Indicative Management Plan

for the proposed

DAMPIER ARCHIPELAGO MARINE PARK AND CAPE PRESTON MARINE MANAGEMENT AREA

2005

GOVERNMENT OF WESTERN AUSTRALIA

DEPARTMENT OF Conservation AND LAND MANAGEMENT
Conserving the nature of WA

MPRA
MARINE PARKS & RESERVES AUTHORITY

PUBLIC SUBMISSIONS ON THE INDICATIVE MANAGEMENT PLAN

Prior to gazettal of a marine conservation reserve, the *Conservation and Land Management Act 1984* (CALM Act) requires the release of an indicative management plan to provide an opportunity for the community to comment on the proposal. It is an opportunity to say whether you support the creation of the marine conservation reserve, provide information, suggest alternatives and generally have a say on how the proposed Dampier Archipelago Marine Park and Cape Preston Marine Management Area should be managed over the next ten years if gazetted.

If you prefer not to write your own submission you could make a joint submission with others. To ensure your submission is as effective as possible:

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

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

Each submission is important, but those that give reasons for concerns, provide supportive evidence and offer information and constructive suggestions are most useful.

All submissions will be summarised according to topics discussed. The indicative management plan will then be reviewed in light of submissions, according to established criteria (see below). A summary of the submissions will be published along with the final management plan, including an indication of how the plan was amended or not in response to the submissions.

Criteria for amending the indicative management plan are that:

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

2. The indicative management plan *may not* be amended if a submission:
   (a) clearly supports the draft proposals;
   (b) offers a neutral statement or no change is sought;
   (c) addresses issues beyond the scope of the plan;
   (d) makes points that are already in the plan or were considered during its preparation;
   (e) is one amongst several widely divergent viewpoints received on the topic and the strategy of the indicative plan is still considered the best option; or
   (f) contributes options that are not possible (generally due to some aspect of existing legislation, or Government policy).

Submissions are welcome after the date of release of the indicative management plan until 10 May 2005. Written submissions should be sent to:

Plan Coordinator
Indicative Management Plan for the Proposed Dampier Archipelago
Marine Park and Cape Preston Marine Management Area
Marine Conservation Branch
Department of Conservation and Land Management
47 Henry Street
Fremantle WA 6160

Submissions can also be forwarded by e-mail to dampier@calm.wa.gov.au

Alternatively, refer to the Department of Conservation and Land Management's NatureBase web site (www.naturebase.net), which has an electronic copy of the plan and allows you to lodge your submission electronically.

The closing date for submissions on the plan is 10 May 2005.

Cover photographs courtesy of Alex Steffe/Lochman Transparencies (background), Clay Bryce/Lochman Transparencies (insert 1), Department of Conservation and Land Management (insert 2 and 3).

INDICATIVE MANAGEMENT PLAN FOR THE PROPOSED DAMPIER ARCHIPELAGO MARINE PARK AND CAPE PRESTON MARINE MANAGEMENT AREA

To maintain for the future, the ecological values of the area, while allowing for economic growth and recognising social and cultural needs.

ACKNOWLEDGMENTS

The Advisory Committee for the Proposed Dampier Archipelago/Cape Preston Marine Conservation Reserve put considerable time and effort into discussions and meetings that provided the basis of the indicative management plan. The advisory committee greatly assisted the Department of Conservation and Land Management (CALM) in developing the proposal and their efforts are acknowledged.

The advisory committee members are listed below.

Mr Trevor Ruland (Chair)
Mr Simon Bennison
Mr Dennis Bryan-Smith
Mr Kent Buddle
Dr Andrew Heyward
Mr John Kraus
Mr John Lally
Dr Stephen van Leeuwen
Mr Nicholas Miller
Mr Greg Oliver
Mr Noel Parkin
Ms Irene Stainton
Mr Len Vertigan

Many groups and individuals provided valuable input to the advisory committee through Sector Reference Groups, individual submissions and out-of-session discussions. In particular, members of the Dampier Archipelago Preservation Association, Dampier Archipelago Recreational Dwellers Association and members of the community provided valuable information and constructive input. Other groups who provided valuable input include representatives from Woodside Energy Ltd., Hamersley Iron Pty. Ltd., and Dampier Salt Pty. Ltd., the aquaculture and pearling industries, charter boat industry, Australian Petroleum Production and Exploration Association Ltd., Dampier Port Authority, Western Australian Museum, Pearl Producers Association and Recfishwest.

A number of CALM's planning team staff were involved in preparation of the plan including Andrew Hill (Coordinator), Dr Chris Simpson, Judy Davidson, Liesl Jonker, Mark Sheridan and Fran Stanley. Various other CALM staff and branches providing assistance in the preparation of the indicative management plan.

Staff from the Department of Industry and Resources and the Department of Fisheries provided information and guidance in respect to both the petroleum industry and, commercial and recreational fishing and pearling and aquaculture. Other agencies provided valuable input and information to the process.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

EXECUTIVE SUMMARY

What is the indicative management plan and why has it been produced?

Section 14 of the *Conservation and Land Management Act 1984* (CALM Act) requires the Minister for the Environment to provide a clear public statement of any proposal to create a marine conservation reserve. This is known as the *notice of intent* and must include the following:

- proposed boundaries;
- reserve purpose;
- whether the reserve is to be classified as an A class reserve;
- an indicative management plan;
- any proposed zoning;
- where interested persons can obtain the above information; and
- how the public can make a submission.

The indicative management plan for the proposed Dampier Archipelago Marine Park and Cape Preston Marine Management Area has been prepared in accordance with the requirements of the CALM Act and has been produced to provide the public with a guide as to how the reserves would be managed (over a ten year period) if gazetted. It will also provide the community with an opportunity to comment on the most appropriate category of marine conservation reserve for the area and to suggest ways in which the indicative management plan could be improved.

How has the plan been developed?

The Department of Conservation and Land Management (CALM) undertook an assessment of the biological and social information relevant to the area before commencing the planning and consultation process. CALM undertook field surveys of habitats in August 1999 and May 2000 and compiled human usage information on recreational and commercial use. The assessment process involved gathering information from government agencies, industry and community groups, as well as reports produced by CALM's Marine Conservation Branch. This information was summarised and published in the *Dampier Archipelago/Cape Preston Regional Perspective* paper (CALM, 2000), to provide an overview of the ecological and social values of the region. The assessment also involved consultation with local community stakeholders to gain an understanding of community concerns, knowledge and aspirations for the marine environment of the Dampier region. This information was summarised in the paper entitled *An Analysis of Issues Relating to the Proposed Dampier Archipelago/Cape Preston Marine Conservation Reserve* (Osborne & Monks, 2000).

