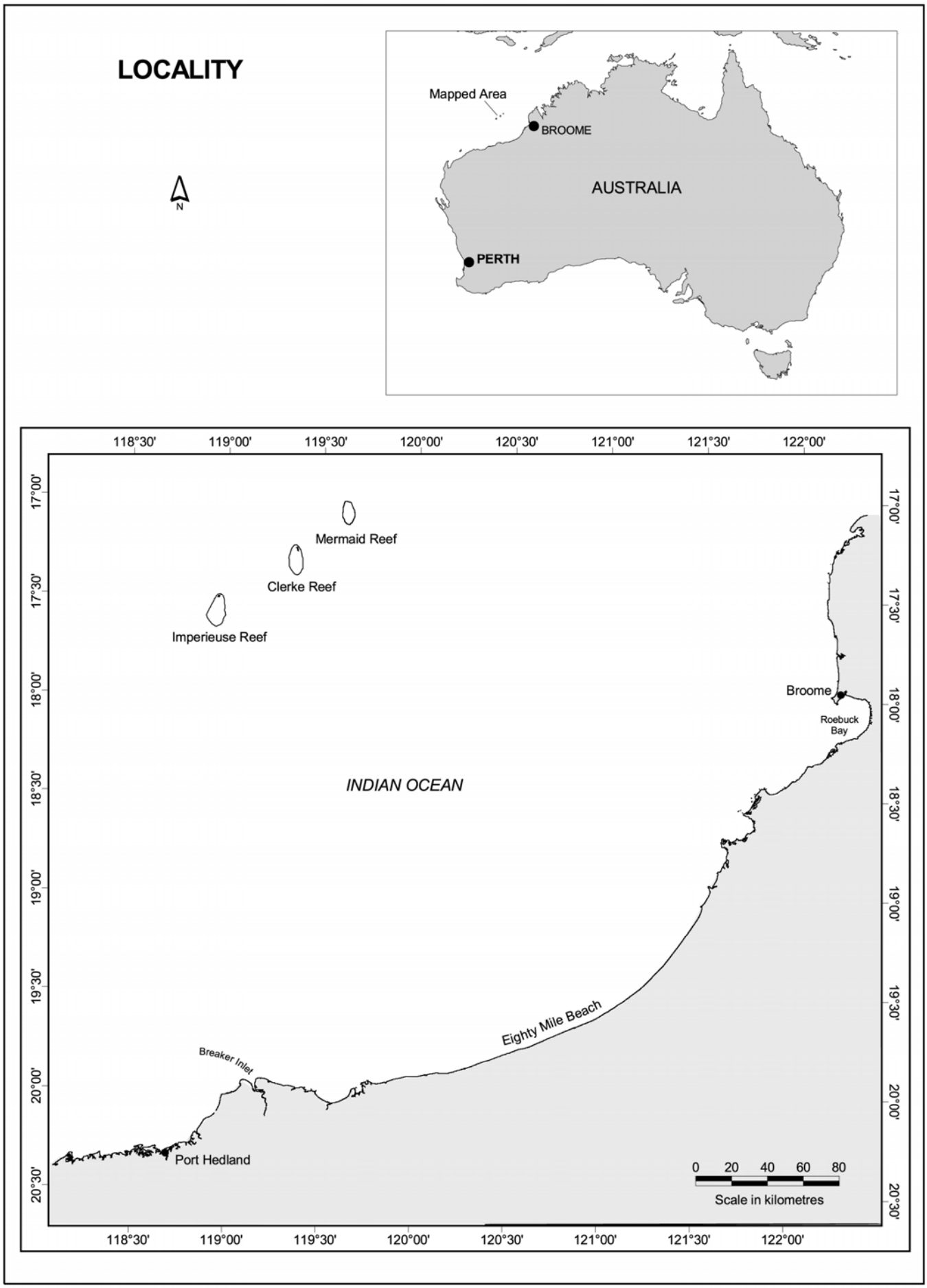

Figure 1: Locality of the Rowley Shoals.

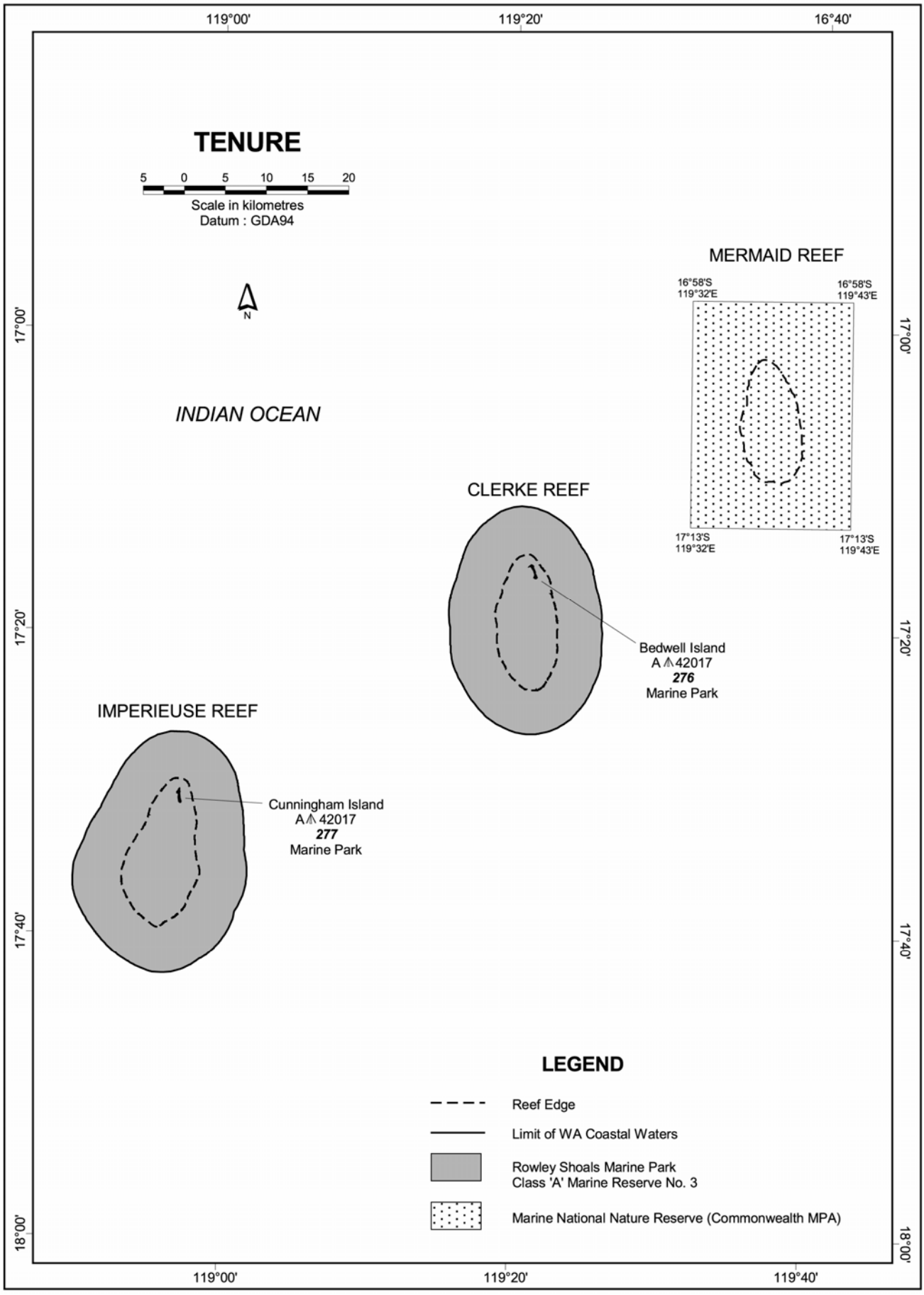

Figure 2: tenure of the Rowley Shoals Marine Park.

6 VISION AND STRATEGIC OBJECTIVES

6.1 Vision

The Rowley Shoals have been described as the most perfectly formed shelf atolls in Australian waters and are of local, national and international significance. The coral reef fauna of the Shoals is considered to be exceptionally rich and diverse, including species typical of the oceanic coral reef communities of the Indo-West Pacific. Many of these species are not found in the inshore tropical waters of northern Australia. The conservation significance of the Shoals was recognised in 1990 with the initial declaration of the Rowley Shoals Marine Park and the extension of the Park in 2004. The vision statement for the Rowley Shoals Marine Park broadly reflects the natural values of the Park and the aspirations of the community with regard to conservation, use and management of the Park.

Vision for the Rowley Shoals Marine Park

In the year 2027, the marine flora and fauna, habitats and water quality of the Rowley Shoals Marine Park will be in the same or better condition than in the year 2007. The area will support ecologically sustainable, recreation and nature-based tourism and the Park will be considered to be an important ecological and social asset by the local, national and international community. It will be a highly valued scientific reference area to compare the health of intensively used reefs in the Indo-West Pacific Region.

6.2 Strategic Objectives

Government policy includes the establishment of a comprehensive, adequate and representative (CAR) system of marine conservation reserves in Western Australia and includes a 'multiple-use- approach. 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 Marine Park are:

Conservation

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

Science and Education

- to promote education, nature appreciation (through recreation and tourism opportunities) and scientific research in the Marine Park.

Public Participation

- to promote community involvement in the management of the Marine Park.

Recreational Uses

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

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.

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 Park. The management of the Marine Park must thus 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, as well as community cooperation and participation.

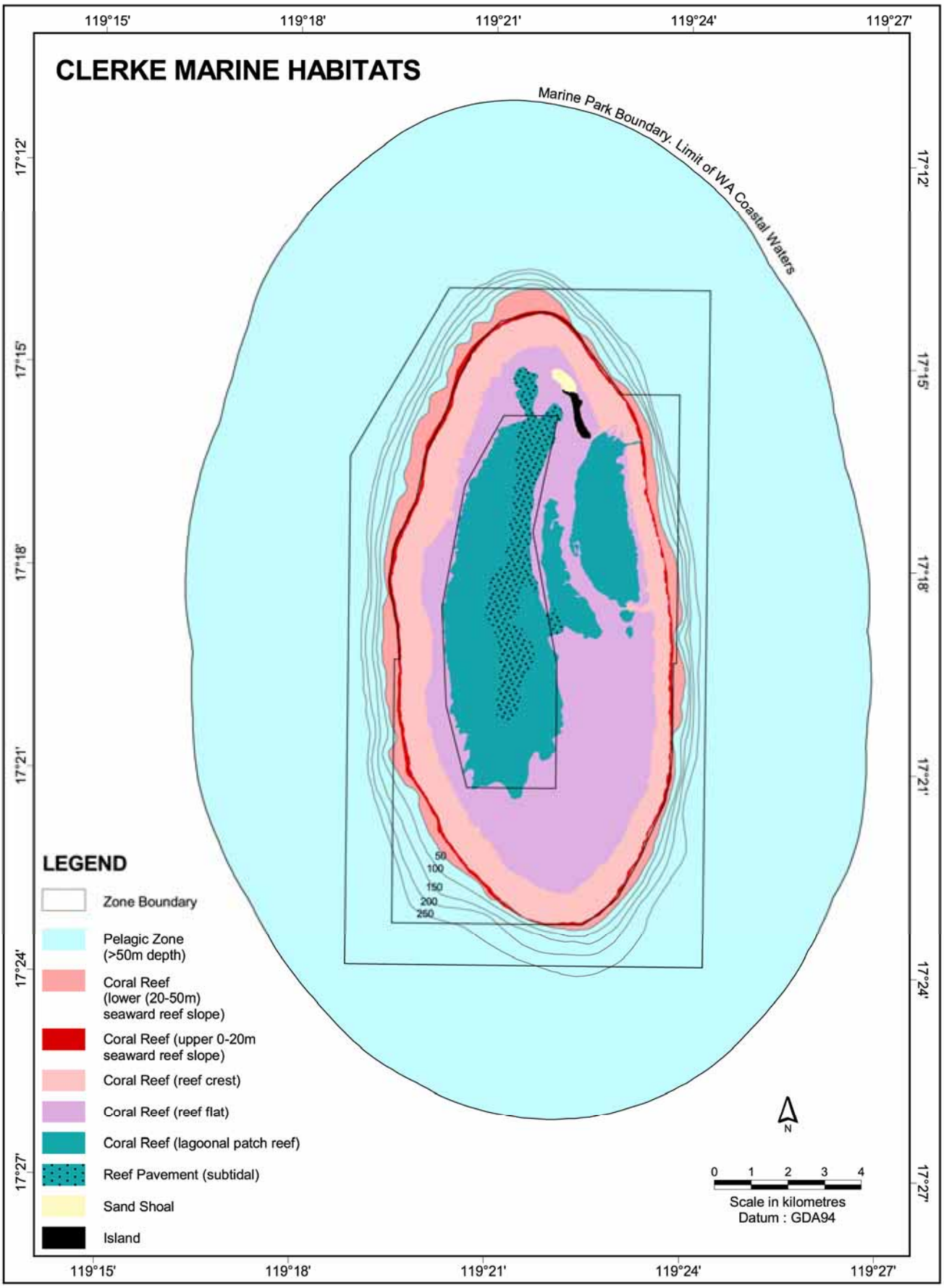

Figure 3: Major marine habitats of the Clerke Reef area of the Rowley Shoals Marine Park.

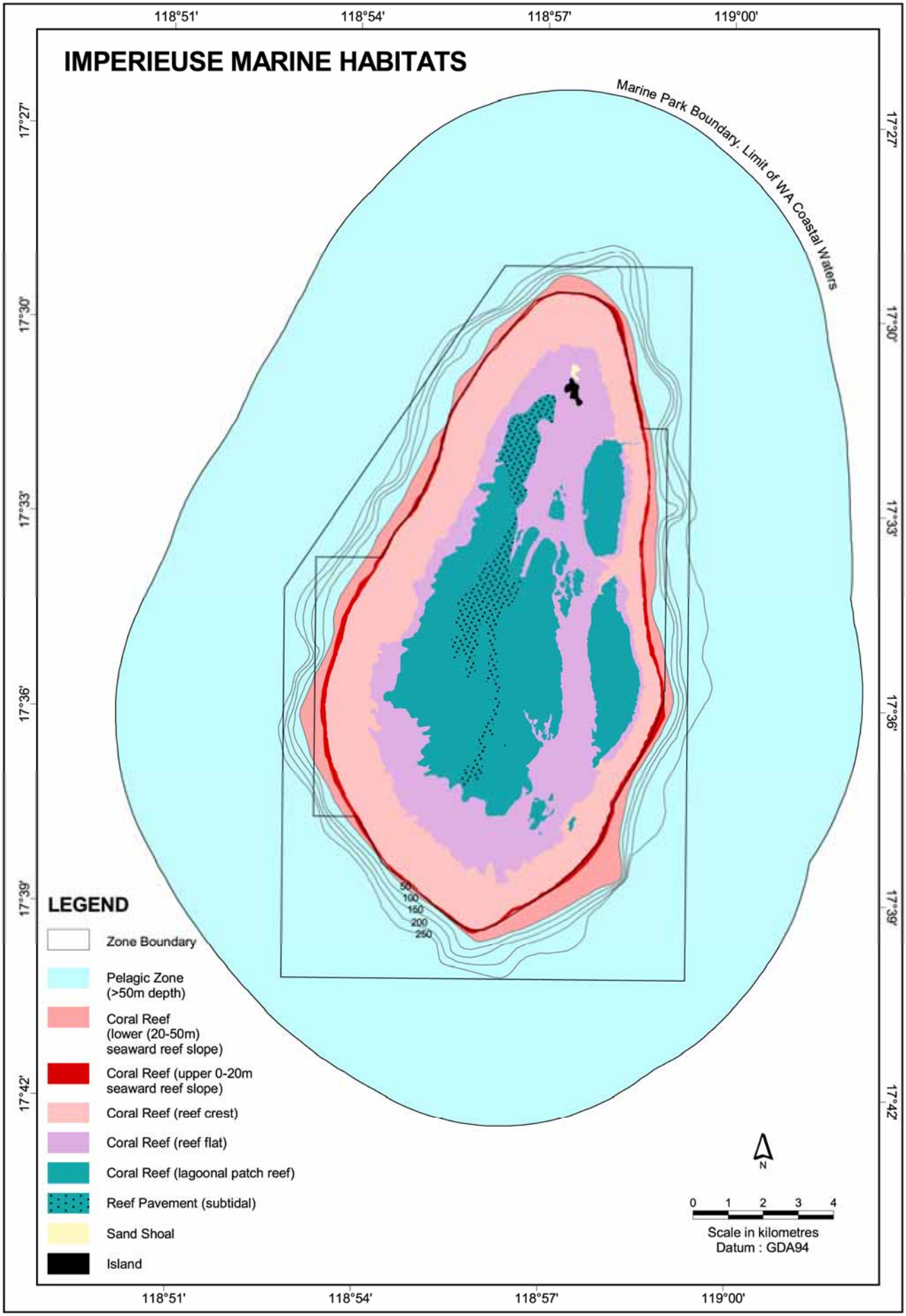

Figure 4: Major marine habitats of the Imperieuse area of the Rowley Shoals Marine Park.

7 GENERIC MANAGEMENT STRATEGIES

The vision, strategic objectives, management targets and management objectives provided in Section 9 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 administrative and management framework;
- education and interpretation;
- patrol and enforcement;
- research;
- monitoring;
- public participation; and
- management intervention and visitor infrastructure

7.1 Development of an Administrative Framework

The development of an appropriate administrative and management framework is essential to ensure the Rowley Shoals Marine Park can be managed effectively over the long term. This framework includes statutory considerations such as the Marine Park's purpose, class and boundaries, a suitable zoning scheme and appropriate regulations, mechanisms to support interagency and/or stakeholder collaboration, as well as the human, financial and infrastructure resources to implement management strategies.

For administrative purposes, DEC is divided into regions, which in turn are made up of districts. The Rowley Shoals Marine Park is within the West Kimberley District of the Kimberley Region and the day to day operational management of the Park is the responsibility of the District Manager. DEC's administrative base for the West Kimberley District is located in Broome. DEC's Marine Policy and Planning Branch has a strategic supporting role in assisting Regional and District offices in the management of marine conservation reserves throughout the State. A number of other specialist branches provide support, direction and assistance in relation to such areas as wildlife management, licensing of nature-based tourism operations and research and monitoring.