A community consultation program was initiated in 2000 with the appointment, by the Minister for the Environment, of the community-based advisory committee to consider the proposed Dampier Archipelago/Cape Preston marine conservation reserve. The Marine Parks and Reserves Authority (MPRA) provided guidance to the advisory committee at the commencement of the process and had an observer at meetings to provide advice during its consideration of the proposal. The committee met nine times in developing a position in respect to the category, boundaries, zoning and management of the proposed reserves. To facilitate community input to the advisory committee, CALM identified Sector Reference Groups (SRGs), which were provided with regular updates of advisory committee meeting outcomes. Feedback from the SRGs was summarised and provided directly back to the advisory committee for consideration. During this period, CALM also coordinated a broad community consultation program, which included liaison with local government, community and industry groups, media articles, public meetings, displays, meetings with key interest groups and direct mail-outs to SRGs. This program aimed to raise community awareness through education, to encourage community discussion of the proposal and to facilitate input into the advisory committee deliberations. The committee provided its advice to the Minister for the Environment in 2003.

During its meetings, the advisory committee identified the ecological and social values, outlined the strategic objectives and vision for the proposed reserves, as well as determining management objectives, strategies and targets. In doing so, the advisory committee developed the content and direction of the indicative management plan, in conjunction with feedback from the community. The outcomes of the advisory committee formed the basis of the indicative management plan, which was prepared by CALM and presented to the MPRA for consideration. The MPRA considered the proposal and provided advice to the Minister for the Environment in August 2003.

In November 2003, the Minister for the Environment requested an additional round of consultation to provide stakeholders with a further opportunity to provide comment on any outstanding issues with regard to the proposed zoning scheme. The comments received were provided to the MPRA and they provided further advice to the Minister for the Environment. Following further ministerial consideration, a number of amendments were made by Government to the proposed zoning scheme.

What are the options in terms of marine conservation reserve categories?

The CALM Act provides for the classification of a marine conservation reserves as a marine park, a marine nature reserve or a marine management area. To determine the appropriate category for a proposed marine conservation reserve, it is necessary to assess the conservation significance and current and future uses of the area. The decision is guided by the purpose of the various reserve types as set out in the CALM Act. More specific guidance is outlined in the MPRA's *Policy Statement: The application of the Marine Management Area reserve category in a marine conservation reserve planning process* (MPRA, 2001). The marine conservation reserve categories and the situations in which they may apply are described below.

Marine nature reserves are created for conservation and scientific research. Although low impact nature-based tourism may be permitted, no recreational or commercial fishing, aquaculture, pearling, petroleum drilling or production is allowed in these areas.

Marine parks are created to protect natural features and aesthetic values while at the same time enabling recreational and commercial uses where these activities do not compromise conservation values. In marine parks, conservation is clearly the priority purpose and commercial and recreational activities are legitimate secondary purposes. In marine parks, four statutory management zones can be created.

- Sanctuary zones- "look but don't take" areas managed solely for nature conservation and low-impact recreation and nature-based tourism.
- Recreation zones- provide for conservation and recreation including recreational fishing (subject to bag limits and other conservation measures).
- Special purpose zones- managed for a particular priority use or issue. This could be protection of a habitat, a seasonal event such as wildlife breeding or whale watching or a particular type of commercial fishing. Uses compatible with the priority use or seasonal event are allowed in these zones.
- General use zones- areas of marine parks not included in sanctuary, recreation or special purpose zones. Conservation of natural resources in general use zones is a priority but activities such as sustainable commercial fishing, aquaculture, pearling and petroleum exploration and production are allowed provided they do not compromise the conservation values.

Marine management areas will provide a formal integrated management framework over areas that have high conservation value and intensive multiple use. These areas will be selected primarily on the basis of their ecological and recreational values and their existing or future commercial activities such as petroleum production and commercial fishing. As with other marine conservation reserves, marine management areas will be subject to environmental impact assessments for activities referrable under the *Environmental Protection Act 1986* (EP Act). In a marine management area, conservation is but one of the values managed under the broader purpose of managing and protecting the marine environment.

What are the major outcomes of the plan and the type of approach taken?

The indicative management plan has been prepared in the context of an over-riding community vision that reflects the aspirations of the community of Western Australia for conservation and sustainable management of human activities of the area both now and in the future. In addition, the MPRA provides strategic objectives, based on the CALM Act, which offer a legislative guide to the overall management aims for conservation and human usage. The indicative management plan has been prepared using a revised format which is based on the identification of key ecological and social values, followed by an assessment of risks to these values, in order to identify the key management strategies and priorities for the area. The plan was developed using an outcome-based approach to facilitate more effective auditing of the implementation of the plan by the management agency (CALM) and the statutory vesting authority (MPRA).

The indicative management plan has been prepared on the basis that marine park and marine management area reserve categories are the most appropriate categories for the proposed Dampier Archipelago/Cape Preston area.

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 states that a marine management area is established "… *for the purpose of managing and protecting the marine environment so that it may be used for conservation, recreational, scientific and commercial purposes. Commercial purposes include:*

a) aquaculture, commercial fishing and pearling activity;
b) mining, within the meaning of the Mining Act 1978;
c) seismic surveys and exploratory drilling for petroleum; and
d) production of petroleum and associated activities."

The marine environment of the proposed reserves has a unique combination of highly diverse and relatively pristine marine habitats, and high recreational and commercial usage. Whilst there may be some impacts on species and localised degradation of habitats, the biological values of the proposed reserves are largely intact. However, increases in commercial and recreational uses of the area in the future have the potential to impact on the biological values.

The use of this area is likely to continue to increase as a result of growth in the region. The area is a focus for industrial development and industry is rapidly expanding. This expansion is likely to result in greater pressure on the marine environment as a result of more infrastructure (e.g. pipelines), greater shipping and the associated population growth will lead to greater recreational fishing pressure. The associated increased use of the area will require more intensive management to ensure that the ecological and social values of the area are maintained. The gazettal of proposed reserves will provide an enhanced management framework to better cope with this increased use. The establishment of the proposed reserves reflects a pro-active approach to conserving the values and managing the human usage of the area.