The three atolls, Mermaid Reef, Clerke and Imperieuse, effectively form one system although they are managed within two different jurisdictions. An integrated approach requires strong administrative collaboration between the Commonwealth and State governments and this is facilitated through the MOU.

The Marine Park comprises part of the NRSMPA. The objective of the NRSMPA is to build a system of marine protected areas that will be:

- *Comprehensive* – include marine protected areas in all bioregions of Australia
- *Adequate* – include marine protected areas that are of appropriate size and configuration to ensure the conservation of biodiversity and the integrity of ecological processes; and
- *Representative* – that include the flora, fauna and habitats that are representative of the bioregion

The zoning scheme is an important strategy for the conservation of marine biodiversity and the management of human use in the Park. The zoning scheme assists in separating conflicting uses and provides for specific activities such as for recreational fishing, 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 Rowley Shoals. Specifically, sanctuary zones will play a key role in the protection of representative areas of important habitat in the Rowley Shoals. As well as providing a measure of management protection, sanctuary zones also provide areas where natural processes can be studied free of significant human influence. These zones provide the opportunity to improve the understanding of the Park's key ecological processes and to obtain critical baseline data to compare against areas of the 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 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, public participation, patrol and enforcement, management intervention and visitor infrastructure, research and monitoring (Sections 7.2 – 7.7).

7.1.1 Development of a zoning scheme

Zones are formally established as classified areas under Section 62 of the CALM Act. Significant changes to the zoning of the Park require comprehensive public consultation and the approval of the Minister for the Environment, the Minister for Fisheries and the Minister responsible for the *Mining Act 1978*.

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 an undisturbed or largely undisturbed state. Passive recreational activities which do not compromise the maintenance of 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) are permitted where they do not conflict with other uses and will be regulated under the CALM Act. Sanctuary zones also provide area for passive appreciation of the marine environment as well as educational or scientific uses.

Recreation zones provide for conservation and compatible activities including recreation, including recreational fishing. Commercial fishing, pearling and aquaculture are not permitted in these zones.

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 activity (e.g. surfing). Uses that are incompatible with the specified priority purpose are generally not permitted in these zones.

General use zones are all areas not included in sanctuary, special use or recreation zones. Conservation of natural values is still the priority in 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 zoning plan for the Park is based on a number of key principles and assumptions. These include:

- recognition of extremely high conservation values of the area and the need to ensure a high level of protection for the coral and associated marine life in the Park;
- the value of the Shoals as an international coral reef reference site;
- recognition that a key value of the Shoals is wilderness and it relies on the area having a high degree of naturalness (e.g. presence of large fish);
- that the zoning scheme should provide areas representative of the Park's habitats, flora and fauna, that are free of significant human impact for research and monitoring;
- operational principles from the Great Barrier Reef Marine Park Authority Representative Areas Program on the design of no-take areas, including -
    - having, where possible, no-take areas whose minimum size is 20 km (10km for coastal bioregions) along their smallest dimension;
    - having larger versus smaller no-take areas;
    - having only whole reefs in no-take areas; and
    - including biophysically special/unique places (e.g. spawning areas);
- the application of the precautionary principle which, in this case, means that a lack of scientific certainty about the location, size or number of no-take areas should not prevent the establishment of no-take areas;
- that zoning is one in a suite of management mechanisms for the area;
- that the zoning scheme should be simple for users to understand and therefore to comply with any restriction; and
- that, where possible, the placement of zones to achieve the management objectives should be done so as to minimise impacts on the social values.

The type, location and size of zones has been based on the need to achieve the various management objectives for the ecological values (e.g. having sanctuary zones in representative areas and for monitoring and research), while minimising impact on the social values.

The zoning scheme for the Park is shown in Figures 5 and 6. The activities permitted in each zone are outlined in Table 2. There are two sanctuary zones and three recreation zones in the Rowley Shoals Marine Park. All other areas are zoned for general use.

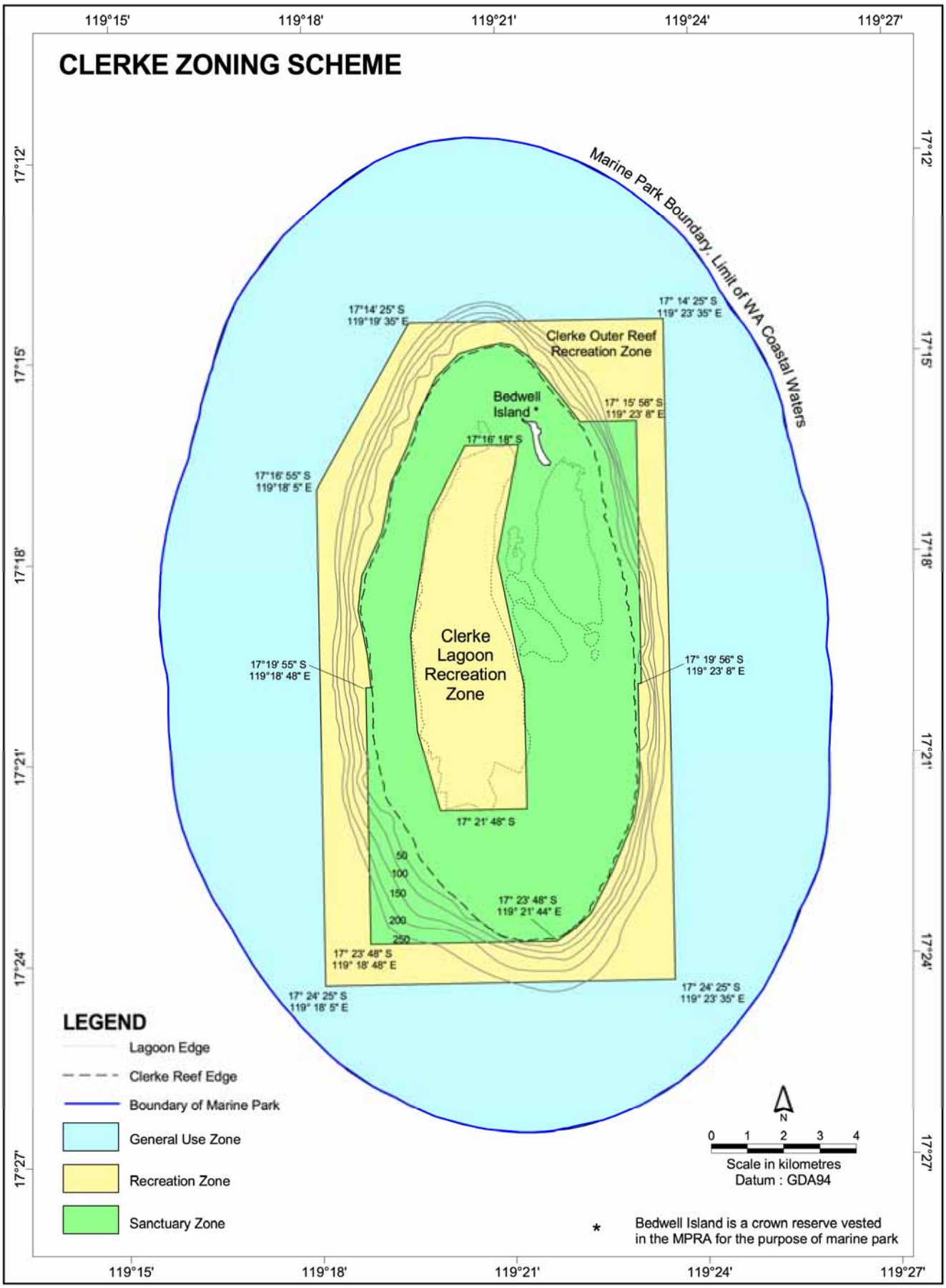

Figure 5: Zoning scheme for the Clerke Reef area of the Rowley Shoals Marine Park.

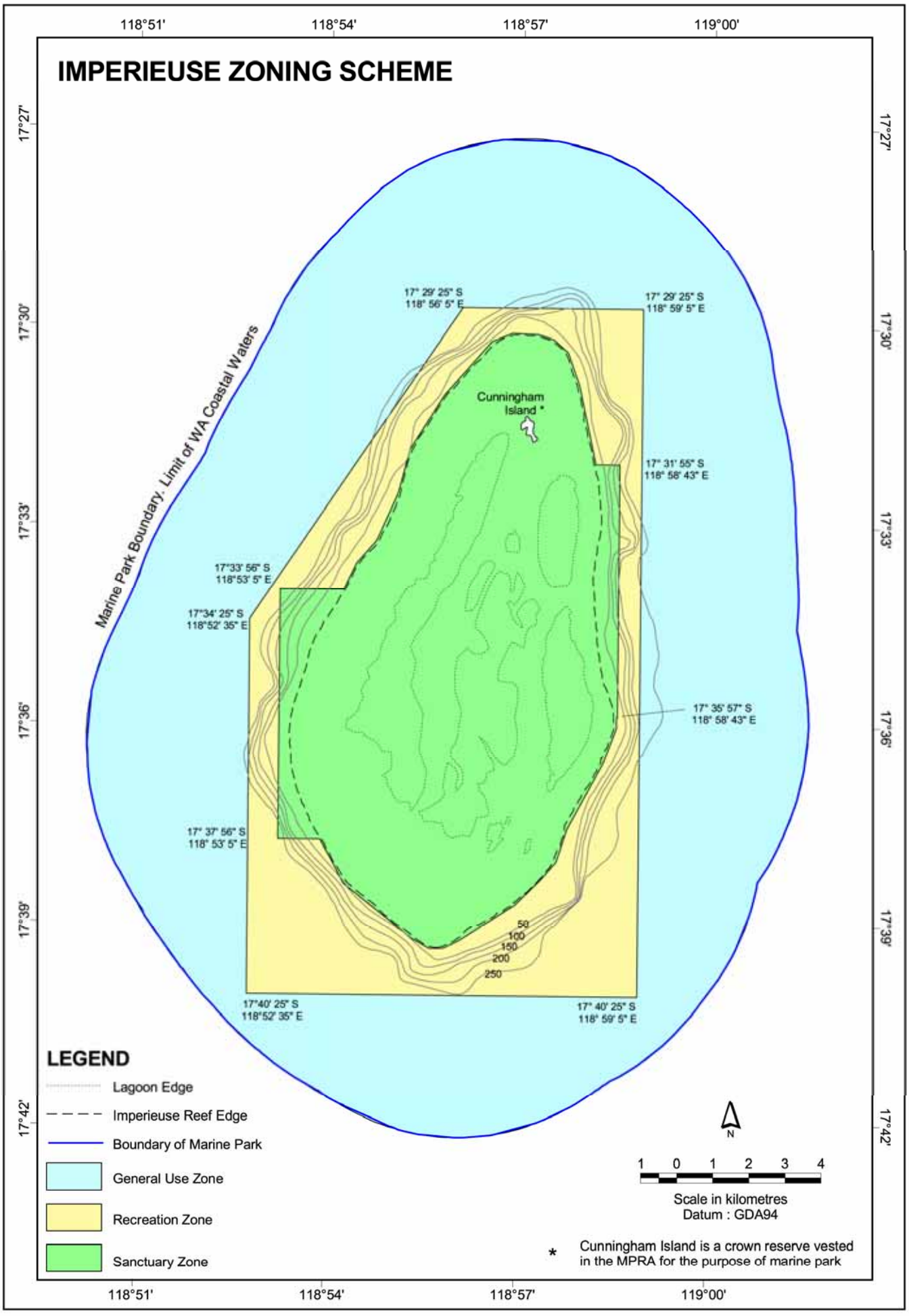

Figure 6: Zoning scheme for the Imperieuse Reef area of the Rowley Shoals Marine Park

Table 2: Uses permitted in each zone type of the Rowley Shoals Marine Park

Activity	Sanctuary Zone	Recreation Zone	General Use Zone
Commercial			
Commercial fishing [b]	No	No	No
Commercial specimen collecting	No	No	No
Aquaculture and pearling [b]	No	No	Assess
Charter vessels - fishing [d]	No	Yes	Yes
Charter vessels - other [c]	Yes	Yes	Yes
Other tourism activities (e.g. sea planes) [a d]	Assess	Assess	Assess
Wildlife interaction [c]	Yes	Yes	Yes
Mineral and petroleum drilling and development [f]	No	No	Assess
Mineral and petroleum exploration (seismic) [f]	Assess	Assess	Assess
Recreation			
Recreational line fishing [b h]	No	Yes	Yes
Recreational netting [h]	No	No	Yes
Spearfishing [b h]	No	Yes [i]	Yes
Spearfishing on compressed air [h]	No	No	Yes
Recreational specimen collecting	No	No	No
Diving and snorkelling	Yes	Yes	Yes
Boating (motor and non-motorised boating) [a g]	Yes	Yes	Yes
Anchoring	Yes [e]	Yes [e]	Yes
Surface water sports [a g]	Yes	Yes	Yes
Other			
Research [d]	Yes	Yes	Yes
Pipelines (including dredging for pipelines) [f]	No	No	Assess
Dredging and dredge spoil dumping for shipping activities [f]	No	No	Assess
Moorings [d]	Special	Special	Yes
Other structures	Assess	Assess	Assess

KEY:

a.	Subject to the *Western Australian Marine Act 1982*.
b.	Subject to the FRM Act and *Pearling Act 1990*.
c.	Subject to licence and the provisions of the CALM Act and WC Act.
d.	Licence required from DEC and/or DoF and/or EPA.
e.	Anchoring may be restricted in specific areas to protect fragile subtidal coral reef communities. However, these restrictions would not apply to a situation where life and property is threatened.
f.	Subject to the EP Act.
g.	Boating may be restricted during the life of this plan in specific areas where there is a demonstrated need to do so (i.e. due to environmental or social impacts)
h.	Take of protected fish species is not permitted throughout the Park
i.	Spearfishing is not permitted in the Clerke Lagoon Recreation Zone
Special	Proposals for moorings will be considered in accordance with the moorings plan, and assessed by the DPI (for safety considerations) and DEC (for environmental, recreational and equity considerations).
Assess	Proposal will be assessed by relevant agencies in accordance with standard procedures.

The purpose, names and sizes of the zones are detailed in Section 6.1.2.

Summary of Generic Administrative Objectives, Strategies and Targets

Management objective/s	To ensure that a fair and equitable zoning scheme is implemented within the Park within 6 months of the release of the management plan.
Strategies	1. Gazette appropriate notices under the CALM Act and FRM Act to implement the zoning scheme (DEC, DoF). **(H - KMS)** 2. Inform visitors about the types of zones, reasons for and restrictions on activities in the Marine Park using signage, information manuals and education programs (DEC, DoF). **(H - KMS)** 3. Develop and implement procedures to ensure coordination between Government agencies and stakeholders to maximise efficiency and effectiveness of surveillance and enforcement activities (DEC, DoF, DPI). **(H - KMS)** 4. Gazette the Marine Park as a mooring control area and seek appointment as the controlling authority within one year of gazettal (DEC, DPI). **(H – KMS)** 5. Develop Codes of Practice for marine based industries and recreational sectors, where necessary (DEC). **(M)**
Target	Implementation of management strategies within agreed timeframes.

7.1.2 Zones in the Rowley Shoals Marine Park

The zoning scheme for the Rowley Shoals Marine Park comprises two sanctuary zones (approximately 21,207 ha or 24% of the Park) and three recreation zones (approximately 16,608 ha or 19% of the Park). All other areas not zoned as sanctuary or recreation zones are zoned for general use (approximately 49,818 ha or 57% of the Park). The zoning of the Rowley Shoals Marine Park is shown in Figures 5 and 6.

Sanctuary Zones

There are two sanctuary zones, comprising a total area of approximately 21,207 ha (24% of the Park), located at Clerke Reef and Imperieuse Reef.

The primary purpose of these zones is to provide areas for the protection of biodiversity that are representative of the major habitats and communities found in the Park, in which the influence of human activities is minimised. These zones also will provide the opportunity to improve the understanding of the Park's key ecological processes and to obtain critical comparative data with areas of the 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 Park.

All extractive activities are excluded from the sanctuary zones. However, passive nature-based tourism, some recreational activities, boating and approved scientific research are permitted. The locations of the sanctuary zones are shown in Figures 5 and 6 and the activities permitted in them are shown in Table 2. The name, location and area of each zone is shown in Table 3.

Recreation Zones

There are three recreation zones, comprising a total area of approximately 16,607 ha (19% of the Park). These are located at Clerke Reef (lagoon and outer reef) and Imperieuse Reef (outer reef).

The recreation zones have the primary purpose of providing opportunities for recreation, including recreational fishing (subject to bag limits and other conservation measures) by both private visitors and patrons of commercial nature-based tourism operations, where these activities are compatible with the maintenance of the values of the Park. Petroleum drilling and production, commercial fishing, pearling and aquaculture are not permitted in the recreation zones.

The locations of the recreation zones are shown in Figures 5 and 6 and the activities permitted in them are shown in Table 2. The name, location and area of each zone is shown in Table 4.