The overlap of high ecological values and a multitude of human activity has lead to the development of a complex array of proposed management tools that will be used to manage the ecological and social values of the proposed reserve including zoning, education and interpretation, surveillance and enforcement, research, monitoring, public participation and intervention. These management tools 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 reserves. These include fisheries regulations, industry regulations, wildlife protection, pollution control and environmental impact assessment, as well as maritime transport and safety measures. Given the value of the area for recreational fishing, complementary fisheries regulations will be particularly important in the Dampier Archipelago Marine Park. The Government recognises the important conservation values of the area and the current level of recreational fishing effort. Consequently it is proposed that a review by the Department of Fisheries of recreational fishing regulations for the Pilbara and Kimberley that is currently underway be broadened to consider whether catch restrictions need to be tightened in the proposed marine park to ensure that stocks of targeted species are maintained at appropriate levels in the proposed marine park. The revised recreational fishing regulations and other complementary management tools will be used to ensure the long-term sustainable management of this important area.

Given the size of the proposed reserves, the remoteness of many of the high conservation areas, and the lack of administrative support in the region, education programs and community involvement are crucial to achieving a high level of compliance and creating a sense of community ownership of, and responsibility for, conserving the local area. The focus of management in the proposed reserves will be for on-ground management techniques (e.g. education, interpretation, public participation and surveillance and enforcement) aimed at gaining community support for the protection of the local marine environment. The implementation of the strategies in this plan will maintain or even improve the marine environment in the Dampier Archipelago/Cape Preston area.

What happens next?

The public submissions to this plan will be reviewed and summarised for consideration by the MPRA. The indicative management plan may be revised by the MPRA as a result of the public submissions received and it will provide formal advice to the Minister for the Environment. The Minister for the Environment will then forward the draft management plan to the Minister for Agriculture, Forestry and Fisheries and the Minister for State Development seeking concurrence to create the proposed reserves. The reserves will then be created and the management plan formally approved by notice in the *Government Gazette*.

1 INTRODUCTION

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

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

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

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

The marine and coastal environment of the Dampier Archipelago/Cape Preston region, with its unique combination of offshore islands, intertidal and subtidal reefs, mangroves, macroalgal communities and coral reefs, was identified in the MPRSWG report as having very significant conservation values (MPRSWG, 1994). In addition, projected increases in visitor numbers and industrial uses of the coastal environs of this area provided further impetus to ensure appropriate marine management arrangements were in place. In May 2000, the Minister for the Environment appointed a community-based advisory committee to assist CALM in developing an indicative management plan to guide the conservation and management of the marine environment in this area. The committee met nine times before finalising its advice to the Minister for the Environment in June 2003.

The *Indicative Management Plan for the proposed Dampier Archipelago Marine Park and Cape Preston Marine Management Area* provides a detailed description of the ecological and social values of the area, management objectives, strategies and targets. The goal of the plan is to facilitate the conservation of the marine biodiversity of the area and to ensure that the existing and future pressures on the values of the proposed reserves are managed within a sustainable framework. The plan also provides mechanisms for the local community to actively participate in the day to day planning and management of the reserves.

The management plan for the proposed reserves 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 reserves. These include fisheries regulations, industry regulations, wildlife protection, pollution control and environmental impact assessment, as well as maritime transport and safety measures. The plan has been prepared to be consistent with the management objectives of the adjacent island reserves and adjoining land use, including the Dampier Port and current industry uses. In addition it should be noted that many marine species are not permanently resident in the proposed reserves and move in and out of the reserves during different stages of their lifecycles. The water quality within the reserves may also be affected by activities outside the reserves. It is therefore critical that the environmental management objectives of the environment external to and within the reserves are compatible. Many of the strategies of the plan reflect this inter-dependence and the plan provides a framework to achieve the

necessary integration and close cooperation that are needed, between management and regulatory agencies, to achieve the conservation and sustainable management objectives outlined in this plan.

2 DEFINITION OF THE AREA AND RESERVE TENURE

The proposed Dampier Archipelago Marine Park and Cape Preston Marine Management Area are located off the north-west coast of Western Australia, approximately 1,650 km north of Perth, and cover an area of approximately 122,170 ha and 92,750 ha, respectively (combined area of 214,920 ha) (Figure 1). The reserve area is divided into three discrete areas intersected by the Dampier Port. The eastern portion of the proposed marine park extends from the boundary of the Dampier Port to include Delambre Island and waters adjacent to it at the eastern most limit of the proposed reserve. The proposed marine park boundary in this area then extends along the coastline of Nickol Bay to Dixon Island. The deeper waters of Nickol Bay are excluded from the proposed reserve. The western portion of the proposed marine park extends from Rosemary Island in the north to Enderby Island and also includes West Lewis, East Lewis, and Malus islands. The proposed marine management area extends from Eaglehawk Island to the Fortescue River mouth in the south-west, and includes all waters up to approximately 20 km from the coast. Technical descriptions of the boundaries of the proposed reserves are presented in Appendix I.

Many of the islands in the Dampier Archipelago are nature reserves, while other islands or parts of islands are reserved for conservation and recreation. All of these reserves are vested in the Conservation Commission of Western Australia and managed by CALM. The boundary of these terrestrial reserves extends to low water mark and as a result the boundary of the proposed marine reserves extend to low water mark, and the intertidal area is located within the terrestrial reserves. Indertidal areas contain important ecological communities (e.g. mangroves, mudflats, coral reefs) and many marine –related activities (e.g. fishing, swimming, reef-walking) occur in the area covering both the intertidal and nearshore subtidal areas. Furthermore, the geographic position of the low water mark is often difficult to determine accurately, particularly in macrotidal areas like the Pilbara. With these considerations in mind and to facilitate better management and enforcement of regulations within the proposed marine reserves the Advisory Committee for the Proposed Dampier Archipelago/Cape Preston Marine Conservation Reserve recommended that these intertidal strips be incorporated into the proposed marine reserves. CALM is currently undertaking a review of the *Dampier Archipelago Nature Reserves Management Plan 1990 - 2000* (CALM, 1990) and is working towards the integration of the marine and terrestrial management plans and resolving the issue of definition of boundaries (i.e. the intertidal strips between high and low water mark). The proposed boundaries of the proposed marine reserves and tenure in the Dampier Archipelago/Cape Preston region are shown in Figure 2.

The CALM Act provides for the classification of marine conservation reserves as marine park, marine nature reserve and marine management area. To determine the appropriate category for a proposed marine conservation reserve, it is necessary to assess the conservation significance and current and future uses of the area and the decision is guided by the purpose of the various reserve types as set out in the CALM Act (outlined below). More specific guidance is outlined in the MPRA's *Policy Statement: The application of the Marine Management Area reserve category in a marine conservation reserve planning process* (MPRA, 2001).