Table 3: Names, locations and areas of sanctuary zones in the Rowley Shoals Marine Park

Name	Location	Area (hectares)
Clerke Sanctuary Zone	Excepting the Clerke Lagoon Recreation Zone, that portion of the Rowley Shoals Marine Park bound by a line:- a) commencing at the intersection of 17º 15' 58" south latitude and 119º 23' 8" east longitude; b) thence south along the meridian to the intersection of 17º 19' 56" south latitude and 119º 23' 8" east longitude; c) thence west along the parallel to the intersection of 17º 19' 56" south latitude and 119º 23' 5" east longitude; d) thence south along the meridian to the intersection of 17º 21' 31" south latitude and 119º 23' 5" east longitude; e) thence generally southerly along the geodesic to the intersection of 17º 21' 14" south latitude and 119º 23' 4" east longitude; f) thence generally southerly along the geodesic to the intersection of 17º 21' 59" south latitude and 119º 22' 59" east longitude; g) thence generally south by south-westerly along the geodesic to the intersection of 17º 22' 47" south latitude and 119º 22' 37" east longitude; h) thence generally south by south-westerly along the geodesic to the intersection of 17º 23' 23" south latitude and 119º 22' 17" east longitude; i) thence generally south-westerly along the geodesic to the intersection of 17º 23' 37" south latitude and 119º 22' 1" east longitude; j) thence generally south-westerly along the geodesic to the intersection of 17º 23' 48" south latitude and 119º 21' 44" east longitude; k) thence west along the parallel to the intersection of 17º 23' 48" south latitude and 119º 18' 48" east longitude; l) thence generally north along the meridian to the intersection of 17º 19' 55" and 119º 18' 48" east longitude; m) thence east along the parallel to the intersection of 17º 19' 55" south latitude and 119º 18' 53" east longitude; n) thence generally northerly along the geodesic to the intersection of 17º 19' 25" south latitude and 119º 18' 50" east longitude; o) thence generally northerly along the geodesic to the intersection of 17º 18' 45" south latitude and 119º 18' 42" east longitude; p) thence generally northerly along the geodesic to the intersection of 17º 18' 14" south latitude and 119º 18' 46" east longitude; q) thence generally north-easterly along the geodesic to the intersection of 17º 17' 34" south latitude and 119º 19' 6" east longitude; r) thence generally north by north-easterly along the geodesic to the intersection of 17º 16' 51" south latitude and 119º 19' 15" east longitude; s) thence generally north by north-easterly along the geodesic to the intersection of 17º 16' 17" south latitude and 119º 19' 32" east longitude; t) thence generally north by north-easterly along the geodesic to the intersection of 17º 15' 51" south latitude and 119º 19' 41" east longitude; u) thence generally north by north-easterly along the geodesic to the intersection of 17º 15' 15" south latitude and 119º 20' east longitude; v) thence generally north-easterly along the geodesic to the intersection of 17º 14' 54" south latitude and 119º 20' 22" east longitude; w) thence generally easterly along the geodesic to the intersection of 17º 14' 48" south latitude and 119º 20' 44" east longitude; x) thence generally easterly along the geodesic to the intersection of 17º 14' 45" south latitude and 119º 21' 2" east longitude; y) thence generally south by south-easterly along the geodesic to the intersection of 17º 14' 47" south latitude and 119º 21' 12" east longitude; z) thence generally south-easterly along the geodesic to the intersection of 17º 14' 58" south latitude and 119º 21' 28" east longitude; aa) thence generally south-easterly along the geodesic to the intersection of 17º 15' 58" south latitude and 119º 22' 15" east longitude; bb) thence east along the parallel to the commencement point.	8,529
Imperieuse Sanctuary Zone	The portion of the Rowley Shoals Marine Park bounded by a line:- a) commencing at the intersection of 17º 31' 55" south latitude and 118º 58' 43" east longitude; b) thence south along the meridian to the intersection of 17º 35' 57" south	12,678

	latitude and 118º 58’ 43” east longitude; c) thence west along the parallel to the intersection of 17º 35’ 57” south latitude and 118º 58’ 42” east longitude; d) thence south along the meridian to the intersection of 17º 36’ 7” south latitude and 118º 58’ 42” east longitude; e) thence generally south by south-westerly along the geodesic to the intersection of 17º 36’ 41” south latitude and 118º 58’ 29” east longitude; f) thence generally south by south-westerly along the geodesic to the intersection of 17º 37’ 44” south latitude and 118º 57’ 54” east longitude; g) thence generally southerly along the geodesic to the intersection of 17º 38’ 16” south latitude and 118º 57’ 43” east longitude; h) thence generally south-westerly along the geodesic to the intersection of 17º 38’ 33” south latitude and 118º 57’ 28” east longitude; i) thence generally south-westerly along the geodesic to the intersection of 17º 38’ 58” south latitude and 118º 57’ 2” east longitude; j) thence generally south-westerly along the geodesic to the intersection of 17º 39’ 32” south latitude and 118º 56’ 7” east longitude; k) thence generally south-west along the geodesic to the intersection of 17º 39’ 40” south latitude and 118º 55’ 51” east longitude; l) thence west along the parallel to the intersection of 17º 39’ 40” south latitude and 118º 55’ 37” east longitude; m) thence generally north-westerly along the geodesic to the intersection of 17º 39’ 30” south latitude and 118º 55’ 19” east longitude; n) thence generally north-westerly along the geodesic to the intersection of 17º 39’ 7” south latitude and 118º 54’ 49” east longitude; o) thence generally north-westerly along the geodesic to the intersection of 17º 38’ 38” south latitude and 118º 54’ 11” east longitude; p) thence generally north-westerly along the geodesic to the intersection of 17º 38’ 16” south latitude and 118º 53’ 59” east longitude; q) thence north-westerly along the geodesic to the intersection of 17º 37’ 56” south latitude and 118º 53’ 47” east longitude; r) thence west along the parallel to the intersection of 17º 37’ 56” south latitude and 118º 53’ 5” east longitude; s) thence north along the meridian to the intersection of 17º 33’ 56” south latitude and 118º 53’ 5” east longitude; t) thence east along the parallel to the intersection of 17º 33’ 56” south latitude and 118º 54’ 9” east longitude; u) thence generally north-easterly along the geodesic to the intersection of 17º 33’ 31” south latitude and 118º 54’ 21” east longitude; v) thence generally north-easterly along the geodesic to the intersection of 17º 33’ 9” south latitude and 118º 54’ 41” east longitude; w) thence generally north by north-easterly along the geodesic to the intersection of 17º 32’ 24” south latitude and 118º 55’ 2” east longitude; x) thence generally north by north-easterly along the geodesic to the intersection of 17º 31’ 42” south latitude and 118º 55’ 13” east longitude; y) thence generally north-easterly along the geodesic to the intersection of 17º 30’ 49” south latitude and 118º 55’ 47” east longitude; z) thence generally north-easterly along the geodesic to the intersection of 17º 29’ 57” south latitude and 118º 56’ 34” east longitude; aa) thence generally east by north-easterly along the geodesic to the intersection of 17º 29’ 49” south latitude and 118º 56’ 55” east longitude; bb) thence generally east along the geodesic to the intersection of 17º 29’ 50” south latitude and 118º 57’ 20” east longitude; cc) thence generally south by south-easterly along the geodesic to the intersection of 17º 29’ 55” south latitude and 118º 57’ 36” east longitude; dd) thence generally south-easterly along the geodesic to the intersection of 17º 30’ 7” south latitude and 118º 57’ 50” east longitude; ee) thence generally south by south-easterly along the geodesic to the intersection of 17º 30’ 39” south latitude and 118º 58’ 2” east longitude; ff) thence generally southerly along the geodesic to the intersection of 17º 31’ 55” south latitude and 118º 58’ 19” east longitude; gg) thence easterly along the parallel to the commencement point.	

Table 4: Names, locations and areas of recreation zones in the Rowley Shoals Marine Park

Name	Location	Area (hectares)
Clerke Lagoon Recreation Zone	The portion of the Rowley Shoals Marine Park bound by a line:- a) commencing at the intersection of 17º 16' 18" south latitude and 119º 21' 16" east longitude; b) thence generally south by south-westerly along the geodesic to the intersection of 17º 18' south latitude and 119º 20' 54" east longitude; c) thence generally south by south-easterly along the geodesic to the intersection of 17º 19' 58" south latitude and 119º 21' 18" east longitude; d) thence south along the meridian to the intersection of 17º 21' 48" south latitude and 119º 21' 18" east longitude; e) thence west along the parallel to the intersection of 17º 21' 48" south latitude and 119º 19' 56" east longitude; f) thence generally north by north-westerly along the geodesic to the intersection of 17º 20' 35" south latitude and 119º 19' 36" east longitude; g) thence generally northerly along the geodesic to the intersection of 17º 19' 9" south latitude and 119º 19' 31" east longitude; h) thence generally north by north-easterly along the geodesic to the intersection of 17º 17' 21" south latitude and 119º 19' 51" east longitude; i) thence extending generally north-easterly along the geodesic to the intersection of 17º 16' 18" south latitude and 119º 20' 26" east longitude; j) thence east along the parallel to the commencement point.	2,523
Clerke Outer Reef Recreation Zone	Excepting the Clerke Sanctuary Zone and the Clerke Lagoon Recreation Zone, that portion of the Rowley Shoals Marine Park bound by a line:- a) commencing at the intersection of 17º 14' 25" south latitude and 119º 23' 35" east longitude; b) thence south along the meridian to the intersection of 17º 24' 25" south latitude and 119º 23' 35" east longitude; c) thence west along the parallel to the intersection of 17º 24' 25" south latitude and 119º 18' 5" east longitude; d) thence north along the meridian to the intersection of 17º 16' 55" south latitude and 119º 18' 5" east longitude; e) thence generally north-east along the geodesic to the intersection of 17º 14' 25" south latitude and 119º 19' 35" east longitude; f) thence east along the parallel to the commencement point.	6,296
Imperieuse Recreation Zone	Excepting the Imperieuse Sanctuary Zone, that portion of the Rowley Shoals Marine Park bound by a line:- a) commencing at the intersection of 17º 29' 25" south latitude and 118º 59' 5"east longitude; b) thence south along the meridian to the intersection of 17º 40' 25"south latitude and 118º 59' 5"east longitude; c) thence west along the parallel to the intersection of 17º 40' 25" south latitude and 118º 52' 35"east longitude; d) thence north along the meridian to the intersection of 17º 34' 25" south latitude and 118º 52' 35" east longitude; e) thence north-east along the geodesic to the intersection of 17º 29' 25" south latitude and 118º 56' 5" east longitude; f) thence east along the parallel to the commencement point.	7,788

1. "Rowley Shoals Marine Park" means the part of Western Australian waters reserved as Class "A" Marine Reserve No.3 under section 13(1) of the Act by the *Rowley Shoals Marine Park (Alteration of Boundaries) Order 2004*, published in the Gazette of 10 December 2004 at page 5986, and named by that order as the Rowley Shoals Marine Park. 2. A reference in this order to a geographic coordinate is a reference to the coordinate in accordance with the Geocentric Datum of Australia 1994 (GDA 94).

General Use Zones

All waters of the Park not zoned as sanctuary or recreation zones will be zoned as general use. There are two general use zones, comprising a total area of 49,818 ha (57% of the Park), extending seaward from the recreation zones at both Clerke and Imperieuse reefs, to the 3 nm State Waters limit. General use zones provide for recreational and commercial activities to occur (in accordance with the permitted activities table), providing that

these are compatible with the overall maintenance of the Park's values. The locations of general use zones in the Park are shown in Figures 5 and 6 and the activities permitted in them are shown in Table 2.

7.2 Education and Interpretation

Developing community support for the Park is critical to the effective implementation of the management plan. The level of public acceptance and support in relation to management controls in the Park will be directly related to the level of understanding of the values of the Park and the reasons for regulation of activities in the Park. The desired outcome of public education is to increase public awareness and understanding of conservation and management issues in the Park and of the marine environment in general. In a local sense, this increased understanding will help to develop a sense of community ownership, which will subsequently lead to better protection of the ecological and social values of the Park. Education programs will need to initially raise awareness of the boundary extension and new restrictions on recreational and commercial activities as a result of the implementation of zoning and other management strategies. Other ongoing education programs will be required to minimise human impacts on the ecological values.

Given the remoteness of the Rowley Shoals Marine Park and the fact that the majority of visitors arrive aboard commercial charter vessels, tour operators play a crucial role in providing information and educational material to customers about the Park. To fulfil the tour operator's role of informing and educating visitors to the Park about the values and management of the Park, it is crucial that personnel be adequately informed. Although this is the respective operator's responsibility, the development of close partnerships between DEC and tour operators will facilitate this and ensure that educational material and information given to the public is accurate and fulfils the objectives of the management plan.

One of the main educational tools that will be used to increase public awareness and understanding of the conservation and management issues in the Rowley Shoals Marine Park will be various publications prepared by DEC, DoF and the Department of Environment and Heritage. Marine nature-based tourism operators will be requested to provide all passengers with a copy of relevant publications and other specified interpretive materials. The use of signs within the Park will be kept to a minimum, as they may compromise seascape-related values.

Specific education strategies are detailed for each specific ecological and social value in Section 9 and a summary of the generic education and interpretation objectives, strategies and targets are outlined below.

Summary of Generic Education and Interpretation Objectives, Strategies and Targets

Management objective/s	To enhance community understanding of and support for the Park through education and interpretation programs and active participation in ongoing management.
Strategies	1. Develop and implement, in collaboration with DoF, other relevant agencies and commercial operators, a marine education program to ensure Park users are aware of and understand the values of the Park, management zones and regulations, and the reasons for these controls (DEC, DoF, Operators). (**H-KMS**) 2. Develop and distribute to the community and visitors a range of education materials about the Marine Park's values, pressures on these values, management strategies and targets, as well as marine conservation more broadly (DEC, DoF). (**H**) 3. Assist the fishing, tourism, charter and other key sectors to access and deliver marine information courses/materials to their staff or patrons (DEC). (**H**)
Target	Implementation of management strategies within agreed timeframes .

7.3 Public Participation

Developing community support for the Park is critical to the effective implementation of Park management. The level of public compliance in relation to management controls in the Park will be related directly to the level of understanding of the values of the Park and the reasons for regulation of activities. An important strategy is the early establishment of a community-based Management Advisory Committee (MAC). The main function of the MAC would be the provision of advice and assistance to DEC and the MPRA. For example, local stakeholders would be able to raise issues with DEC and the MPRA in matters relating to the Park's management, administration, zoning, conflicts of usage and any 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 below.

Summary of Generic Public Participation Objectives, Strategies and Targets

Management objective/s	To facilitate on-going community participation in the management of the Park.
Strategies	1. Establish and maintain a MAC, or other appropriate mechanism to facilitate community input into the ongoing management of the Park (DEC). **(H - KMS)** 2. Encourage charter industry involvement in education and interpretation programs (DEC). **(M)** 3. Encourage charter industry involvement in monitoring programs (DEC). **(M)**
Target	Implementation of management strategies within agreed timeframes.

7.4 Patrol and Enforcement

This plan details a range of strategies relating to the management of particular human activities within the Park. The effectiveness of these strategies will be dependent on the extent to which the visitors of the Park abide by these management measures and controls. The education program is critical to achieving a high level of compliance as in most cases users will abide by 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 visitors continue to undertake illegal activities, take action to stop inappropriate behaviour.

The remoteness of the Rowley Shoals Marine Park introduces logistical and resource-based constraints, which limit the frequency and duration of Department patrols in the Park. Users of the area, particularly charter operators, will play a self-regulatory and visitor regulation role in the surveillance and enforcement program. DEC must therefore initiate collaborative arrangements with other agencies and users (e.g. DEH, charter operators) to enlist their support in surveillance and enforcement within the Park. As noted in section 2.2, an MOU has been developed between the Minister for the Environment and the Minister for Fisheries to establish principles of cooperation and integration between DEC and DoF in the management of the State's marine protected areas. Joint working plans will be developed between DEC and DOF to ensure efficient and effective delivery of a range of programs including patrol and enforcement. Specific actions include joint patrols, cross-authorisation of agency staff, improved liaison and reporting arrangements. CoastWatch (the responsibility of Australian Customs) can provide aerial surveillance of the Park involving an average of up to two flights per week. Through these flights CoastWatch can provide the following types of information for management:

- date;
- position of sighting;
- type of vessel;
- identification of vessel (name/registration number);
- activity of the vessel;
- number of people seen;
- any radio communication with vessel in the vicinity; and
- photographs.

The information collected by CoastWatch would also serve as valuable information for maintaining a database on human usage patterns. In addition to inter-agency patrol and enforcement, consideration should be given to use of remote monitoring techniques, such as internet based surveillance technologies, at the Rowley Shoals. A summary of the generic patrol and enforcement objectives, strategies and targets is outlined below.

Summary of Generic Patrol and Enforcement Objectives, Strategies and Targets

Management objective/s	To maximise public compliance with regulations related to the ongoing management of the Park
Strategies	1. Facilitate cross authorisation of Government enforcement officers as appropriate (DEC, DoF, DPI). **(H-KMS)** 2. Develop and implement procedures to ensure coordination between Government agencies to maximise efficiency and effectiveness of patrol and enforcement activities (DEC, DEH, DoF, DPI). **(H-KMS)** 3. Develop and implement a surveillance and enforcement program, in collaboration with DoF, to ensure an adequate level of compliance with zoning restrictions (DEC, DoF). **(H-KMS)** 4. Assess the suitability and, if appropriate implement remote surveillance technology **(H)** 5. Implement education strategies outlined in this plan to support compliance

	activities (DEC). **(H)** 6. Develop a MOU between DEC and CoastWatch in regard to maintaining regular surveillance flights and reporting for the Rowley Shoals Marine Park (DEC, CoastWatch). **(H)** 7. Monitor illegal fishing activities by crews of foreign fishing vessels (CoastWatch). **(H)** 8. Develop and maintain a database of incidences of illegal fishing and species taken by crews of foreign fishing vessels (DoF, DEC, DEH). **(H)** 9. Investigate opportunities for appointment of honorary enforcement officers (DEC). **(M)**
Target	Implementation of management strategies within agreed timeframes.

7.5 Management Intervention and Visitor Infrastructure

Intervention comprises direct management actions required to achieve management outcomes. These can be proactive (i.e. preventative) or reactive (i.e. restorative) management actions. Intervention includes provision of visitor facilities to reduce site disturbance and environmental impacts (such as moorings and designation of dive sites), rehabilitation of degraded areas and risk management.

Although the majority of the waters of the Rowley Shoals Marine Park are in a relatively undisturbed condition, there may be areas that have suffered some localised disturbance from human use. Anecdotal evidence from users of the Park suggests that there may be localised impacts on targeted finfish and invertebrate stocks and localised anchor damage. Such localised disturbances may negatively affect the ecological and social values of the area. Management response in this case would be to identify areas which have been disturbed 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 (for example recovery of finfish stocks if no further fishing pressure is applied), 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 usage of the Park will increase in the future. An increase in visitor number may require additional facilities (e.g. moorings) to be provided, so as to protect the ecological values from human disturbance and to enhance the visitor experience. The level of usage of the Park and the areas which come under the highest visitor pressure should be monitored and consideration given to provision of visitor facilities where appropriate.

The remote nature of the Park, combined with shallow submerged reefs, high tidal range, strong ocean currents, high winds and seasonal cyclones, pose a high risk to visitors who may be inexperienced in or unprepared for such conditions. As visitation to the Marine Park will increase during the life of the management plan, an ongoing visitor risk management program should be undertaken to identify potential hazards and measures implemented to minimise these. Risks to visitors are managed under the framework of the DEC's Policy Statement No. 53 'Visitor Risk Management Policy'. A summary of the generic management intervention objectives, strategies and targets is outlined below.