The CALM Act (Section 13B (1)) states that a marine park is established *"... for the purpose of allowing only that level of recreational and commercial activity which is consistent with the proper conservation and restoration of the natural environment, the protection of indigenous flora and fauna and the preservation of any feature of archaeological, historic or scientific interest."*

The CALM Act (Section 13A (1)) states that a marine nature reserve is established *"... for:*

a) the conservation and restoration of the natural environment;
b) the protection, care and study of indigenous flora and fauna; and
c) the preservation of any feature of archaeological, historic or scientific interest."

The CALM Act (Section 13C (1)(2)) states that a marine management area is established "… *for the purpose of managing and protecting the marine environment so that it may be used for conservation, recreational, scientific and commercial purposes. Commercial purposes include:*

a) aquaculture, commercial fishing and pearling activity;
b) mining, within the meaning of the Mining Act 1978;
c) seismic surveys and exploratory drilling for petroleum; and
d) production of petroleum and associated activities."

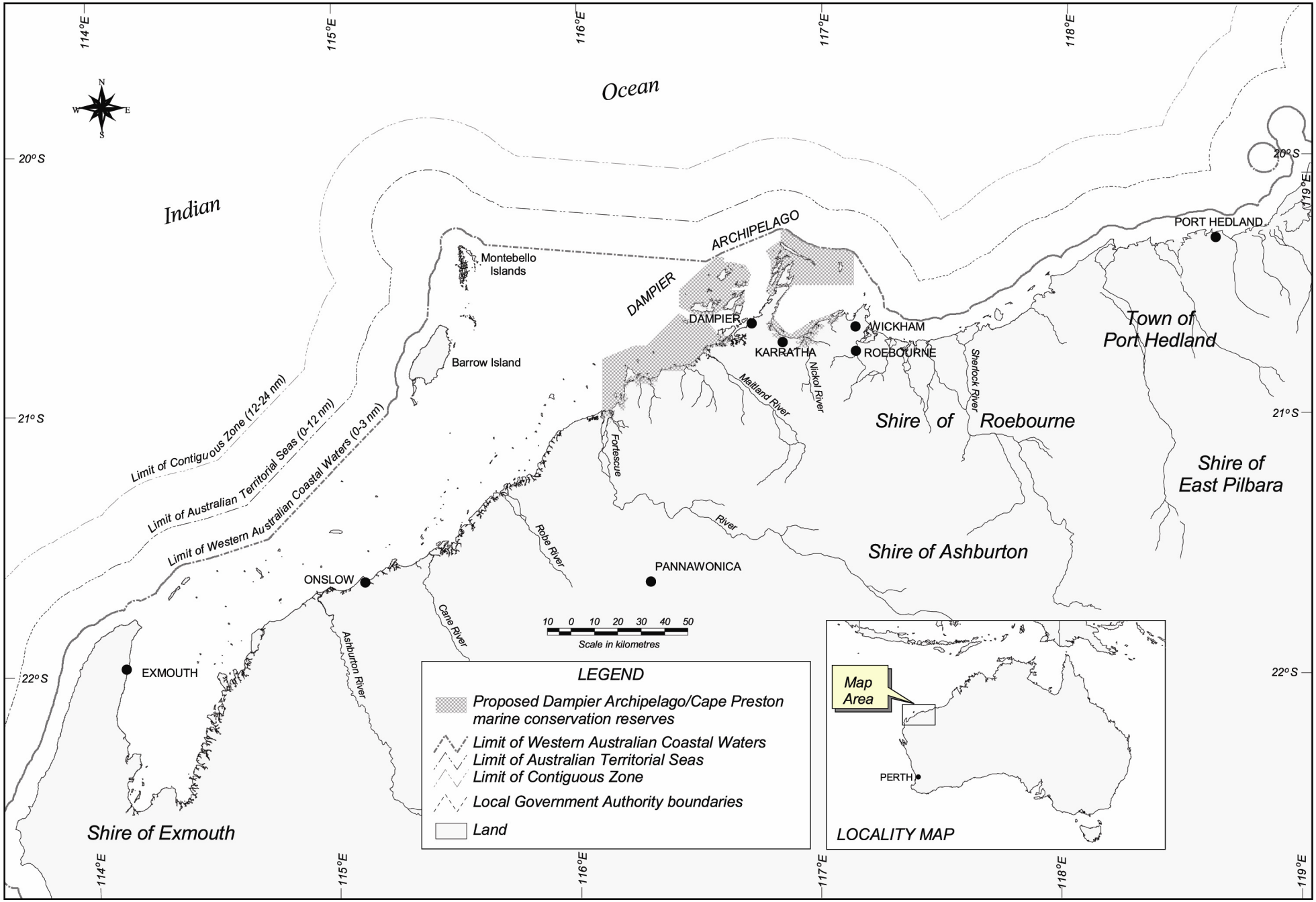


FIGURE 1: Locality map of the proposed Dampier Archipelago Marine Park and Cape Preston Marine Management Area.

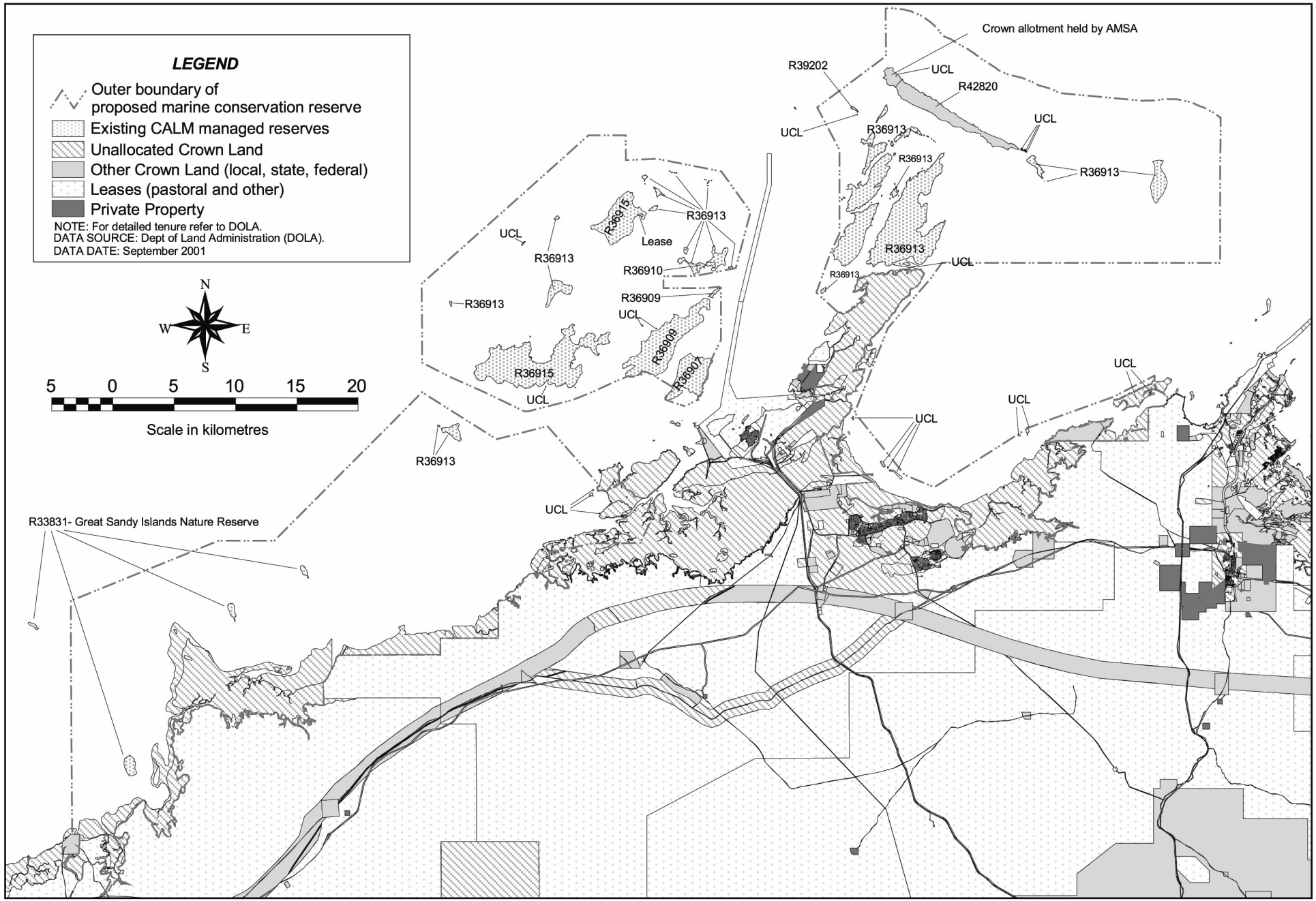


FIGURE 2: Tenure within and adjacent to the proposed Dampier Archipelago Marine Park and Cape Preston Marine Management Area.

The CALM Act (Section 6 (6)) also states that a marine park, marine nature reserve and marine management area *"... includes:*

(a) the airspace above such waters or land;

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

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

It is proposed that the Dampier Archipelago area be vested as marine park given the high ecological values as well as the fact that the primary social values are reliant on the maintenance of these ecological values (e.g. nature-based tourism, pearling, aquaculture, recreational and commercial fishing). The Cape Preston area is proposed as a marine management area. The use of this area is dominated by petroleum activities with a lower level of use for aquaculture, commercial fishing and recreational fishing. On the balance of ecological and social values, and in keeping with MPRA policy, it is recommended that marine management area is the most appropriate category and will provide an appropriate management framework for this area.

The reserves are proposed to be gazetted as Class A reserves. Under the statutory classification of Class A reserve, amendment of the purpose and boundaries of the reserves once gazetted, requires the tabling of an order in both Houses of Parliament. Either House can resolve to disallow an order so, Class A vesting provides a high level of security. 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 provides the flexibility to respond to changing management priorities and community aspiration. Any substantial change to the management plan requires a statutory three-month public submission period and approval by the Minister for the Environment, the Minister for Agriculture, Forestry and Fisheries and the Minister for State Development.

3 VISION AND STRATEGIC OBJECTIVES

3.1 Vision

The vision statement for the proposed reserves represents the community's future aspirations for the proposed reserves, as well as providing a broad direction for management of the proposed reserves.

Vision for the Dampier Archipelago Marine Park and Cape Preston Marine Management Area

To maintain for the future, the ecological values of the area, while allowing for economic growth and recognising social and cultural needs.

3.2 Strategic Objectives

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

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

Within the context of Government policy and the CALM Act, the strategic objectives for the proposed reserves are:

Conservation

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

Recreational Uses

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

Commercial Uses

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

Science and Education

- to promote education, nature appreciation and scientific research.

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

4 ECOLOGICAL AND SOCIAL VALUES

This section briefly outlines the ecological and socio-economic context of the proposed reserves. More comprehensive and detailed descriptions of the natural attributes and social values of the area can be found in Section 7, in some of the references and source documents outlined in Sections 11 and 12 and in the *Dampier Archipelago/Cape Preston Regional Perspective* (CALM, 2000).

4.1 Ecological Values

Ecological values are the intrinsic physical, chemical, geological and biological characteristics of an area. Their value is measured in relation to their local, regional, national and global biodiversity significance and their role in maintaining the structure and function of ecosystems. For convenience the ecological values are treated individually in this plan. However, in reality the marine environment of the proposed reserves is a structurally and functionally complex array of relationships between the plants and animals interacting with their physical environment.

The proposed reserves lie about 1,650 km north of Perth in the Pilbara Nearshore (PIN) marine bioregion (IMCRA, 1997). The PIN marine bioregion comprises nearshore waters up to 10 m deep and extends from Cape Keraurdren to the North West Cape. The bioregion is characterised by intertidal mud and sand flats associated with fringing mangals in bays and lagoons, a large tidal range, highly turbid water and the occurrence of fringing coral reefs around some of the islands. The marine biota of the region consists primarily of tropical species as well as many endemic species, with a particularly high diversity of in-fauna associated with the soft sediment habitats and a unique faunal assemblage associated with the coral reef habitats. In addition, a significant number of beaches are important turtle nesting sites and some of the islands support large seabird colonies. The area is considered to be in a relatively pristine condition; however, there are localised areas of species and habitat depletion. The Dampier Archipelago/Cape Preston region was identified for consideration as a marine conservation reserve in the MPRSWG report for the above reasons (MPRSWG, 1994).

The 12 major islands and 30 smaller islands, rocky reefs, coral reefs and shoals within the Dampier Archipelago represent the peaks of a drowned landmass. The islands and shoals rise above submarine plains that gently slope from 5 m deep near the mainland coast to 15 m to 20 m deep at the northern margin of the proposed reserve. Close to the outer islands, the sea floor descends steeply to more than 30 m, forming the inner part of the North West Shelf. The sea floor consists of extensive limestone pavements and large sheets of shell gravel, sand and mud. Many of the islands are composed of Precambrian rocks such as granite and granophyre, covered in parts by more recent deposits of limestone. The geomorphology of the islands range in size and elevation from small rocky islets less than 1 ha to Enderby Island at 3,290 ha and Dolphin Island at 3,203 ha and 120 m above mean sea level. The geomorphology of the islands varies with some having steep and rugged coastal cliffs, large rock piles and rocky shores separated by valleys, beaches and coastal sand plains, while others are of low elevation, lack rock piles and feature superficial sand dunes and beaches. The mainland coast between Cape Lambert and Cape Preston is characterised by rocky headlands interspersed with low-lying mudflats while Nickol Bay, a prominent feature in the proposed marine park, is a large shallow embayment whose shoreline includes mudflats, rocky shores, limestone pavements and sand beaches.