Summary of Generic Management Intervention and Visitor Infrastructure Objectives, Strategies and Targets

Management objective/s	1. To remediate existing human impacts on the ecological and social values of the Park. 2. To provide visitor facilities that enhance visitor enjoyment of and minimise environmental impact to, the Park. 3. To take reasonable steps to minimise visitor risk where possible in the Park.
Strategies	1. Undertake triennial assessment to identify areas of human impact in the Park, assess rehabilitation options and, where appropriate, implement these measures (DEC). **(H)** 2. Undertake a triennial risk assessment of human use patterns and trends in the Park, and where changes in use have potential to cause environmental impacts, assess preventative options and where appropriate, implement these measures (DEC). **(H)** 3. Undertake a triennial assessment of visitor risk in the Park and, where necessary, implement appropriate measures to minimise visitor risk (DEC). **(H)**
Target	Implementation of management strategies within agreed timeframes.

7.6 Research

The Rowley Shoals Marine Park is in a relatively undisturbed condition. Although human usage is expected to remain low in the Park, there is potential for slow detrimental changes, which are difficult to recognise and quantify over time. Individually, these changes may be minor, however, their cumulative impact over time may be significant and difficult to reverse.

Developing an understanding of the natural and social environment of the Marine Park is critical to effective management. Research provides background information on the ecological and social environment and an understanding of what is 'natural' as a benchmark for monitoring programs. Much of this information does not exist at this stage for the Marine Park, so research programs need to focus on establishing the natural state of key ecological values and identifying key processes supporting these values. Research programs should be designed to fill key gaps in current knowledge relevant to management. Licences under the CALM regulations may be required to conduct research within the Park. Specific research strategies are detailed for each ecological and social value (section 9) and scientific research as a value of the Marine Park is provided in section 9.2.1. A summary of the generic research objectives, strategies and targets is provided 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 Park. 2. To promote ecological and social research in the Park that improves knowledge of the Park and the technical basis for management decisions.
Strategies	1. Develop and progressively implement a coordinated and prioritised research program focused on key values and processes of the Park (DEC, DoF). **(H - KMS)** 2. Develop and maintain detailed habitat and wildlife distribution maps for the Park (DEC). **(H-KMS)** 3. Develop and maintain a database of human usage in the Park (DEC, DoF). **(H - KMS)** 4. Identify, prioritise and communicate high priority ecological and social research projects relevant to the management of the Park to appropriate research organisations, via a strategic research plan with the aim of maximising priority research outcomes for the Park (DEC). **(H - KMS)** 5. Develop and maintain a database of historical and current research in the Park (DEC). **(H)** 6. Facilitate ecological and social research in the Park conducted by research, academic and educational institutions, by providing financial and logistical assistance (where possible) (DEC, DoF). **(H)**
Target	Implementation of management strategies within agreed timeframes.

7.7 Monitoring

Monitoring the condition of the Park's values is critical to the effective management of any marine park. A monitoring program is a key strategy to allow the early detection of detrimental changes and thereby provide the trigger for management action to mitigate potential impacts before undesirable changes in the Marine Park's values occur. The detection of human-induced changes requires an understanding of what is 'natural' as a benchmark and this information is provided through strategic research programs. Where changes have occurred and remediation measures implemented, a monitoring program will enable the measurement of the rate of recovery of an affected area. Licences under the CALM regulations may be required to conduct monitoring within the Park. Specific monitoring strategies are described for each ecological and social value (section 9). A summary of the generic monitoring objectives, strategies and targets is provided below.

Summary of Generic Monitoring Objectives, Strategies and Targets

Management objective/s	1. To determine the status and trends in the condition of, and threats to, the ecological values and the effectiveness of management responses in the reserves. 2. To provide the necessary information for the MPRA and DEC audit function. 3. To promote ecological and social monitoring in the Park that can detect changes to the ecological values and aid management decisions.
Strategies	1. Develop and progressively implement an integrated and prioritised ecological and social monitoring program for the Park, with a particular emphasis on MPRA and DEC audit requirements (DEC, DoF, Charter Sector). **(H - KMS)** 2. Ensure that proponents of development proposals or activities with the potential to impact on the Park's values conduct appropriate compliance monitoring programs (DEC). **(H)** 3. Encourage Commonwealth marine research agencies to continue with long-term reference sites to better understand natural variability and key ecological processes (e.g. recruitment, herbivory etc) in the reserves (DEC). **(H)**
Target	Implementation of management strategies within agreed timeframes.

8 DEVELOPMENT PROPOSALS WITHIN THE MARINE PARK

All development proposals within the Marine Park are subject to the environmental impact assessment requirements of the EP Act and consideration by DEC in the context of the management plan. During the life of the management plan there may be proposals for the installation or construction of marine infrastructure associated with commercial and recreational fishing or tourism operations. These could be developments such as the installation of moorings, Fish Aggregating Devices or navigation markers. 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 and determine whether it is consistent with the targets of the Marine Park.

The Mooring Policy (Policy Statement No. 59) (CALM and MPRA 2002) 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. Under the Mooring Policy, DEC will seek to designate all marine conservation reserves as mooring control areas under the *Shipping and Pilotage Act 1967* or other legislative mechanism. DEC will further seek appointment as the 'controlling authority' in accordance with the *Shipping and Pilotage (Mooring Control Areas) Regulations 1983*, to facilitate the management of mooring control areas in marine conservation reserves. DEC will develop a mooring plan in conjunction with DPI and with appropriate consultation.

Unmanaged anchoring in the Park has the potential to impact on fragile coral reef habitats. This is not only a threat to the ecological values but also may impact on the attractiveness of key dive sites and degree of naturalness at these sites. The Department, in conjunction with tour operators and other stakeholders, has considered options for the management of vessel mooring and anchoring to avoid these impacts. Whilst broad principles have been determined, there is a need to develop more detailed mooring and anchoring arrangements in consultation with major users. The Department will, within twelve months of gazettal of this plan, develop a detailed mooring plan for the entire Park that will consider the appropriateness of mooring activities and identify mooring and anchoring areas. In addition, within eighteen months of gazettal of the management plan, site plans will be prepared for the mooring and anchoring areas identified in the mooring strategy to indicate the appropriate number, type and location of moorings, as well as appropriate anchoring practices.

Moorings will be installed at key overnight `anchorages' where continued anchoring has the potential to cause unacceptable environmental impacts. The major mooring area will be located in the northern section of Clerke Lagoon, where installation of permanent moorings will be undertaken. The mooring strategy will also consider the need for additional moorings in areas of high use outside the reef at both Clerke and Imperieuse reefs, where installation of moorings is a practical measure. It is not anticipated that moorings will be required in Imperieuse Lagoon. While the use of moorings will minimise the need to anchor in the Park, there may be a need in some circumstances for vessels to anchor and suitable anchoring areas will be identified to provide for this need. Anchoring will not be permitted elsewhere in the Park. Anchoring areas will be located so as to minimise environmental damage from anchoring (i.e. in sand or rubble wherever possible). Education strategies will encourage appropriate low impact, sustainable anchoring practices in these anchorage areas.

Strategies will also be developed to allow continued and sustainable access to key dive site locations. At some sites moorings may be appropriate, whereas anchoring may be acceptable at other locations where anchoring can occur without significant impacts on coral. Access to dive sites via the main vessel `holding off' without anchoring or mooring may also be an option where moorings are impractical and anchoring inappropriate. It is anticipated that most users can be accommodated by a small number of moorings and limited anchoring areas.

A summary of the generic objectives, strategies and targets for development proposals are outlined below.

Summary of Development Proposals Objectives, Strategies and Targets

Management objective/s	To ensure that the ecological and social impacts of infrastructure development proposals on the ecological and social values, are evaluated through an appropriate level of environmental assessment.
Strategies	1. Ensure appropriate advice is provided to relevant authorities with regard to proposed marine infrastructure and the defined ecological targets for the Park (DEC, MPRA). **(H)** 2. In conjunction with stakeholders, prepare a detailed mooring strategy for the Park and detailed site plans for the identified mooring and anchoring areas addressing the number and location of moorings, and requirements for anchoring controls (DEC). **(H)** 3. Install permanent moorings where considered necessary in accordance with the mooring and anchoring site plans (DEC). **(H)** 4. In conjunction with stakeholders, prepare a Code of Practice for mooring and anchoring in the Park and ensure Park users are aware of appropriate mooring anchoring practices and restrictions. (DEC). **(H)**
Targets	1. Finalise the mooring strategy and site plans for the Park within 6 months of gazettal of the management plan. 2. Install permanent moorings in accordance with the site plans within 18 months of gazettal of the management plan

9 MANAGEMENT OF ECOLOGICAL AND SOCIAL VALUES

9.1 Ecological Values

Ecological values are the intrinsic 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 function. Ecological values also have social significance in that many social values are functionally dependent on the maintenance of ecological values. Nine core ecological values have been identified for the Park that reflect (1) physical properties (geology and geomorphology, water quality), (2) key habitats (intertidal coral reef communities, and subtidal coral reef communities) and the (3) key groups of organisms (finfish, turtles, seabirds, and cetaceans). In addition to these specific ecological values, there are important ecosystem characteristics and processes that contribute to the area's high biodiversity. These characteristics have been considered in developing the management arrangements of the Marine Park as outlined in this plan.

In addition, the ecological values form the basis on which visitors to the area enjoy the experience of the Rowley Shoals. Conservation of the ecological values ensures not only protection of the Rowley Shoals environment, but also ensures protection of the recreational and commercial uses that rely on these values.

9.1.1 Geology and Geomorphology

Ecological value	**Geology and Geomorphology**: *The best geological examples of shelf-edge atolls on the Australian continental shelf, with the three reefs representing three distinct stages in formation.*

Background	The geology and geomorphology of the Rowley Shoals Marine Park are described in Berry & Marsh (1986). The Shoals are part of a series of five atolls that rise steeply from the outer edge of the Scott Reef/Rowley Shoals Platform, which is a plateau adjoining the outer edge of the continental shelf. The atolls are Scott and Seringapatam reefs in the north and Mermaid, Clerke and Imperieuse reefs (the Rowley Shoals) in the south. Although the three Shoals are shelf atolls, their situation on the edge of the wide Australian continental shelf makes them similar to oceanic atolls. They are considered to be the most perfect examples of shelf atolls in Australian waters (Fairbridge, 1950). The three atolls are very similar to one another in size, shape and orientation. The sizes of Mermaid, Clerke and Imperieuse reefs are, 14.5 km x 7.6 km, 15.8 km x 7.6 km and 17.8 km x 9.5 km, respectively. Each is pear-shaped, with the narrow end towards the north. The Shoals are separated from one another by deep water, and rise from considerable depths. On its landward side, Mermaid Reef rises from about 440 m, Clerke from 390 m and Imperieuse from 230 m. There is thus a progressive increase in depth, from south-west to north-east, suggesting a tilting of the platform from which they arise. This may account for the fact that the three Shoals appear to represent different stages of geological development. On their western sides, the Shoals drop off extremely steeply. A further similarity between the three Shoals is that the enclosing reef of each is broken (by one or more narrow passages) in the same place, about two thirds of the way up the eastern side. The reef of each Shoal is exposed at low tide and encloses areas of lagoon and sand. Mermaid Reef is the simplest, with a single lagoon (up to 20 m deep) while the lagoons of the other two atolls are divided into three main basins. Oceanic processes and a high tidal range have combined to create unique reef structures. Only Clerke and Imperieuse reefs contain islands located at their northern ends. Bedwell Island (in Clerke Reef) is a supratidal, unvegetated, elongated cay about 1.3 km long, composed of coarse coral sand. On its eastern and western sides it has areas of beach rock that appear to be protected from erosion by a coating of short, moss-like green algal turf (Berry & Marsh, 1986). On the east side, this beach rock forms an intertidal promontory of tumbled boulders. At low tide two further sand-banks become exposed just to the north of the Island and there is also an extensive area of sand-bank that is exposed at the southern end of the shoal. Cunningham Island (in Imperieuse Reef) is an unvegetated sand cay.

	Given the robust nature of much of the subtidal geomorphology and the nature of activities in the area in 2007, there are no identified major pressures on the geology or geomorphology. Management of this value includes the assessment of any proposals for development within the Park that have the potential to disturb the geomorphology and to educate users in regard to the importance of maintaining the Park's geomorphology in a natural state.
Current Status	The geomorphology of the Rowley Shoals Marine Park is generally in an undisturbed condition.
Existing and potential uses and/or pressures	• Physical disturbance from vessel impacts on shallow reefs. • Physical disturbance from the installation of markers, removal of hazards for boats and widening of boat channels.
Current major pressure/s	None.
Management objective/s	To ensure the structural complexity of the Park's geomorphology is not significantly affected by human activities.
Strategies	1. See ZONING strategies (Section 7.1.1). (**H-KMS**) 2. Provide advice to the EPA in relation to ensuring development activities do not have significant impacts on the geomorphology of the Park (DEC, MPRA). **(M)** 3. Identify areas requiring rehabilitation and where necessary, undertake appropriate rehabilitation measures (DEC). (**M**) 4. Monitor appropriate indicators of geomorphology (DEC). (**M**) 5. Educate Park users about the ecological importance of maintaining the Park's geomorphology in a natural state (DEC). **(L)**

Performance measure/s	Area of physical disturbance.	**Desired trend/s**	Constant or negative.
Short-term target/s	Not Applicable.		
Long-term target/s	No change of seabed structural complexity as a result of human activity in the Park.		

9.1.2 Water quality (KPI)

Ecological value	**Water quality**: *High water quality due to the relatively low seasonal human usage and the surrounding pristine oceanic waters.*

Background	The Rowley Shoals Marine Park lies in the path of a tropical water current that originates in the Pacific and flows through the Indonesian Archipelago and down the Western Australian coast. The existence of the Rowley Shoals is in part due to these warm current waters, which are enriched with larvae carried from the north (Wilson, 1990). The prevailing oceanic swell is from the south-west, generally resulting in wider reef formation on the western margins of the reefs (Berry & Marsh, 1986). The Rowley Shoals experience twice-daily tides with a spring range of about 4.5 meters. The tidal range within each enclosed lagoon is significantly less because as the tide falls, the lagoon water is impounded by the rim at about half ebb tide. The narrow passage restricts the flow from the lagoon and entrapped water rushes through, continuing to flow out until about half flood tide. Thus the water in the lagoon is held substantially above the outside water level at low tide. At high tide the reefs disappear, with only the sandy islands visible (Berry & Marsh, 1986). The broad oceanographic processes and the nature of water circulation in the lagoons influence the transport, dispersal and mixing of sediment, biota and pollutants. The low rate of exchange between the waters of the lagoons and the surrounding ocean controls the supply of nutrients and the removal of waste, thus influencing the level of biological activity that the lagoons can support (Berry & Marsh, 1986). Any additional nutrients or waste released into the lagoons could be slow to dissipate, affecting the marine environment. Nutrient enrichment can have deleterious effects on flora and fauna. For example, excessive algal growth resulting from an increase in nutrients can impede the penetration of light and retard the growth of coral. Accidental and deliberate spillage of pollutants (e.g. sewage) into the waters of the Park has the potential to negatively affect the values of the Park. The mooring and anchorage site at Clerke Reef, which is situated in a poorly flushed lagoon, has the greatest potential for pollution impacts given the high use of this site. Litter is another potential source of pollution and rubbish should be taken away from the area. The burial of rubbish on the islands is inappropriate and is prohibited under the CALM Regulations. Sewage discharge from vessels has the potential to increase nutrient levels and cause health problems for direct contact recreational activities due to elevated bacterial levels. The impact of sewage discharge from vessels will vary considerably from location to location 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). The Government's *Strategy for Management of Sewage Discharge from Vessels into the Marine Environment* provides for a three zone approach. In respect to the Rowley Shoals Marine Park discharge of sewage will not be permitted in the lagoon and within 1 nm of the reef edge (i.e. zone 1). Vessel sewage may be discharged in water more than 1 nm from the reef edge (i.e. zone 3). Charter boats carry the majority of visitors to the Rowley Shoals Marine Park and to minimise potential impacts on water quality, operators must adhere to license conditions consistent with the applicable discharge restrictions. Management of water quality includes gaining a better understanding of the processes that contribute to high water quality and development of predictive models and response strategies in the event of oil spill or shipping accident. In addition, users will be educated about the correct procedure for sullage disposal from vessels in accordance with sewage discharge restrictions.
Current Status	The water quality of the Rowley Shoals Marine Park is generally in an undisturbed condition.
Existing and potential uses and/or pressures	• Toxicant inputs from the accidental spillages of fuel and oils, antifouling paints used on boat hulls and oil spills from passing ships. • Nutrient and pathogen inputs from sewage discharged from vessels. • Litter from commercial and recreational boating/fishing activities.

Current major pressure/s	Bacterial contamination from sewage discharge.
Management objective/s	To ensure that the water quality of the Marine Park is not significantly impacted by sewage discharge from boats.
Strategies	1. Establish and undertake baseline water quality monitoring programs in designated mooring and anchoring areas in relation to nutrient enrichment, bacterial contamination and litter (DEC). **(H)** 2. Where required. gazette appropriate notices to implement restrictions on sewage discharge in the Park (DEC). **(H)** 3. Inform users of the Park about regulations relating to sewage disposal from vessels and incorporate these regulations as license conditions for charter operators (DEC, DPI). **(H)** 4. Map the ecological and social values of the Park that are particularly sensitive to oil spills and ensure the values of the Park are fed into predictive models and response plans for oil spills by providing this information to the State Committee for Combating Marine Oil Pollution (DEC, DPI). **(M)** 5. Develop an appropriate understanding of the circulation and mixing of the Park's waters (within and outside the lagoons) (DEC). **(M)** 6. Establish and maintain a pollutant inputs database for the Park (DEC). **(M)**

Performance measure/s	1. Nutrients: Chlorophyll a and inorganic nitrogen (N) concentrations in seawater. 2. Pathogens: Faecal coliform concentrations. 3. Litter: Weight (kg) of litter at selected sites.	**Desired trend/s**	1. Constant or negative. 2. Negative. 3. Negative.
Short-term target/s (KPI)	Not Applicable.		
Long-term target/s (KPI)	No change in water quality of all Park waters from background$^{\Omega}$ levels as a result of human activity in the Park.		