The majority of the waters of the proposed reserves are relatively pristine. Nearshore water movements and mixing patterns are driven primarily by large tidal ranges, wind stress and local currents, and are also influenced by wave action, seabed topography and the steering effect of islands and reefs. The Dampier Archipelago/Cape Preston region resides in the inshore zone of a relatively expansive shelf region, which, along with the presence of islands and reefs, reduces the ability of the Leeuwin Current and other broad scale regional currents to make any significant incursions into the near-shore zone. Water clarity in the region is influenced by the level of suspended material, which varies according to rainfall, cyclonic effects, proximity to the coast, water movement, wind speed and sediment type. The offshore reefs of the Archipelago are characterised by a relatively clear water column, while wind, tidal stirring and low throughflow rates within the inner Archipelago result in local re-suspension of fine sediments. Salinity and temperature differences between the near-shore and mid-shelf regions are expected to drive gentle cross-shelf circulation in the region.

Marine habitats in the Dampier Archipelago/Cape Preston region are extremely varied. Major marine habitats include soft sediment habitats (sand, mud and silt), macroalgal covered limestone reefs, coral reefs, mangals, beach, and rocky shores (Figure 3). The marine flora and fauna of the region are predominantly tropical species and surveys indicate that the biota is very diverse. Soft sediment habitats generally support an abundant and species-rich invertebrate fauna including molluscs, polychaete worms and crustaceans, which are extremely important as a food source for migratory birds. Of particular interest among the molluscs, for example, are five regionally endemic species of the volutid gastropod genus *Amoria*, which are sought after by specimen shell collectors. Limestone reefs are often covered in large, fleshy macroalgae (e.g. *Sargassum* spp.) or macroalgal turf, and support a range of invertebrate life such as sponges, ascidians and soft corals. The fringing coral reefs support a community structure and faunal composition that is unique. The coral fauna is diverse with 216 species of 57 hermatypic coral genera being recorded (Veron & Marsh, 1988). Structurally complex mangals are a common feature of the mainland shore with smaller systems around many of the islands, and are generally fronted by intertidal sand and mud flats. The most common mangrove species found in the proposed reserves are the white mangrove (*Avicennia marina)* and red mangrove *(Rhizophora stylosa)*, while the yellow-leaf spurred mangrove (*Ceriops tagal),* club mangrove (*Aegialitis annulata),* ribbed-fruit orange mangrove *(Bruguiera exaristata)* and river mangrove *(Aegiceras corniculata)* also occur. Mangals provide a home for many gastropods and other invertebrates, and are an important habitat for birds such as the mangrove whistler (*Pachycephala melanura*) and brahminy kite (*Haliastur indus*). Mangals and rocky shores support a variety of mollusc species including oysters and barnacles.

Marine wildlife of the Dampier Archipelago/Cape Preston region includes a total of eight species of toothed whale and four species of baleen whale. Whales use the proposed reserves as a resting area, and some whale migration paths pass through the proposed reserves. Dugong (*Dugong dugon*) are found in the region where they feed primarily on seagrass. Five species of marine turtle have been recorded from the region, with green (*Chelonia mydas*), loggerhead (*Caretta caretta*), hawksbill (*Eretmochelys imbricata*) and flatback (*Chelonia depressa*) turtles regularly using the sandy beaches for nesting. The Dampier Archipelago/Cape Preston region is a significant rookery for a variety of seabird species, with a significant wedge-tailed shearwater rookery in the area, and the proposed reserves are considered to provide important feeding and nesting grounds for migratory species.

The ecological values of the proposed reserves are listed below.

Summary of Ecological Values

- ***Geomorphology:*** *A complex seabed and island topography consisting of islands, islets, headlands, beaches, mudflats, rocky shores, platforms, intertidal and subtidal reef systems, sheltered lagoons and embayments and deep channels and drop-offs.*
- ***Sediment quality****: The sediments of the proposed reserves are generally undisturbed and are essential to the maintenance of a healthy ecosystem.*
- ***Water quality:*** *The majority of the waters of the proposed reserves are relatively pristine and are essential to the maintenance of a healthy marine ecosystem.*
- ***Coral reef communities:*** *Intertidal and subtidal reef systems, bommies and pavements with a high diversity of hard corals.*
- ***Mangrove communities:*** *There are six species of mangrove found in the proposed reserves and extensive mangrove communities line over 50% of the mainland shore. Many of these communities are considered to be of international significance.*
- ***Macroalgal and seagrass communities:*** *Extensive subtidal macroalgal and seagrass communities, which are important primary producers and refuge areas for fishes and invertebrates occur within the proposed reserves.*
- ***Subtidal soft-bottom communities:*** *Extensive sand and silt substrates that support a variety of invertebrate species both in and on the sediments.*
- ***Intertidal sand and mudflat communities (including samphire communities):*** *The intertidal sand and mudflat communities of the proposed reserves are primary producers and have an abundance of invertebrate life, which provides a valuable food source for shorebirds.*
- ***Rocky shore communities (including intertidal reef platforms):*** *Rocky shores are a major shoreline habitat of the proposed reserves and provide shelter for a variety of intertidal organisms, which in turn provide a valuable food source for shorebirds.*
- ***Turtles:*** *Green, hawksbill, loggerhead, flatback and leatherback turtles are of special conservation status and are all found in the proposed reserves. It is likely that most of the sandy beaches are used for turtle*

nesting and Rosemary Island has been identified as the focus for hawksbill turtle nesting in Western Australia.