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

9.1.3 Intertidal coral reef communities (KPI)

Ecological value	**Intertidal coral reef communities:** *Extensive relatively undisturbed intertidal coral reef communities with a high diversity of marine fauna.*

Background	Intertidal coral reef communities are a major feature of the Rowley Shoals Marine Park (Figures 3 and 4). These areas contribute significantly to the variety of habitats and therefore the biological diversity of the Park. The Rowley Shoals, Scott Reef and Seringapatam Reefs have coral fauna which are very different to the coral fauna observed in waters adjacent to the Australian mainland. Coral communities at the Rowley Shoals Marine Park have developed in response to the clear deep offshore water, strong wave action on exposed outer slopes and significant tidal range. The clear water allows coral communities to exist over a great range of depth and wave action on outer slopes, and the large tidal range causes strong differentiation in community structure and coral growth form (Veron, 1986; Veron, 1993). A total of 233 species of hermatypic (hard) corals from 56 genera have been recorded at the Rowley Shoals, Scott Reef and Seringapatam Reef. Coral diversity is lower in the more southerly Shoals with only 184 species from 52 genera being recorded (Veron, 1986; Veron, 1993). Visitors to the Rowley Shoals are attracted to the intertidal reefs due to the intrinsic biological attributes and the easy access to these areas. As such, the major pressure relates to reef-walking activities and infrequent servicing of island infrastructure by amphibious vehicles, which can potentially impact the fauna on these vulnerable intertidal reef habitats through physical disturbance. Commercial fishing (including coral collecting) is prohibited in the Shoals under Notice No. 239 of the FRM Act and recreational collection of live coral and molluscs is prohibited under Notice No. 238 of the same Act. Management of intertidal coral reef communities will focus on educating users about their potential impacts on these sensitive areas and undertaking research to better characterise the diversity of these communities.
Current status	The intertidal coral reef communities in the Rowley Shoals Marine Park are generally in an undisturbed condition with limited disturbance evident from human activity.
Existing and potential uses and/or pressures	• Physical disturbance from reef-walking, amphibious vehicles, scientific research, boat impacts and propeller damage. • Illegal collecting activities.
Current major pressure/s	Physical disturbance from reef-walking.
Management objective/s	To ensure species diversity and abundance of marine flora and fauna on the intertidal coral reef communities of the Park are not significantly impacted by reef-walking and collecting activities.
Strategies	1. See the zoning strategies detailed in Section 7.1. **(H-KMS)** 2. Educate Park users about the potential detrimental effects of reef walking and boating on the intertidal coral reef communities of the Park and discourage users from undertaking these activities (DEC). **(H-KMS)** 3. Initiate research programs to characterise the floral and faunal diversity, and natural variability, of selected intertidal coral reef communities within the Park (DEC). **(H-KMS)** 4. Develop agreements with the Australian Marine Safety Authority on the conditions for access to island infrastructure to minimise impacts to intertidal reefs adjacent to the island (DEC). **(H)** 5. Develop and implement an appropriate monitoring program in relation to potential impacts of human activities on the most highly used intertidal coral reef communities within the Park (DEC). **(M)**

Performance measure/s	To be developed.	**Desired trend/s**	To be developed.

Short-term target/s (KPI)	Not Applicable.
Long-term target/s (KPI)	1. No loss of intertidal coral reef community diversity as a result of human activity in the Park. 2. No loss of living intertidal coral reef community abundance[Ø] as a result of human activity in the Park.

[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, turtles and cetaceans where minor or transient losses would be unacceptable (but does not apply to losses due to accidents).

9.1.4 Subtidal coral reef communities (KPI)

Ecological value	**Subtidal coral reef communities:** *Coral communities dominated by a rich diversity of hard corals.*

Background	The Rowley Shoals, Scott Reef and Seringapatam Reefs have coral fauna which are very different from the coral fauna observed in waters adjacent to the Australian mainland. Coral communities at the Rowley Shoals Marine Park have developed in response to the clear deep offshore water, strong wave action on exposed outer slopes and significant tidal range. The clear water allows coral communities to exist over a great range of depth and wave action on outer slopes, and the large tidal range causes strong differentiation in community structure and coral growth form (Veron, 1986; Veron, 1993). A total of 233 species of hermatypic (hard) corals from 56 genera have been recorded at the Rowley Shoals, Scott Reef and Seringapatam Reef. Coral diversity is lower in the more southerly Shoals with only 184 species from 52 genera being recorded (Veron, 1986; Veron, 1993). Sparse seagrass is found within subtidal coral reef communities and although not a major habitat type at the Rowley Shoals, seagrass is an important component of these habitats. The seagrass *Thalassia hemprichii* has been recorded at Mermaid, Clerke and Scott reefs, and the seagrasses *Thalassodendron ciliatum* and *Halophila ovalis* have been recorded at Scott and Mermaid reefs (Berry, 1986; Walker & Prince, 1987). To maintain biological, recreational and commercial values it is essential that disturbance of the coral communities is minimised. Research indicates that damage to corals and seagrasses can result in substantial ecological changes. All commercial and recreational collection of live corals has been prohibited since 1987 under Notice No. 238 of the FRM Act. Inappropriately designed and located moorings and anchoring have significant potential to impact benthic habitats. At the Rowley Shoals Marine Park suitable sites for mooring and anchoring (i.e. sheltered sites) are limited. The Clerke Reef anchorage area will be the primary anchoring and mooring area in the Park. DEC will encourage appropriate anchoring practices such as anchoring in sand or shelf areas where there is not extensive live coral cover, to minimise damage from anchoring. Permanent moorings will also be permitted in appropriate sites and will provide for commercial vessels with minimal environmental impact. There may be restrictions on anchoring in specific areas of the Park, where necessary, to protect coral reef communities. In addition, the provision of appropriately designed and sited moorings will reduce the amount of anchoring, so that localised damage to corals in the main anchorage areas will be reduced. DEC will liaise with users of the Park and monitor major visitor sites during the life of the management plan to assess the need for gazettal of anchoring controls at specific sites. Management strategies for this value focus on control of moorings in the area, research and education of users about their possible impacts on these communities. The DEC Mooring Policy provides a framework for management of moorings within the Park. DEC will establish standards for the type of moorings to be used and determine acceptable locations for moorings to minimise environmental impacts of the moorings.
Current status	The subtidal coral reef communities in the Rowley Shoals Marine Park are generally in an undisturbed condition with limited disturbance evident from human activity associated with anchoring.
Existing and potential uses and/or pressures	• Mooring and anchoring. • Nutrient inputs (sewage discharge). • Vessel groundings and propeller damage. • Discharge of toxic substances. • Diver/Snorkeller damage.
Current major pressure/s	Mooring and anchoring.
Management objective/s	To reduce damage to coral communities caused by mooring and anchoring activities.

Strategies	1. See the zoning strategies detailed in Section 7.1. **(H-KMS)** 2. Ensure all existing moorings meet environmental guidelines within 3 years of gazettal of the plan, and that all new moorings meet the environmental guidelines (DEC, DPI). **(H-KMS)** 3. Map coral communities of the Rowley Shoals Marine Park most at risk from mooring and anchoring activities and monitor coral communities in these areas (DEC). **(H-KMS)** 4. Develop and implement a monitoring program to monitor coral communities in areas at most risk of mooring, anchoring and diver damage (DEC). **(H-KMS)** 5. Develop and implement a cost-effective monitoring protocol to estimate annual coral recruitment within the Park and investigate the implications for coral reef resilience and connectivity (DEC). **(H-KMS)** 6. Educate users on the important ecological role of coral communities and the potential impacts of human activities, particularly boat moorings, anchoring and nutrient pollution, on these communities (DEC). **(H)** 7. Implement the mooring plan (see Section 8) including the installation of public moorings in the Clerke Lagoon designated mooring area and designation of an overflow anchorage area (DEC, Charter Sector). **(H)** 8. Gazette anchoring restrictions as necessary to protect significant coral communities (DEC, DPI). **(H)** 9. Minimise anchor damage by encouraging appropriate anchoring practice by boat visitors (DEC). **(H)**

Performance measure/s	1. Diversity 2. Biomass	**Desired Trend/s**	1. Constant or positive. 2. Constant or positive
Short-term target/s (KPI)	Not Applicable.		
Long-term target/s (KPI)	1. No loss of subtidal coral reef community diversity as a result of human activity in the Park. 2. No loss of living subtidal coral community abundance[Ø] as a result of human activity in the Park.		

[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, turtles and cetaceans where minor or transient losses would be unacceptable (but does not apply to losses due to accidents).

9.1.5 Invertebrates (excluding corals) (KPI)

Ecological value	**Invertebrates (excluding corals):** *A diverse marine invertebrate community that includes a number of endemic species.*

Background	Invertebrate species (excluding corals) at the Rowley Shoals include sponges, cnidarians (jellyfish, anemones), worms, bryozoans (sea mosses), crustaceans (crabs, lobsters, etc.), molluscs (cuttlefish, baler shells, giant clams, etc.), echinoderms (starfish, sea urchins) and sea squirts. Cnidarians have been collected at the Rowley Shoals, Scott Reef, Seringapatam Reef and Ashmore Reef/Cartier Island. The majority of these specimens, which are held at the Western Australian Museum, have not yet been identified. However, 13 species have been identified from the Rowley Shoals, 13 from the Scott and Seringapatam reefs and 35 from Ashmore Reef/Cartier Island. Of the crustaceans, a total of 40 brachyurans (largely xanthid crabs), 14 paguroids (hermit crabs), one scyllarid and one palinurid (spiny lobster) were recorded from Scott and Seringapatam reefs in 1984 (Berry & Morgan, 1986). Berry & Morgan (1986) noted an apparent and unexpected absence from the Rowley Shoals of the spiny lobster (*Panulirus versicolor*), which occurs at Scott Reef. One hundred and sixty-one species of mollusc have been recorded from the Rowley Shoals; 146 of these were from Clerke Reef and 104 from Mermaid Reef. Forty of the species recorded are new records for Western Australia, and many that are common in the Park have only been recorded in isolated populations along the mainland coast. New records include the vase shells *Vasum turbinellus*, *Lambis truncata* and *L. chiragra* (Wells & Slack-Smith, 1986). Rowley Shoals may have a unique mollusc fauna, with species found there not being found at other sampling locations of similar latitude. Surveys suggest that the richest area for molluscs in the Rowley Shoals Marine Park may be the lower intertidal zone on the east side of Bedwell Island. A diverse molluscan fauna is also present on the reef flats. The dominant groups on the reef flats, in terms of numbers of species, are cones, cowries, thaids, mitres and ceriths. Giant clams (*Hippopus hippopus Tridacna squamosa*, *Tridacna crocea* and *Tridacna maxima)* are abundant and common on the reef-flats (Wells & Slack-Smith, 1986). The area is also the southern most record for the giant clam, *Tridacna gigas* (Fromont, WAM, pers.comm). Ninety species of echinoderm have been recorded from the Rowley Shoals; 81 of these were from Clerke Reef and 43 from Mermaid Reef. Thirty-six of the species recorded are new records for Western Australia. These consist almost entirely of widespread Indo-West Pacific species, together with several that have a more restricted distribution, to the north of Australia (Marsh, 1986). Further intensive collecting is likely to reveal additional species at the Rowley Shoals. Commercial fishing (including specimen shell collection) is prohibited in the Rowley Shoals under Notice No. 239 of the FRM Act. However, it should be noted that depletion of trochus and bêche-de-mer populations in reefs north of the Rowley Shoals makes the populations within the Park of significant regional importance. Recreational collection of live coral and molluscs is also prohibited under Notice No. 238 of the FRM Act. Recreational collection of other invertebrate species is believed to occur and it is therefore recommended that these activities be reviewed and protection for other invertebrates be implemented as appropriate. Management of this value will focus on increased legislative protection for those species identified as being under threat from collecting activities and monitoring programs for these communities.
Current status	The invertebrate communities in the Rowley Shoals Marine Park are generally in an undisturbed condition, except for limited disturbance due to anchoring.

Existing and potential uses and/or pressures	• Recreational specimen collecting. • Illegal fishing by crews from foreign fishing vessels.
Current major pressure/s	1. Recreational specimen collecting. 2. Illegal fishing by crews from foreign fishing vessels.
Management objective/s	To ensure that invertebrate diversity and abundance are not significantly impacted by recreational fishing and from illegal fishing activities in the Park.
Strategies	1. See the zoning strategies detailed in Section 7.1. **(H-KMS)** 2. Identify invertebrate species that can be sustainably taken by recreational fishers in appropriate zones in the Park and, in liaison with DoF, provide the necessary legislation to provide protection for all other invertebrate species (DEC, DoF). **(H-KMS)** 3. Develop and implement monitoring programs for invertebrate species likely to be targeted by illegal commercial and recreational specimen collectors (DEC, DoF). **(M)**

Performance measure/s	1. Diversity. 2. Abundance.	**Desired trend/s**	1. Constant. 2. Constant or positive.
Short-term target/s (KPI)	Not Applicable.		
Long-term target/s (KPI)	1. No loss of invertebrate species diversity as a result of human activity in the Park. 2. No loss of protected invertebrate species abundance[Ø] as a result of human activity in the Park. 3. Abundance and size composition of invertebrate species in sanctuary zones to be at natural* levels. 4. Management targets for abundance of targeted invertebrate species in all other areas to be determined in consultation with DoF 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, turtles and cetaceans where minor or transient losses would be unacceptable (but does not apply to losses due to accidents).

* "Natural" in this case refers to the abundance that would occur in areas that are undisturbed and/or unexploited by human activities.

9.1.6 Finfish (KPI)

Ecological value	**Finfish:** *A rich finfish fauna that includes many species unique to Australia.*

Background	The Rowley Shoals has a rich diversity of fish fauna, consisting of many species common to the Indo-Pacific region and the tropical and subtropical waters of Western Australia. Although many of the oceanic dwellers are also found on the Great Barrier Reef (Allen & Russell, 1986), almost half of the species recorded at the Shoals have not been recorded from other Western Australian coral reef environments. The Rowley Shoals provide a shallow water environment outside the 200 metre depth contour of Australia's northern continental shelf that lies in the path of the southerly flowing Timor Current, creating a unique set of habitat conditions in a limited area. The current provides a recruitment pathway for larval fish fauna. Of the 528 fish species (from 232 genera and 75 families) that were recorded from the Rowley Shoals during several Western Australian Museum surveys, 220 have not been previously recorded in Western Australia (Allen & Russell, 1986; Allen, 1993; Hutchins *et al*., 1995). The only described species thus far restricted to the Rowley Shoals/Scott Reef region is Connie's wrasse (*Conniella apterygia*), the only member of its genus. The 10 most diverse genera recorded at the Shoals are listed below (family and number of species indicated in brackets): *Chaetodon* (Chaetodontidae; 16) *Apogon* (Apogonidae; 13) *Chromis* (Pomacentridae; 11) *Scarus* (Scaridae; 10) *Gymnothorax* (Muraenidae; 9) *Pomacentrus* (Pomacentridae; 9) *Acanthurus* (Acanthuridae; 9) *Trimma* (Gobiidae; 8) *Sargocentron* (Holocentridae; 8) *Epinephelus* (Serranidae; 8) (Allen & Russell 1986). The assemblage of fish and invertebrates is strongly influenced by the location of the Rowley Shoals, the Timor Current, and the availability of shallow water habitats. Consequently, the fish community of the Rowley Shoals, and in particular the resident demersal community, is an important ecological value of the Park. It is likely that recruitment to the Shoals for many demersal species is determined by the influence of the Timor Current and other environmental factors, rather than by the status of breeding stocks resident in the area, and is highly variable from year to year. Population levels for resident species are also likely to be significantly constrained by the area of available habitat and seasonal abundance of food, and may be highly variable from year to year due to environmental causes and recruitment patterns. Pelagic fish common to the Indo-Pacific region utilise the Rowley Shoals area opportunistically, but are not dependent on this habitat for key life-cycle stages. The Rowley Shoals have had a relatively low level of fishing effort due to their isolation from major population centres. There has been a prohibition on commercial fishing and a ban on the take of key demersal fish by recreational fishers since 1987. It is proposed to extend this protection to all species of the family Serranidae, (including cods, grouper and coral trout), any fish of the family Labridae (wrasses and tuskfish, specifically the Humphead Maori Wrasse, *Cheilinus undulatus*), and the Humphead Parrotfish within the reef lagoon and within 3 nm of the reef perimeter. The population status (e.g. age and size classes) of fish communities in the lagoon area is largely unknown. Monitoring of populations of exploited fish species will be undertaken in the Shoals to assist in determining impacts of human activities on finfishes. The presence of large

	specimens of the cod, groper and wrasse families and their visibility in the shallow lagoon waters is a major attraction for divers and snorkellers. Fish feeding does occur in the lagoons as part of commercial tourism operations. Fish feeding is restricted via conditions on tourism licenses to minimise impacts of this activity. Monitoring will be undertaken to ensure that impacts of fish feeding are not significant. The major potential pressures on the diversity and abundance of fish communities within the Park, and in particular the lagoon areas, are environmental factors, an escalation in illegal foreign fishing or recreational fishing activity and the take of non-target species. Research and monitoring of finfish diversity and abundance, and the effects of recreational fishing on fish stocks at the Rowley Shoals will be a resource intensive task. It is recommended that cooperative arrangements be developed with charter boat operators to undertake data collection for research and monitoring projects while visiting the Rowley Shoals. There may also be opportunities to address information requirements through research and monitoring projects in other parts of the region. An example of this is determining the survival rates of catch and release fishing techniques. The management of fish stocks and recreational fishing will primarily occur through the regional recreational fisheries management strategy for the Pilbara/Kimberley, with specific protection for the species identified above which are a major value of the Park**.**
Current status	Finfish communities in the Rowley Shoals Marine Park are generally in an undisturbed condition, apart from some localised areas subject to fishing pressure.
Existing and potential uses and/or pressures	• Recreational fishing. • Incidental recreational extraction (i.e. bycatch). • Degradation or loss of critical habitats. • Decline in water quality. • Inappropriate fish feeding. • Illegal fishing operations.
Current major pressure/s	None.
Management objective/s	To develop an understanding of the finfish diversity and abundance in the Park.
Strategies	1. See the zoning strategies detailed in Section 7.1. **(H-KMS)** 2. Develop and implement monitoring programs to characterise finfish diversity and abundance in different zones in the Park (DEC). **(H)** 3. Undertake monitoring programs to determine the impact of recreational fishing and status of key fish stocks (DoF, DEC). **(H)** 4. Determine the level of bycatch and the survival rates of protected species which are incidentally caught and released (DoF, DEC). **(H)** 5. Review the need for special conditions (e.g. bag limits and possession limits) for target finfish species in the reserves (DoF). **(H)** 6. Identify finfish species that can be taken by recreational fishers in the Park and, in liaison with DoF, provide the necessary legislation to provide protection for all other finfish species in the Park (DEC, DoF). **(M)** 7. Undertake monitoring of fish feeding activities on finfish communities and restrict this activity as appropriate (DoF, DEC). **(M)** 8. Investigate cooperative projects with charter boat operators to undertake data gathering for research and monitoring projects where appropriate (DEC, DoF). **(M)**

Performance measure/s	1. Diversity. 2. Abundance.	**Desired Trend**	1. Constant. 2. Constant or positive.
Short-term target/s (KPI)	To be developed within three years.		
Long-term target/s (KPI)	1. No loss of finfish species diversity as a result of human activity in the Park. 2. No loss of protected finfish species abundance^{Ø} as a result of human activity in the Park. 3. Abundance and size composition of finfish species in sanctuary zones to be at natural* levels 4. Management targets for abundance of targeted finfish species in all other areas to be		

	determined in consultation with DoF and peak bodies.