- ***Marine mammals:*** *Eight species of toothed whale, four species of baleen whale and the dugong have been recorded from the proposed reserves. The humpback whale passes through the area during its annual migration.*
- ***Seabirds:*** *The proposed reserves are a significant rookery for seabird and provide important feeding and resting areas for migrating shorebirds.*
- ***Finfishes:*** *A diverse finfish fauna of approximately 736 species contributes significantly to the biodiversity of the proposed reserves.*
- ***Invertebrates:*** *A high diversity and abundance of invertebrate fauna within the proposed reserves is an important food source for a variety of marine animals including migratory birds and fishes.*

4.2 Social Values

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

The pre-history of Aboriginal habitation in the area dates back to at least 20,000 years and evidence of this history of occupation is found throughout the Burrup Peninsula. This area contains a rich collection of Aboriginal rock art engravings, some of which are the earliest examples of Aboriginal art that exist in Australia. Other archaeological features found in the Archipelago include mythological and ceremonial sites, graves, rock shelters, artifact quarries, burials and middens. These archaeological sites include shell middens, providing evidence of the strong association the Aboriginal people in this area have for the sea. There is still a strong Aboriginal identity in the region and traditional hunting of dugongs and turtles is an important activity. There are several native title claims over parts of the waters and islands of the proposed reserves.

In 2000/01, Western Australia's petroleum industry was worth $10,600 million per annum, making it the State's most valuable commodity. The Pilbara region is the State's most productive petroleum area producing 99.3% of the State's oil and 92.2% of the State's gas (DoIR pers. comm.). Dampier is a major exporting base for the State's minerals, oil and gas and the Dampier Port is the largest port by tonnage in Australia with 82.5 million tonnes of product worth in excess of six billion dollars exported in 2000 (IRC Environment, 2002). Forty seven percent of Western Australia's, and 14% of Australia's, exports leave via the Dampier Port (IRC Environment, 2002). The majority of this cargo is the result of the operations of three companies, which use their own private wharves, these being Dampier Salt Pty. Ltd., Hamersley Iron Pty. Ltd. and Woodside Energy Ltd. Salt production is a major industry in the region, with the Dampier Salt operation producing 3.7 million tonnes of salt per year valued at $60 million (Dampier Salt pers. comm.). Hamersley Iron operates three wharves (Parker Point, East Intercourse Island and a service wharf) from which iron ore is exported. Woodside Energy has offshore petroleum production platforms linked to onshore liquefied natural gas (LNG) production facilities and a fleet of dedicated LNG carriers that export mainly to Japan. In 2001, 7.7 million tonnes of LNG, 1.2 million tonnes of liquefied petroleum gas (LPG) and 4.2 tonnes of condensate were exported (Dampier Port Authority, 2002). The Dampier Port Authority (DPA) also operates a public wharf with seven berths, which can accommodate vessels up to 35,000 tonnes (DoT & PDC, 1997). Given the existing infrastructure already available in the region, expansion of processing and other industrial facilities is likely to significantly increase in the region.

The major commercial fishing activities in the proposed reserves are prawn and finfish trawling, finfish trapping and wet lining for finfish and on a smaller scale shell collecting and aquarium fish and coral collecting also occur in the proposed reserves. There are two prawn fisheries within the region, the Onslow Prawn Managed Fishery which comprises 31 licensed vessels and an estimated annual catch value of $0.9 million, and the Nickol Bay Prawn Managed Fishery which comprises 14 licensed vessels and an estimated annual catch value of $0.3 million (DoF, 2002). Fishing vessels operate out of the ports of Dampier, Onslow and Point Samson, with the latter primarily supporting the finfish fishery. There is a finfish processing facility located at Point Samson.

This map should not be used for navigational purposes.
This marine habitat map has its origins in the dataset developed from the Western Australian Department for Conservation, Environment and Heritage Dampier Archipelago Marine Study of 1981-1985.
Numerous subsequent marine habitat surveys undertaken by the public and private sectors have provided additional information.
The delineation between habitats on the map is shown by abrupt changes in habitat classification. In reality changes are more often a gradual transition from one habitat to another. Also many of the extensive deeper subtidal (>10m depth) and the nearshore subtidal habitats are unable to be distinguished with available remotely sensed information. As a result, the location of these habitat boundaries should be considered as approximate only.
In addition relatively limited ground-truthing data has been used in determining these habitats due to their extensive area.

For further information on data sources and methods, refer to:
Bancroft K.P. and Sheridan M.W. (2000). The major marine habitats of the proposed Dampier Archipelago/Cape Preston marine conservation reserve. Data Report MRI/PI/DAR-49/2000. August 2000. Marine Conservation Branch, Department of Conservation and Land Management, Fremantle, Western Australia. (Unpublished report).