ØIn 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, turtles and cetaceans where minor or transient losses would be unacceptable (but does not apply to losses due to accidents).

***** "Natural" in this case refers to the abundance that would occur in areas that are undisturbed and/or unexploited by human activities.

9.1.7 Turtles

Ecological value	**Turtles:** *Turtles occur within the Park, however there are no known significant breeding sites.*

Background	Based on the known distributions for turtles, both green and hawksbill turtles are present at the Rowley Shoals. Green turtle hatchlings have also been obtained by CSIRO in 1982 from a nest on Bedwell Island (Berry, 1986), however, these reefs are not known to be regionally significant turtle habitats. The nearest significant turtle rookery, which is also the largest green turtle rookery in the region, is approximately 300 km to the east, at Lacepede Island. Sandy Island at Scott Reef (approximately 500 km from the Park), is used as a rookery by green turtles (*Chelonia mydas*) (Prince, 1994). The green turtle is a threatened species declared to be specially protected under the *Wildlife Conservation Act 1950* and as vulnerable under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*. Boat collisions and boat noise are potential disturbances to turtle populations in the Park. The likelihood of entanglement of turtles in fishing gear or discarded rubbish is considered negligible. As such, management will focus on maintaining records of the incidence of entanglement and boat strike to ensure that a human impact on these species is not increasing.
Current status	The population of turtles in the Park is considered to be stable.
Existing and potential uses and/or pressures	• Physical disturbance from boat collisions and boat noise. • Entanglement (e.g. in litter, ropes, discarded fishing gear).
Current major pressure/s	None.
Management objective/s	To gain an increased understanding of the importance of habitats within the Park for turtles.
Strategies	1. Undertake research to determine the importance of the Park's habitats to turtle populations (DEC). **(L)** 2. Develop and maintain a database of the incidence of entanglement of, and boat collisions with, turtle species (DEC). **(L)**

Performance measure/s	1. Reported entanglements. 2. Reported boat collisions.	**Desired trend/s**	1. Negative. 2. Negative.
Short-term target/s	Not Applicable.		
Long-term target/s	1. No loss of turtle diversity as a result of human activity in the Park. 2. No loss in turtle abundance[Ø] as a result of human activity in the Park.		

[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, turtles and cetaceans where minor or transient losses would be unacceptable (but does not apply to losses due to accidents).

9.1.8 Seabirds

Ecological values	**Seabirds:** *Bedwell Island within Clerke Reef is the site of the second largest breeding colony of red-tailed tropic birds, an uncommon species in Western Australia.*

Background	A wide range of seabirds have been observed at the Rowley Shoals including: wedge-tailed shearwater (*Puffinus pacificus*) red-tailed tropic-bird (*Phaethon rubricauda*) white-tailed tropic-bird (*Phaethon lepturus*) brown booby (*Sula leucogaster*) eastern reef-egret (*Egretta sacra*) white-breasted sea eagle (*Haliaeetus leucogaster*) ruddy turnstone (*Arenaria interpres*) large sand plover (*Charadrius leschenaultii*) sanderling (*Calidris alba*) crested tern (*Sterna bergii*) little tern (*Sterna albifrons*) sooty tern (*Sterna fuscata*) white-throated needletail (*Hirundapus caudacutus*) In 1989, Bedwell Island was home to Western Australia's second largest breeding colony of red-tailed tropic-bird (10 pairs), which is an uncommon species in Western Australia (Johnstone & Storr, 1998). This species nests in hollows, and some experimental artificial stone structures have been constructed and are being used for nesting. Red-tailed tropic birds nest during the autumn months. This period corresponds with the peak Rowley Shoals' visitor season, so there is the potential for human activities to affect breeding birds. In addition, Bedwell and Cunningham islands are believed to be important resting places for northern migrants *en route* to and from Australia as large flocks of unidentified waders have been seen at the Rowley Shoals (Berry, 1993). Management of this value will centre around education of Park users on the appropriate behaviour in the vicinity of migratory waders and nesting red-tailed tropic birds.
Current status	The population of seabirds in the Rowley Shoals Marine Park is probably stable.
Existing and potential uses and/or pressures	• Boating activities within the vicinity of Bedwell Island. • Human activity on Bedwell Island e.g. barbeques. • Entanglement in discarded fishing gear and litter.
Current major pressure/s	1. Boating activity in the vicinity of Bedwell Island. 2. Human activity on Bedwell Island.
Management objective/s	To ensure that breeding red–tailed tropic birds on Bedwell Island are not significantly disturbed by human activity.
Strategies	1. Develop and implement monitoring programs to monitor seabird diversity and abundance in the Park (DEC). **(M)** 2. Educate Park users about the ecological significance of the Rowley Shoals for migratory waders and the red-tailed tropic bird breeding colony, as well as the potential detrimental impacts of human disturbance (DEC). **(M)** 2. Implement temporary access controls on Bedwell Island to minimise disturbance of red-tailed tropic bird breeding activities and areas used by migratory waders. (DEC). **(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 within three years.		
Long-term target/s	1. No loss of seabird diversity as a result of human activity in the Park. 2. No loss of seabird abundance[Ø] as a result of human activity in the Park.		

[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, turtles and cetaceans where minor or transient losses would be unacceptable (but does not apply to losses due to accidents).

9.1.9 Cetaceans

Ecological value	**Cetaceans:** *Based on known distributions, it is likely that at least 13 species of cetaceans regularly visit the Park.*

Background	Based on known distributions, it is likely that the waters surrounding the Park are visited by a variety of toothed and baleen whales, including the following: **Toothed Whales (Odontoceti)** Bottlenose dolphin — *Tursiops truncatus* Common dolphin — *Delphinus delphinus* Risso's dolphin — *Grampus griseus* Striped dolphin — *Stenella coeruleoalba* Spinner dolphins — *Stenella longirostris* Melon-headed whale — *Peponocephala electra* Short-finned pilot whale — *Stenella longirostris* False killer whale — *Pseudorca crassidens* Killer whale — *Orcinus orca* Sperm whale — *Physeter macrocephalus* **Baleen Whales (Mysticeti)** Tropical Bryde's whale — *Balaenoptera edeni* Southern Minke whale — *Balaenoptera acutorostrata* Humpback whale — *Megaptera novaeangeliae* Humpback whales pass close to the Rowley Shoals on their annual migration to calving grounds off the Kimberley coast. Humpback whales are threatened species declared to be specially protected under the WC Act due to over-exploitation during the whaling era. DEC administers and enforces guidelines for interaction with wildlife and licenses commercial operations for this purpose. The main potential cause of disturbance of cetacean populations is from boat noise and collisions. However given the very low level of vessel movement in the Park, this is not considered to be a significant pressure. The likelihood of entanglement of cetaceans in fishing gear or discarded rubbish is also considered negligible.
Current status	The populations of cetaceans in the Park are generally in an undisturbed condition.
Existing and potential uses and/or pressures	• Physical disturbance (boat collisions and boat noise). • Entanglement (e.g. in litter, ropes, discarded fishing gear).
Current major pressure/s	None.
Management objective/s	To gain an increased understanding of the use of the Park by cetaceans.
Strategies	1. Undertake research to determine the importance of the Park to cetacean populations (DEC). **(L)** 2. Develop and maintain a database of the incidence of entanglement, boat collisions and strandings of cetaceans (DEC). **(L)**

Performance measure/s	1. Reported entanglements. 2. Reported boat collisions.	**Desired Trend**	1. Negative. 2. Negative.
Short-term target/s	Not Applicable.		
Long-term target/s	1. No loss of cetacean diversity as a result of human activity in Park. 2. No loss of cetacean abundance[Ø] as a result of human activity in the Park.		

[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, turtles and cetaceans where minor or transient losses would be unacceptable (but does not apply to losses due to accidents).

9.2 Social values

Social values are those cultural, aesthetic, recreational and economic characteristics for which the area is significant or well known. The Rowley Shoals have a long history of recreational use. The area was enjoyed by approximately 300 visitors in 2004 who visited the area primarily on charter boats. For these visitors, the remote wilderness value and untouched feel of the Rowley Shoals is a rewarding 'once in a lifetime' personal experience. Seven core social values have been identified for the Marine Park comprising scientific research, wilderness, seascapes, marine nature-based tourism, water sports, recreational fishing and petroleum exploration and production. It should be noted that DEC Policy Statement No. 18 provides a framework for '*provision of world class recreation and tourism opportunities, services and facilities for visitors to the public conservation estate while maintaining in perpetuity Western Australia's natural and cultural heritage*'. Recreation and tourism values will be managed in light of this policy.

9.2.1 Scientific research

Social value	**Scientific research**: *The undisturbed nature and rich diversity of marine communities provide researchers with access to a reference area with which to compare the health of intensively used reefs in the Indo-West Pacific region.*

Background	The Rowley Shoals have significant potential for scientific research because they represent one of the world's few relatively undisturbed tropical reef ecosystems. The undisturbed nature and rich diversity of marine communities provide researchers with access to areas where baseline data can be collected and used in providing ecological benchmarks against which to compare other similar coral communities worldwide. The ability to establish benchmarks is crucial when trying to establish the worldwide status of coral reefs. The marine biodiversity of the Rowley Shoals Marine Park is broadly representative of the Indo-West Pacific region and the Park provides a relatively undisturbed reference area to compare with the intensively used reefs in that region. The Rowley Shoals provide opportunities for research into the investigation of fundamental ecological processes in the absence of the compounding effects of human disturbance. The reefs also provide an opportunity to study many species of coral and fish fauna from the area. A key area of study is the role of the reefs as a source of recruitment for tropical flora and fauna to other reefs of the Western Australian coastal zone which are inter-connected by large-scale current systems. The Australian Institute of Marine Science and DEC have long term monitoring sites established in the Rowley Shoals. The opportunities that the Park provides for scientific research are an important value of the area, however research and monitoring are also important generic management tools and are identified as a management strategy for many of the other values. This is discussed further in section 7.6 and 7.7. All research within the 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 Park (i.e. "impact" and "control" sites). • Equitable access to the Park for ecological and social research opportunities in appropriate zones.
Management objective/s	1. To promote and provide opportunities for ecological and social research in the Park that enhances understanding of the functioning of these ecosystems and the short and long-term effects of human usage. 2. To ensure ecological and social research is ethical and ecologically sustainable.
Strategies	1. See the zoning strategies detailed in Section 7.1. **(H-KMS)** 2. Identify and communicate high priority scientific and social research projects relevant to the management of the Park to appropriate research organisations (DEC). **(H-KMS)** 3. Facilitate scientific and social research in the Park by research, academic and educational institutions by providing financial and logistical assistance where possible, and through the development of international links with other marine protected area programs throughout the Indo-West Pacific region (DEC, DoF). **(H)**

Reporting	To be developed.
Target/s	Implementation of management strategies within agreed timeframes.

9.2.2 Scuba diving, snorkelling and other watersports

Social value	**Scuba diving, snorkelling and other watersports:** *The relatively undisturbed nature and diversity of the natural environment provides world class opportunities for SCUBA diving and snorkelling.*

Background	The Rowley Shoals Marine Park has a relatively undisturbed and diverse marine environment, which provides world-renowned opportunities for SCUBA diving and snorkelling. The Rowley Shoals have a rich diversity of coral and fish fauna. There is a high abundance of large fish fauna including maori wrasse, potato cod and sharks, which are rarely seen at diving locations in other parts of Western Australia or elsewhere in the world. The shallow sheltered lagoons provide ideal conditions for snorkelling, while for experienced SCUBA divers, there are a broad range of opportunities including lagoon, channel, and wall dives. The zoning scheme provides diving locations free from conflicting uses such as fishing in all the major habitats found in the Park. The majority of visitors to the Rowley Shoals Marine Park come via licensed charter boat tour operators. Charter boats primarily visit Clerke Reef, which provides a safe sheltered mooring/anchorage site located within the lagoon. From the mooring/anchorage area, visitors have easy access to prime snorkelling sites within the lagoon. There are numerous popular SCUBA dive sites around Clerke Reef, including the channel dive (divers get pushed by a strong current from the lagoon to the outer reef) and other popular dives on the fore reef (e.g. Blue Lagoon, Jimmy goes to China, The Wall). Charter boats also visit Imperieuse Reef, but stays are limited as the anchorage site is more exposed. The majority of boats are unable to enter the lagoon through the small channel and must anchor on the leeward side of the reef. Visitors can go snorkelling within the lagoon and SCUBA dive on the fore reef. Mermaid Reef is the least visited reef in the Rowley Shoals and is visited primarily for SCUBA diving within the lagoon and outer reef. The goal of Park management is to manage recreational water sports in the Park in a manner that is consistent with maintaining the Park's ecological and social values, and to maintain the values of the Park on which the enjoyment of recreational water sports is based.
Requirements	• High water quality. • Healthy subtidal coral reef communities. • Maintenance of healthy fish fauna appreciated by visitors. • High aesthetic quality of the marine environment. • Separation of incompatible activities within the Park. • Provision of relatively "undisturbed" areas for nature appreciation. • Equity of access to appropriate areas within the Park.
Management objective/s	1. To ensure that water sports, particularly SCUBA diving and snorkelling, are managed in a manner that is consistent with maintaining the Park's ecological values. 2. To maintain the ecological values of the Park that are important to recreational water sports. 3. To manage recreational activities in a manner that minimises conflict between Park users.
Strategies	1. Develop and maintain a database of the nature, spatial and temporal patterns of all existing uses of the Park (DEC). **(H)** 2. Determine the nature, spatial patterns, compatibility and potential environmental impacts of all recreational activities in the Park (DEC). **(M)** 3. In collaboration with user groups, develop Codes of Conduct to minimise environmental impacts of recreational activities, as appropriate (DEC). **(M)** 4. Use zoning and regulations to separate incompatible activities, as appropriate (DEC). **(M)**

Reporting	To be developed.
Target/s	Implementation of management strategies within agreed timeframes.

9.2.3 Seascapes (KPI)

Social value	**Seascapes**: *"Wilderness" seascapes of turquoise lagoon waters, low sandy islands, intertidal reefs, breaking surf and the oceanic waters beyond the reef rim are major attractions.*

Background	Uninterrupted vistas of turquoise lagoon waters, low sandy islands, intertidal reefs, surf breaks and oceanic waters beyond the reef rim are major aesthetic attractions of the Rowley Shoals Marine Park. These attributes can be appreciated from the islands and from boats, both within and outside the lagoons. The only structure at the Rowley Shoals Marine Park is a lighthouse that is located on Cunningham Island at Imperieuse Reef. As a result, the Rowley Shoals Marine Park has high aesthetic values which contribute to the wilderness experience for visitors. Inappropriate structures on the islands and in the surrounding waters and high levels of boating activity have the potential to degrade the aesthetic values of the Park. Management of the seascapes of the Park will concentrate on ensuring seascape values are protected. As such, developments and maritime infrastructure projects that may impact on seascape values should be avoided or minimised to the greatest extent feasible.
Requirements	Coastal seascapes uninterrupted by permanent structures.
Management objective/s	To ensure that the designated seascapes of the Park are not degraded by development of island structures or marine infrastructure within the Park.
Strategies	1. Identify and determine the key characteristics and spatial extent of the major seascapes of the Park (DEC). **(L)** 2. Assess proposals for structures within the Park to ensure that development proposals do not have significant impacts on the designated seascapes of the Park (DEC, MPRA). **(M)** 3. Develop performance measures and management targets for designated seascapes (DEC). **(L)**

Performance measure/s	Number of artificial structures.	**Desired trend/s**	Minimal change
Short-term target/s (KPI)	Not Applicable.		
Long-term target/s (KPI)	No significant change in the designated seascapes as a result of human activity in the Park.		

9.2.4 Marine Nature-based tourism

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

Background	Nature-based tourism within the Rowley Shoals Marine Park is based on DEC licensed charter boat operators who take passengers to the Rowley Shoals on trips of up to 10 days in duration. The majority of boats visit between the months of August and November. Charter boats provide one of the primary means of visitor access to the Rowley Shoals. Charter operations offer opportunities for visitors to experience the Park and to engage in SCUBA diving, snorkelling, fishing and other nature based activities or combinations of these. During the 2004 season eight commercial vessels made a total of 27 trips to the Rowley Shoals carrying 282 passengers. The majority of trips were made during August to November. The average trip length to the Rowley Shoals by commercial operators is 7 days with the number of passengers ranging from 2 to 23. The majority of passengers on the charter vessels are adults and the primary purpose of most of the trips is for diving (50%) and recreational fishing (50%). All of the 27 charter boat visits in the 2004 season spent half of their time at Clerke Reef as it provides easy access into the lagoon and a protected mooring/anchorage site. The lagoon and surrounding waters of Clerke Reef provide excellent opportunities for visitors to engage in all activities. Those vessels engaging predominantly in SCUBA diving spend the remainder of their time at Mermaid Reef with occasional visits to Imperieuse Reef. Vessels engaging predominantly in catch and release game fishing (4 vessels in the 2004 season) spent the remainder of their time at Imperieuse Reef in 2004. This reef is visited far less frequented by charter boats because of limited access to the relative safety of the lagoon for overnight anchoring. At Imperieuse Reef, access to the lagoon is limited to tender vessels which go over the reef at high tide or which negotiate a narrow channel. Charter vessels usually anchor overnight in a large conspicuous sand patch on the extreme north eastern corner of the atoll which is open to easterly winds that could present uncomfortable conditions. All commercial tour operators are required to obtain a licence in order to provide facilities and services on lands and waters managed by DEC. DEC administers proposals for licences and determines whether they are consistent with the purpose of the reserve and maintaining its values. DEC offers two types of commercial licences within the Park which are “full season” licences and “single visit” licences. Fees and charges are levied for licences and are used to offset management costs. A range of conditions are attached to licences to ensure that the activities of the operators do not impact on the Park’s values. DEC regularly reviews conditions and the number of licences granted in order to ensure the maintenance of Park values. Reviews are based on patterns of usage and the status of the Park’s values. “Full season” licences are valid for up to a five year period and in order for an operator to maintain the licence they have to comply with a number of licence conditions including making a minimum of four trips per year. In 2004 there were five ‘full season’ licences in issue, with a further three issued as a result of a competitive application process in 2005. “Full season” licence operators are required to submit a schedule of trips to be carried out during the season. This schedule is submitted prior to the commencement of the season and allows for scheduling of charter visits to avoid overcrowding due to operators visiting at the same time. Overcrowding can potentially decrease the accessibility to other users and detract from the visitor’s wilderness experience. “Single visit” licences are only valid for a single trip on a specified date, for a duration of up to 10 days and are intended for one-off charter tours to the Park. Commercial operators can apply for these licences throughout the year. The approval of “single visit” licences is dependent on the scheduled activity of “full season” operators that are intending to be visiting the Shoals and are based on an acceptance of licence conditions. There may be proposals for the establishment of new nature-based tourism operations (e.g.

	floatplanes) or infrastructure to support new or existing tourism operations (e.g. platforms). Any proposal to establish new operations or structures will be assessed against its potential impact on the ecological and social values of the Park. Operations or structures which are likely to significantly impact on these values will not be permitted. A popular activity at the Rowley Shoals Marine Park is fish feeding. Only DEC licensed operators are permitted to feed fish, and this activity is regulated by fish feeding guidelines and charter boat license conditions. Condition 21 stipulates that "… *fish feeding as part of the operation of the license including the feeding of fish by divers can only occur in areas zoned for this purpose"*. The only area in the Park where this will be permitted is in the mooring area at Clerke Reef. Condition 22 stipulates that "… *licensed operators must ensure that fish feeding is in accordance with the fish feeding guidelines"*. The goal of Park management in relation to marine nature-based tourism is to manage tourism activities in the Park in a manner that is consistent with maintaining the Park's values, to maintain the values of the Park on which nature-based tourism depends and to assist in providing a quality experience through education and interpretation.
Requirements	• High water quality. • Healthy marine communities . • High aesthetic quality of the marine environment. • Provision of relatively "undisturbed" areas for nature appreciation. • Equitable access to the natural values of the Park. • Maintenance of wilderness values
Management objective/s	1. To manage the marine nature-based tourism industry in the Park in a manner that is consistent with maintaining the Park's values. 2. To maintain the natural values of the Park that are important to the marine nature-based tourism industry. 3. To facilitate forms of nature-based tourism and visitor services in the Park that are environmentally and socially compatible and that enhance visitors' enjoyment and experiences through education or interpretation.
Strategies	1. License all commercial nature-based tourism operations within the Park with appropriate conditions (DEC). **(H)** 2. Develop Codes of Practice for commercial marine nature-based tourism operations in the Park including performance measures, desired trends, short-term and long-term management targets, monitoring and reporting requirements (DEC). **(H)** 3. Work collaboratively with the charter boat sector in the management of the Park, particularly in key areas such as visitor education programs, mooring arrangements and monitoring programs (DEC, Charter Sector). **(H)** 4. Assess the nature, level and potential environmental impacts of commercial tourism operations within the Park (DEC). **(H)** 5. Develop and maintain a database of the nature, spatial and temporal patterns and potential environmental impacts of commercial tourism operations within the Park (DEC). **(H)** 6. Consider the prohibition of shark feeding activities (DEC, DoF). **(M)** 7. Provide access to representative areas of the Park that are largely undisturbed for passive marine nature-based tourism (DEC). **(L)** 8. Ensure other uses of the Park do not unnecessarily restrict marine nature-based tourism activities and future marine nature-based tourism opportunities (DEC). **(L)**

Reporting	To be developed.
Target/s	Implementation of management strategies within agreed timeframes.

9.2.5 Recreational fishing

Social value	**Recreational Fishing:** *A popular offshore fishing destination, with fishers primarily targeting pelagic and, to a lesser degree, demersal finfish species.*

Background	The Rowley Shoals Marine Park is a world-renowned recreational fishing destination. However, very few people participate in recreational fishing at the Rowley Shoals because of its remote location. The majority of fishers visit the Rowley Shoals Marine Park with one of the restricted DEC licensed charter boat tour operators that cater for fishing. During the 2004 season (August to November) there were twelve vessel visits for the primary purpose of recreational fishing. These boats carried a total of 117 adult visitors. Charter boats that offer fishing as an activity visit Clerke Reef (which has a protected anchorage in the lagoon) and Imperieuse Reef, which is visited only for short periods as it does not offer a protected anchorage. In addition, some private vessels visit the Rowley Shoals for recreational fishing activities. Recreational fishers primarily target pelagic finfish in the waters surrounding the reefs, with the majority of this type of fishing occurring on the western (leeward) sides. Recreational fishers also target demersal fish on the outer reef slopes and in the lagoons. This type of fishing occurs primarily when conditions are unsuitable for pelagic fishing, and anecdotal reports indicate that the majority is carried out on a catch and release basis or for "on-site" consumption. There has been a move among fishers towards catch and release fishing which, for species where post-release mortalities are low, may reduce the impact of fishing on these species. There is a need to review the merit of allowing catch and release fishing, with a particular focus on determining post-release survival where this is unknown. The DoF has responsibility for management of fishing throughout the State, and this is achieved through species and gear restrictions, bag limits, size limits, and seasonal and area closures. Fishing Notice No. 238 was gazetted in 1987 prohibiting the take of live molluscs, live corals, and fish of the family Epinephelidae (potato cod and related species), the family of Coridae (maori wrasses), the species *Promicrops lanceolatus* (Queensland groper) and the species *Plectropomus maculatus* (coral trout). Fisheries notice 239, also gazetted in 1987, prohibited commercial fishing in the Park. The Fisheries legislation will be amended to also provide protection throughout the Park to all *Plectropomus* species (coral trout) and extend recreational and commercial fishing restrictions to the 3nm state water limit (i.e. to the Park boundary). This will provide protection for these easily caught fish species, which are a major value of the Park. Recreational fishing is not permitted in sanctuary zones. The creation of sanctuary zones within the Park will provide research and monitoring opportunities through which the sustainability and environmental impacts of recreational fishing in the Park can be assessed. The zoning includes a recreation zone in the lagoon at Clerke Reef, which allows for recreational fishing. This will provide opportunities for recreational fishing when conditions outside the lagoons are not suitable. The majority of the outer reef waters will be open to recreational fishing, except in sanctuary zones. It is also recommended that the Rowley Shoals be a "no take away" zone to help protect local fish stocks. Management of recreational fishing needs to be consistent with the maintenance of the values of the Park. The role of Park management with regard to recreational fishing is to ensure that fishing activity in the Park is socially and ecologically sustainable, and to help to maintain the ecological values of the Park on which fishing depends.
Requirements	• High water quality. • Maintenance of target species habitat. • Equitable access to fishing grounds within the Park (in appropriate zones). • Maintenance of recreational fish stocks in the Park.
Management objective/s	1. To ensure that, in collaboration with DoF, recreational fishing in the Park is managed in a manner that is consistent with maintaining the Park's values. 2. To maintain the ecological values of the Park that are important to recreational fishing. 3. To cooperate with the community and the DoF to maintain quality recreational fishing opportunities in the Park.

Strategies	1. See the zoning strategies detailed in Section 7.1. **(H-KMS)** 2. Undertake patrol and enforcement operations in collaboration with DoF and other agencies (DEC, DoF, Customs). **(H-KMS)** 3. Ensure that recreational fishers are aware of the zoning scheme and of restrictions that apply to their activities within the Park (DEC, DoF). **(H-KMS)** 4. Evaluate the impact of recreational fishing on target species within the region and its impact on the Park's values (DoF). **(H)** 5. Formulate performance measures and targets for key recreational species that will maintain the quality of recreational fishing in the Park (DoF). **(H)** 6. Develop and implement a program to monitor recreational fishing catch/effort within the Park (DoF). **(H)** 7. Quantify the survival rates of fish species targeted by recreational fishers for catch and release (DoF). **(H)** 7. Determine the effects of recreational fishing activities on the Park's values and review management controls, including the recommendation of the Marine Park being a 'no take away' area, as required (DoF, DEC). **(M)**

Reporting	To be developed.
Target/s	Implementation of management strategies within agreed timeframes.

9.2.6 Petroleum exploration and production

Social value	**Petroleum exploration and production:** *The Rowley sub-basin of the Canning Basin (over which the Rowley Shoals are located) is considered to be prospective for petroleum.*

Background	The Rowley Shoals overlie the Rowley sub-basin of the Canning Basin which is considered to be prospective for petroleum. Although only limited petroleum exploration has occurred to date, it has included an exploration well located approximately 30 km north-east of Mermaid Reef (Berry & Marsh, 1986) and a several wells in WA-293–P (Darwin No. 1, Minilya No.1, Phoenix No.1 and Phoenix No.2) located in a range from approximately 60 to 130 km south of the Rowley Shoals. Two other wells, La Grange and Bedout No. 1 lie about 75km south east of Imperieuse Reef, in waters over which there are no exploration licences in 2005. As at 2005, Imperieuse and Clerke reefs do not have petroleum permits overlying them, however State Waters abut Commonwealth petroleum exploration permit WA-297-P which extends from the 3 nm State Waters limit. In marine parks, drilling for exploration or production is not permitted in sanctuary and recreation zones or in special purpose zones where the Minister declares that drilling or production is incompatible with the conservation purpose specified in the classified area notice. Drilling is permitted in general use zones and some special purpose zones subject to environmental assessment. Exploration and production in marine conservation reserves are subject to environmental impact assessment by the EPA. Consistent with the CALM Act, petroleum drilling and development will not be permitted in sanctuary and recreation zones of the Rowley Shoals Marine Park. Proposals for petroleum drilling and development in general use zones and proposals for petroleum exploration (seismic) in all areas of the Marine Park will be subject to environmental impact assessment by the EPA. The primary role of Park management in relation to hydrocarbon exploration and development will be to ensure that the Park's values are not impacted by petroleum activities, in liaison with DoIR and DEC/EPA.
Requirements	Equitable access to areas of the Park within appropriate zones subject to environmental assessment.
Management objective/s	To ensure that, in collaboration with the petroleum industry and the Department of Industry and Resources (DoIR), any petroleum industry activities approved within the Park are managed in a manner that is consistent with maintaining the Park's values.
Strategies	1. Provide formal advice to EPA and DoIR in relation to the environmental assessment of proposed petroleum activities in the Park (MPRA, DEC). **(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 (DEC, DoIR, EPA). **(M)** 3. Ensure other uses of the Park do not unnecessarily restrict future petroleum industry opportunities in appropriate zones in the Park (DEC). **(M)**

Reporting	To be developed.
Target/s	Implementation of management strategies within agreed timeframes.

9.2.7 Wilderness (KPI)

Social value	**Wilderness**: *A remote and isolated location with minimal infrastructure and low visitor levels provides a wilderness experience for visitors*.

Background	The Rowley Shoals Marine Park is remote from the mainland and major population centres. Visitation is presently very low and highly seasonal. During the 2004 season 282 people visited the Rowley Shoals on DEC licensed charter boat tours on a total of 27 trips. Some private vessels also visit the Rowley Shoals, however it is thought that numbers are low. Apart from the lighthouse on Cunningham Island and some isolated moorings, there is no infrastructure in the Park and the area is very close to being in a natural state. The combination of isolation, low visitation and the absence of infrastructure provides the essential elements of a wilderness experience for visitors. Input from charter operators indicates that a wilderness experience is a major attraction for visitors to the Rowley Shoals and important for the nature-based tourism industry. Wilderness is a difficult value to define because it is very dependent on an individual's personal perception. Two visitors may have a very different perception of wilderness and the levels of visitation and infrastructure that would significantly impact on this value. Perceptions of wilderness will also vary between cultural groups and may vary over time. The defining of targets to maintain this value is thus a difficult but important project. With respect to the Rowley Shoals Marine Park, the MPRA has the ability to set targets for visitor levels through the management plan. DEC can then implement this through controlling the number of nature-based tourism operations, the form of the licenses and the conditions imposed on the licenses. There is also an ability to control the level of infrastructure established in the Park. A key strategy to maintain wilderness values is to, where possible, schedule charter visits to avoid multiple boats at a particular area at the same time. DEC will work with operators to facilitate this where possible. There are limited ways in which visitation by private vessels can be controlled, however in 2005 visitation of this type was low and not considered to significantly impact on the wilderness values. Given that the visitor perceptions of wilderness may vary over time and depend on the visitor profile, the setting of targets with respect to maintaining this value will require ongoing review and input from users. There was broad agreement during the management plan process that the level of visitation and infrastructure in 2005 is acceptable with respect to maintaining the wilderness values. Based on this, short term targets have been developed relating to the maximum number of visitors and maximum number of boats which should be permitted at Imperieuse or Clerke reefs at any one time. As visitation increases it will be necessary for the MPRA to review these targets in liaison with the community. There will always need to be a balance between maintaining these values whilst not unnecessarily restricting access to the area by the public. Ongoing surveys of visitors are recommended over time to gauge the level of satisfaction with their wilderness experience.
Requirements	• Coastal seascapes uninterrupted by structures or evidence of human influence (e.g. litter). • Maintaining low numbers of boats and people at each reef at any one time.
Management objective/s	To manage visitation and the installation of structures so as to maintain, for the majority of visitors, a satisfying wilderness experience.
Strategies	1. Develop long-term management targets for wilderness values in the management of existing and proposed commercial nature-based tourism operations, in liaison with key stakeholders and users (DEC). **(H-KMS)** 2. Monitor charter vessel logbooks and liaise with CoastWatch to gauge the level and type of visitation to each reef (DEC). **(H)** 3. Identify the importance of the wilderness experience to visitors and their perceptions of what is a suitable level of use, before these values are significantly impacted (DEC). **(H)** 4. Encourage charter operators to coordinate trips to the Shoals such that the targets for maximum visitor numbers are not exceeded (DEC). **(M)** 5. Liaise with nature-based tourism operators, the management advisory committee and other users to review management targets for maximum visitation levels (DEC). **(L)**

Performance measure/s	Total number of vessels and passengers/visitors present at each reef at one point in time.	**Desired trend/s**	Generally not to exceed maximum targets set.
Short-term target/s (KPI)	At any one point in time there should be no more than 4 vessels and no more than 120 visitors at either Clerke or Imperieuse reefs.		
Long-term target/s (KPI)	To be developed following ongoing consultation with the community and surveys of visitor perceptions of the wilderness value of the Park.		

10 PERFORMANCE ASSESSMENT

The effectiveness of the management plan for the Marine Park will be periodically reviewed through a formal review and audit process. This will be undertaken through an annual assessment carried out by DEC and a formal audit by the MPRA every three years. The audits will include reports on the status of the key ecological and social values of the Marine Park and an assessment of the effectiveness of current management strategies, therefore providing feedback to Marine Park managers.

Overall management performance will be audited by the MPRA via a performance assessment report that considers compliance against the stated key ecological and social management targets (i.e. outcome-based approach) and against progress regarding implementation of the key management strategies (i.e. activity-based approach) as provided in Sections 7 to 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 the Marine Park's management. These are identified in Section 9 by the symbol ***(KPI).*** KPIs for the Rowley Shoals Marine Park are water quality, intertidal coral reef communities, subtidal coral reef communities, invertebrates, finfish, seascapes and wilderness. The KPIs reflect both the conservation priorities and the management imperatives of the MPRA, DEC and the community. *Key management strategies* (KMS) are identified in Sections 7 to 9 by the symbol (H - KMS).

10.1 Performance assessment by the Department of Environment and Conservation

The prioritised strategies outlined in Sections 7 - 9 of this management plan will be built into the annual works program of DEC's West Kimberley District, as this district is responsible for the day to day management of the Rowley Shoals Marine Park. Progress against the KPIs, KMSs and the remaining management targets and strategies will form the basis of an annual status report on the Rowley Shoals Marine Park by DEC's West Kimberley District to DEC's Corporate Executive.

10.2 Audit by the Marine Parks and Reserves Authority

Progress against the KPIs and KMSs will form the basis of formal MPRA audits of the Rowley Shoals Marine Park every three years. DEC will provide annual reports to the MPRA, from the time of gazettal of the Marine Park, from which the MPRA can monitor annual progress of DEC'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.

Given the key values and pressures on the area, the KPIs for the Marine Park will be based on the management targets for water quality, intertidal coral reef communities, subtidal coral reef communities, invertebrate communities (excluding corals), finfish, wilderness and seascapes.

10.3 Review of the Management Plan

The Rowley Shoals Marine Park Management Plan will cover management of the Marine Park for a period of ten years from the date the plan is approved however the plan will continue to have effect until a replacement plan is approved by the Minister for the Environment.

At the completion 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, the Minister for Fisheries, the Minister for responsible for the *Mining Act 1978* and Minister for Tourism for consideration. The CALM Act specifies that in the event of such a revision not occurring by the end of the plan's specified lifespan, the plan will remain in force in its original form, unless it is either revoked by the Minister 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 was published in 1998 (Government of Western Australia, 1998). 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 building on the framework contained within the 1998 report. Relevant marine issues covered by this framework are the implementation of a state-wide 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 for the Marine Park is broadly consistent with the 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 mechanisms 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: INDICATIVE TIMELINE FOR IMPLEMENTATION OF MANAGEMENT STRATEGIES

VALUE	MANAGEMENT STRATEGY	YEAR									
Ecological		**1**	**2**	**3†**	**4**	**5**	**6†**	**7**	**8**	**9**	**10‡**
Geology and geomorphology (EV 9.1.1)	1. Provide advice to the EPA in relation to ensuring development activities do not have significant impacts on the geomorphology of the Park (DEC, MPRA). **(M)**										
	2. Identify areas requiring rehabilitation and where necessary, undertake appropriate rehabilitation measures (DEC). (**M**)										
	3. Monitor appropriate indicators of geomorphology (DEC). (**M**)										
	4. Educate Park users about the ecological importance of maintaining the Park's geomorphology in a natural state (DEC). **(L)**										
Water quality * (EV 9.1.2)	1. Establish; and undertake baseline water quality monitoring programs in designated mooring and anchoring areas in relation to nutrient enrichment, bacterial contamination and litter (DEC). **(H)**										
	2. Where required. gazette appropriate notices to implement restrictions on sewage discharge in the Park (DEC). **(H)**										
	3. Inform users of the Park about regulations relating to sewage disposal from vessels and incorporate these regulations as license conditions for charter operators (DEC, DPI). **(H)**										
	4. Map the ecological and social values of the Park that are particularly sensitive to oil spills and ensure the values of the Park are fed into predictive models and response plans for oil spills by providing this information to the State Committee for Combating Marine Oil Pollution (DEC, DPI). **(M)**										

VALUE	MANAGEMENT STRATEGY	YEAR									
Ecological		**1**	**2**	**3†**	**4**	**5**	**6†**	**7**	**8**	**9**	**10‡**
	5. Develop an appropriate understanding of the circulation and mixing of the Park's waters (within and outside the lagoons) (DEC). **(M)**										
	6. Establish;										
	and maintain a pollutant inputs database for the Park (DEC). **(M)**										
Intertidal coral reef communities * (EV 9.1.3)	1. Educate Park users about the potential detrimental effects of reef walking and boating on the intertidal coral reef communities of the Park and discourage users from undertaking these activities (DEC). **(H-KMS)**										
	2. Initiate research programs to characterise the floral and faunal diversity, and natural variability, of selected intertidal coral reef communities within the Park (DEC). **(H-KMS)**										
	3. Develop agreements with the Australian Marine Safety Authority on the conditions for access to island infrastructure to minimise impacts to intertidal reefs adjacent to the island (DEC). **(H)**										
	4. Develop;										
	and implement an appropriate monitoring program in relation to potential impacts of human activities on the most highly used intertidal coral reef communities within the Park (DEC). **(M)**										
Subtidal coral reef communities * (EV 9.1.4)	1. Ensure all existing moorings meet environmental guidelines within 3 years of gazettal of the plan, and that all new moorings meet the environmental guidelines (DEC, DPI). **(H-KMS))**										
	2. Map coral communities of the Rowley Shoals Marine Park most at risk from mooring and anchoring activities and monitor coral communities in these areas (DEC). **(H-KMS)**										
	3. Develop;										
	and implement a monitoring program to monitor coral communities in areas at most risk of mooring, anchoring and diver damage (DEC). **(H-KMS)**										
	4. Develop; and implement a cost-effective monitoring protocol to estimate annual coral recruitment within the Park and investigate the implications for coral reef resilience and connectivity (DEC). **(H-KMS)**										

VALUE	MANAGEMENT STRATEGY	YEAR									
Ecological		**1**	**2**	**3†**	**4**	**5**	**6†**	**7**	**8**	**9**	**10‡**
	5. Educate users on the important ecological role of coral communities and the potential impacts of human activities, particularly boat moorings, anchoring and nutrient pollution, on these communities (DEC). **(H)**										
	6. Implement the mooring plan (see Section 8) including the installation of public moorings in the Clerke Lagoon designated mooring area and designation of an overflow anchorage area (DEC, Charter Sector). **(H)**										
	7. Gazette anchoring restrictions as necessary to protect significant coral communities (DEC, DPI). **(H)**										
	8. Minimise anchor damage by encouraging appropriate anchoring practice by boat visitors (DEC). **(H)**										
Invertebrate (excluding corals) * (EV 9.1.5)	1. Identify invertebrate species that can be sustainably taken by recreational fishers in appropriate zones in the Park and, in liaison with DoF, provide the necessary legislation to provide protection for all other invertebrate species (DEC, DoF). **(H-KMS)**										
	2. Develop;										
	and implement monitoring programs for invertebrate species likely to be targeted by illegal commercial and recreational specimen collectors (DEC, DoF). **(M)**										
Finfish * (EV 9.1.6)	1. Develop;										
	and implement monitoring programs to characterise finfish diversity and abundance in different zones in the Park (DEC). **(H)**										
	2. Undertake monitoring programs to determine the impact of recreational fishing and status of key fish stocks (DoF, DEC). **(H)**										
	3. Determine the level of bycatch and the survival rates of protected species which are incidentally caught and released (DoF, DEC). **(H)**										
	4. Review the need for special conditions (e.g. bag limits and possession limits) for target finfish species in the reserves (DoF). **(H)**										
	5. Identify finfish species that can be taken by recreational fishers in the Park and, in liaison with DoF, provide the necessary legislation to provide protection for all other finfish species in the Park (DEC, DoF). **(M)**										

VALUE	MANAGEMENT STRATEGY	YEAR									
Ecological		**1**	**2**	**3†**	**4**	**5**	**6†**	**7**	**8**	**9**	**10‡**
	6. Undertake monitoring of fish feeding activities on finfish communities and restrict this activity as appropriate (DoF, DEC). **(M)**										
	7. Investigate cooperative projects with charter boat operators to undertake data gathering for research and monitoring projects where appropriate (DEC, DoF). **(M)**										
Turtles (EV 9.1.7)	1. Undertake research to determine the importance of the Park's habitats to turtle populations (DEC). **(L)**										
	2. Develop;										
	and maintain a database of the incidence of entanglement of, and boat collisions with, turtle species (DEC). **(L)**										
Seabirds (EV 9.1.8)	1. Develop;										
	and implement monitoring programs to monitor seabird diversity and abundance in the Park (DEC). **(M)**										
	2. Educate Park users about the ecological significance of the Rowley Shoals for migratory waders and the red-tailed tropic bird breeding colony, as well as the potential detrimental impacts of human disturbance (DEC). **(M)**										
	3. Implement temporary access controls on Bedwell Island to minimise disturbance of red-tailed tropic bird breeding activities and areas used by migratory waders. (DEC). **(M)**										
Cetaceans (EV 9.1.9)	1. Undertake research to determine the importance of the Park to cetacean populations (DEC). **(L)**										
	2. Develop;										
	and maintain a database of the incidence of entanglement, boat collisions and strandings of cetaceans (DEC). **(L)**										

VALUE	MANAGEMENT STRATEGY	YEAR									
Social		**1**	**2**	**3†**	**4**	**5**	**6†**	**7**	**8**	**9**	**10‡**
Scientific research (SV 9.2.1)	1. Identify and communicate high priority scientific and social research projects relevant to the management of the Park to appropriate research organisations (DEC). **(H-KMS)**										
	2. Facilitate scientific and social research in the Park by research, academic and educational institutions by providing financial and logistical assistance where possible, and through the development of international links with other marine protected area programs throughout the Indo-West Pacific region (DEC, DoF). **(H)**										
SCUBA diving, snorkelling & other water sports (SV 9.2.2)	1. Develop; and maintain a database of the nature, spatial and temporal patterns of all existing uses of the Park (DEC). **(H)**										
	2. Determine the nature, spatial patterns, compatibility and potential environmental impacts of all recreational activities in the Park (DEC). **(M)**										
	3. In collaboration with user groups, develop Codes of Conduct to minimise environmental impacts of recreational activities, as appropriate (DEC). **(M)**										
	4. Use zoning and regulations to separate incompatible activities, as appropriate (DEC). **(M)**										
Seascapes * (SV 9.2.3)	1. Identify and determine the key characteristics and spatial extent of the major seascapes of the Park (DEC). **(L)**										
	2. Assess proposals for structures within the Park to ensure that development proposals do not have significant impacts on the designated seascapes of the Park (DEC, MPRA). **(M)**										
	3. Develop performance measures and management targets for designated seascapes (DEC). **(L)**										
Marine nature-based tourism (SV 9.2.4)	1. License all commercial nature-based tourism operations within the Park with appropriate conditions (DEC). **(H)**										
	2. Develop Codes of Practice for commercial marine nature-based tourism operations in the Park including performance measures, desired trends, short-term and long-term management targets, monitoring and reporting requirements (DEC). **(H)**										
	3. Work collaboratively with the charter boat sector in the management of the Park, particularly in key areas such as visitor education programs, mooring arrangements and monitoring programs (DEC, Charter Sector). **(H)**										

VALUE	MANAGEMENT STRATEGY	YEAR									
Social		**1**	**2**	**3†**	**4**	**5**	**6†**	**7**	**8**	**9**	**10‡**
	4. Assess the nature, level and potential environmental impacts of commercial tourism operations within the Park (DEC). **(H)**										
	5. Develop;										
	and maintain a database of the nature, spatial and temporal patterns and potential environmental impacts of commercial tourism operations within the Park (DEC). **(H)**										
	6. Consider the prohibition of shark feeding activities (DEC, DoF). **(M)**										
	7. Provide access to representative areas of the Park that are largely undisturbed for passive marine nature-based tourism (DEC). **(L)**										
	8. Ensure other uses of the Park do not unnecessarily restrict marine nature-based tourism activities and future marine nature-based tourism opportunities (DEC). **(L)**										
Recreational fishing (SV 9.2.5)	1. Undertake patrol and enforcement operations in collaboration with DoF and other agencies (DEC, DoF, Customs). **(H-KMS)**										
	2. Ensure that recreational fishers are aware of the zoning scheme and of restrictions that apply to their activities within the Park (DEC, DoF). **(H-KMS)**										
	3. Evaluate the impact of recreational fishing on target species within the region and its impact on the Park's values (DoF). **(H)**										
	4. Formulate performance measures and targets for key recreational species that will maintain the quality of recreational fishing in the Park (DoF). **(H)**										
	5. Develop;										
	and implement a program to monitor recreational fishing catch/effort within the Park (DoF). **(H)**										
	6. Quantify the survival rates of fish species targeted by recreational fishers for catch and release (DoF). **(H)**										
	7. Determine the effects of recreational fishing activities on the Park's values and review management controls, including the recommendation of the Marine Park being a 'no take away' area, as required (DoF, DEC). **(M)**										
Petroluem exploration and	1. Provide formal advice to EPA and DoIR in relation to the environmental assessment of proposed petroleum activities in the Park (MPRA, DEC). **(M)**										

VALUE	MANAGEMENT STRATEGY	YEAR									
Social		**1**	**2**	**3†**	**4**	**5**	**6†**	**7**	**8**	**9**	**10‡**
production (SV 9.2.6)	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 (DEC, DoIR, EPA). **(M)**										
	3. Ensure other uses of the Park do not unnecessarily restrict future petroleum industry opportunities in appropriate zones in the Park (DEC). **(M)**										
Wilderness * (SV 9.2.7)	1. Develop long-term management targets for wilderness values in the management of existing and proposed commercial nature-based tourism operations, in liaison with key stakeholders and users (DEC). **(H-KMS)**										
	2. Monitor charter vessel logbooks and liaise with CoastWatch to gauge the level and type of visitation to each reef (DEC). **(H)**										
	3. Identify the importance of the wilderness experience to visitors and their perceptions of what is a suitable level of use, before these values are significantly impacted (DEC). **(H)**										
	4. Encourage charter operators to coordinate trips to the Shoals such that the targets for maximum visitor numbers are not exceeded (DEC). **(M)**										
	5. Liaise with nature-based tourism operators, the management advisory committee and other users to review management targets for maximum visitation levels (DEC). **(L)**										

VALUE	MANAGEMENT STRATEGY	YEAR									
Generic strategies		**1**	**2**	**3†**	**4**	**5**	**6†**	**7**	**8**	**9**	**10‡**
Zoning	1. Gazette appropriate notices under the CALM Act and FRM Act to implement the zoning scheme (DEC, DoF). **(H - KMS)**										
	2. Inform visitors about the types of zones, reasons for and restrictions on activities in the Marine Park using signage, information manuals and education programs (DEC, DoF). **(H - KMS**										
	3. Develop;										

VALUE	MANAGEMENT STRATEGY	YEAR									
Generic strategies		**1**	**2**	**3†**	**4**	**5**	**6†**	**7**	**8**	**9**	**10‡**
	and implement procedures to ensure coordination between Government agencies and stakeholders to maximise efficiency and effectiveness of surveillance and enforcement activities (DEC, DoF, DPI). **(H - KMS**										
	4. Gazette the Marine Park as a mooring control area and seek appointment as the controlling authority within one year of gazettal (DEC, DPI). **(H – KMS)**										
	5. Develop Codes of Practice for marine based industries and recreational sectors, where necessary (DEC). **(M)**										
Education and Interpretation	1. Develop;										
	and implement, in collaboration with DoF, other relevant agencies and commercial operators, a marine education program to ensure Park users are aware of and understand the values of the Park, management zones and regulations, and the reasons for these controls (DEC, DoF, Operators). (**H-KMS**)										
	2. Develop and distribute to the community and visitors a range of education materials about the Marine Park's values, pressures on these values, management strategies and targets, as well as marine conservation more broadly (DEC, DoF). (**H**)										
	3. Assist the fishing, tourism, charter and other key sectors to access and deliver marine information courses/materials to their staff or patrons (DEC). (**H**)										

VALUE	MANAGEMENT STRATEGY	YEAR									
Generic strategies		**1**	**2**	**3†**	**4**	**5**	**6†**	**7**	**8**	**9**	**10‡**
Patrol and enforcement	1. Facilitate cross authorisation of Government enforcement officers as appropriate (DEC, DoF, DPI). **(H-KMS)**										
	2. Develop and implement procedures to ensure coordination between Government agencies to maximise efficiency and effectiveness of patrol and enforcement activities (DEC, DEH, DoF, DPI). **(H-KMS)**										
	3. Develop and implement a surveillance and enforcement program, in collaboration with DoF, to ensure an adequate level of compliance with zoning restrictions (DEC, DoF). **(H-KMS)**										
	4. Assess the suitability and, if appropriate implement remote surveillance technology **(H)**										
	5. Implement education strategies outlined in this plan to support compliance activities (DEC). **(H)**										
	6. Develop a MOU between DEC and CoastWatch in regard to maintaining regular surveillance flights and reporting for the Rowley Shoals Marine Park (DEC, CoastWatch). **(H)**										
	7. Monitor illegal fishing activities by crews of foreign fishing vessels (CoastWatch). **(H)**										
	8. Develop; and maintain a database of incidences of illegal fishing and species taken by crews of foreign fishing vessels (DoF, DEC, DEH). **(H)**										
	9. Investigate opportunities for appointment of honorary enforcement officers (DEC). **(M)**										
Research	1. Develop; and progressively implement a coordinated and prioritised research program focused on key values and processes of the Park (DEC, DoF). **(H - KMS)**										
	2. Develop; and maintain detailed habitat and wildlife distribution maps for the Park (DEC). **(H-KMS)**										
	3. Develop; and maintain a database of human usage in the Park (DEC, DoF). **(H - KMS)**										

VALUE	MANAGEMENT STRATEGY	YEAR									
Generic strategies		**1**	**2**	**3†**	**4**	**5**	**6†**	**7**	**8**	**9**	**10‡**
	4. Identify, prioritise and communicate high priority ecological and social research projects relevant to the management of the Park to appropriate research organisations, via a strategic research plan with the aim of maximising priority research outcomes for the Park (DEC). **(H - KMS)**										
	5. Develop; and maintain a database of historical and current research in the Park (DEC). **(H)**										
	6. Facilitate ecological and social research in the Park conducted by research, academic and educational institutions, by providing financial and logistical assistance (where possible) (DEC, DoF). **(H)**										
Monitoring	1. Develop; and progressively implement an integrated and prioritised ecological and social monitoring program for the Park, with a particular emphasis on MPRA and DEC audit requirements (DEC, DoF, Charter Sector). **(H - KMS)**										
	2. Ensure that proponents of development proposals or activities with the potential to impact on the Park's values conduct appropriate compliance monitoring programs (DEC). **(H)**										
	3. Encourage Commonwealth marine research agencies to continue with long-term reference sites to better understand natural variability and key ecological processes (e.g. recruitment, herbivory etc) in the reserves (DEC). **(H)**										
Public Participation	1. Establish; and maintain a MAC, or other appropriate mechanism to facilitate community input into the ongoing management of the Park (DEC). **(H - KMS)**										
	2. Encourage charter industry involvement in education and interpretation programs (DEC). **(M)**										
	3. Encourage charter industry involvement in monitoring programs (DEC). **(M)**										
Management Intervention & Visitor Infrastructure	1. Undertake triennial assessment to identify areas of human impact in the Park, assess rehabilitation options and, where appropriate, implement these measures (DEC). **(H)**										
	2. Undertake a triennial risk assessment of human use patterns and trends in the Park, and where changes in use have potential to cause environmental impacts, assess preventative options and where appropriate, implement these measures (DEC). **(H)**										

VALUE	MANAGEMENT STRATEGY	YEAR									
Generic strategies		**1**	**2**	**3†**	**4**	**5**	**6†**	**7**	**8**	**9**	**10‡**
	3. Undertake a triennial assessment of visitor risk in the Park and, where necessary, implement appropriate measures to minimise visitor risk (DEC). **(H)**										
Development proposals	1. Ensure appropriate advice is provided to relevant authorities with regard to proposed marine infrastructure and the defined ecological targets for the Park (DEC, MPRA). **(H)**										
	2. In conjunction with stakeholders, prepare a detailed mooring strategy for the Park and detailed site plans for the identified mooring and anchoring areas addressing the number and location of moorings, and requirements for anchoring controls (DEC). **(H)**										
	3. Install permanent moorings where considered necessary in accordance with the mooring and anchoring site plans (DEC). **(H)**										
	4. In conjunction with stakeholders, prepare a Code of Practice for mooring and anchoring in the Park and ensure Park users are aware of appropriate mooring anchoring practices and restrictions. (DEC). **(H)**										

Key:
Ecological (EV) and social (SV) value reference in management plan
***** = Key Performance Indicator
† MPRA Audit
‡ MPRA Audit and Management Plan Review