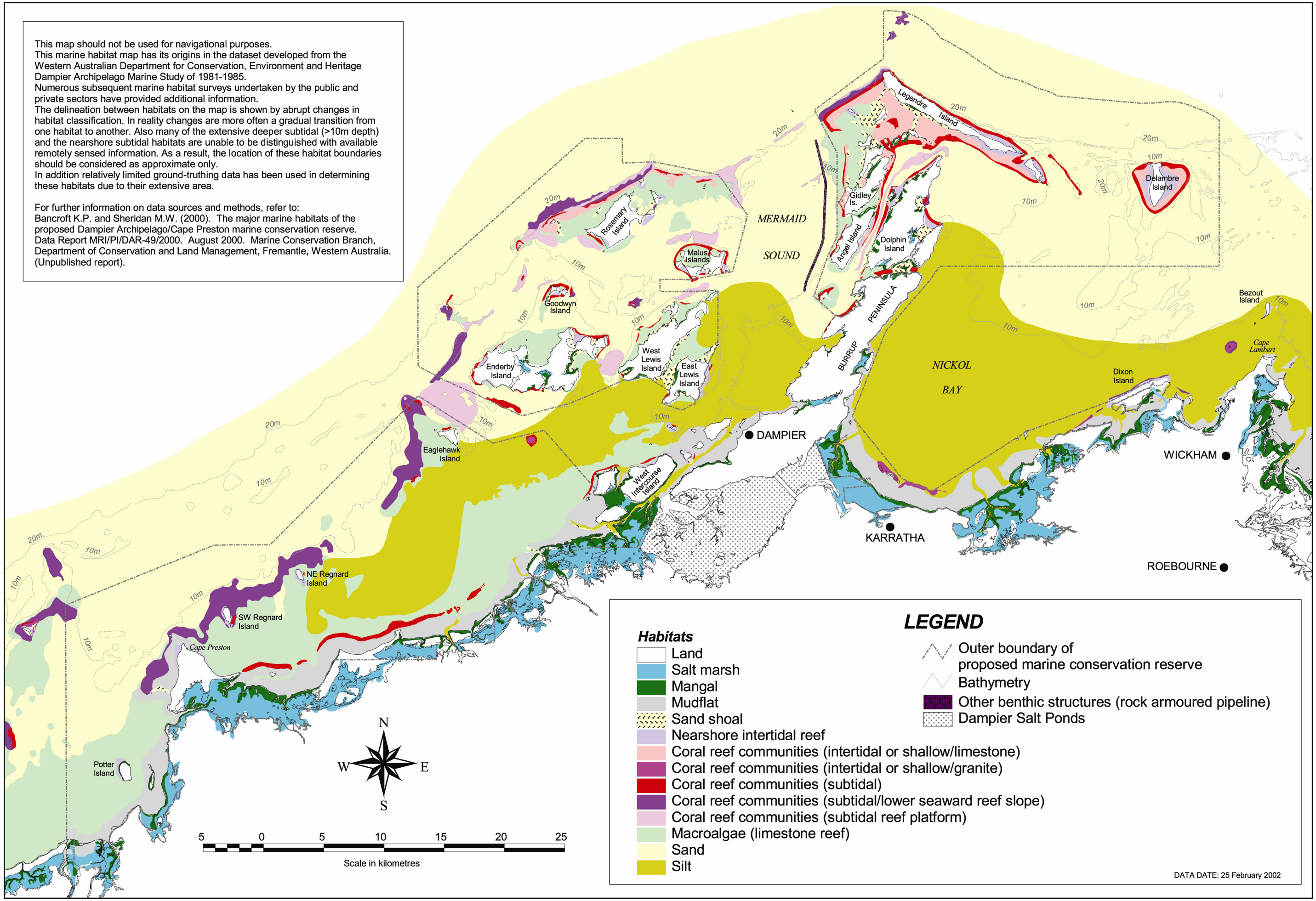


FIGURE 3: Major marine habitats of the proposed Dampier Archipelago Marine Park and Cape Preston Marine Management Area.

The Pilbara Trap Managed Fishery currently involves six licenses for two vessels that target demersal scalefish such as snapper, grouper, emperor and jobfish species. There are currently 32 commercial shell collectors licensed to operate in Western Australia and the annual catch of molluscs in the Pilbara in 1997 was approximately 106 tonnes valued at $335,000 (DCT & PDC, 1999). The Marine Aquarium Managed Fishery involves 13 aquarium collectors who are licensed to operate in Western Australia and five of these have an endorsement to take corals. Three of these marine aquarium collectors derive most of their business from the waters of the Dampier Archipelago. There is also some commercial line and net fishing in the proposed reserves. Pearling and aquaculture operations and leases exist in the region and the opportunity for development of this industry is significant.

The productive and sheltered waters provide a range of recreational fishing opportunities and this is a significant social value for the local community. Recreational fishers target species such as coral trout, tusk fish, rock cod, prawns, crayfish and mud and blue manna crabs. Game fishing tends to focus more on deeper water pelagic species such as marlin (*Makaira* sp.), sailfish (*Isiophorus* sp.), spanish mackerel (*Scomberomorus* sp.), golden trevally (*Gnathanodon* sp.) and turrum (*Caranx* sp.). Recreational fishers employ a variety of methods to catch fishes including line, spear and throw net fishing. Divers may have close encounters with large potato cods (*Epinephelus tukula*) or manta rays (*Manta birostris*).

The wide variety of wildlife, the natural rugged beauty and the attractive underwater scenery within the proposed reserves provide valuable nature-based tourism and recreation experiences for visitors. The area was identified as a Pilbara Priority Tourism Destination Area by the Western Australian Tourism Commission (WATC). Charter boat companies operate out of Dampier providing fishing, diving, snorkelling, swimming and island tours. Boating, camping and four-wheel driving are also popular activities. The large-scale industrial developments attract interest and visitor lookouts and tours have been developed to cater for this market. Tourism is also generated through the rich cultural and maritime heritage of the region. The significant potential for tourism within the Dampier Archipelago/Cape Preston region will see a continued increase in the number of visitors to the area and provide an increased incentive to protect the areas natural attractions.

Human activity in the marine environment of the Dampier Archipelago/Cape Preston region is increasing and as a result the recreational, commercial and tourism uses need to be managed to ensure compatibility with, and to minimise impact on, the reserves' conservation values. The social values of the proposed reserves are listed below.

Summary of Social Values

- ***Aboriginal heritage:*** *Shell middens, artefacts and rock art remain as testimonies to a rich history of Aboriginal habitation dating back 20,000 years. There is still a strong Aboriginal identity in the region today and the area is culturally and recreational significant to Indigenous people.*
- ***Maritime history:*** *The Dampier Archipelago/Cape Preston region has a history of European contact dating from 1628, which includes pearling, whaling and fishing for turtles.*
- ***Nature-based tourism:*** *The proposed reserves offer a wide range of attractions and opportunities for visitors to the area, with popular visitor activities including diving, fishing, and wildlife appreciation.*
- ***Commercial fishing:*** *The proposed reserves are used by commercial fishers targeting prawns, finfish and sharks. On a smaller scale beche de mer, molluscs and aquarium fish are also targeted.*
- ***Aquaculture:*** *The environment of the proposed reserves support the culture of pearls, algae, red claw crayfish and aquarium fishes, and have potential for future development of aquaculture industries in the future.*
- ***Pearling:*** *The warm water temperatures, high nutrient levels, protection from wave damage, and relatively shallow water in parts of the proposed reserves provide optimal conditions for the production of pearls.*
- ***Ports and shipping:*** *The high level of shipping activity in the area is expected to increase with the addition of future port facilities and the expected increase in tonnage of the nearby Dampier Port.*
- ***Industry:*** *Petroleum, iron ore export and salt production are the major industries, which operate in and adjacent to the proposed reserves.*
- ***Recreational activities:*** *The warm climate, island scenery, abundance of wildlife and pristine environment provides for a range of recreation activities including boating, diving and surface water sports.*
- ***Recreational fishing:*** *Line fishing, netting and spearfishing are used by fishers to target a variety of pelagic and reef finfish species, mud-crabs, crayfish and other invertebrates.*
- ***Seascapes:*** *Panoramic vistas of azure waters, offshore islands, reefs, mangroves and beaches are major aesthetic attractions of the proposed reserves.*

- ***Scientific research:*** *The pristine nature and wide variety of the habitats and communities of the proposed reserves combined with the wide range of human activities including heavy industry, ports and shipping, commercial fishing and recreational activities within the proposed reserve provide unique opportunities for ecological and social research.*
- ***Education****: The unique array of ecological and social values within the proposed reserves combined with the easy access and close proximity of the proposed reserves to regional centres provides opportunities for community education about the marine environment*.

5 MANAGEMENT FRAMEWORKS

5.1 International and National Context

At a national level, the conservation of marine biodiversity, maintenance of ecological processes and the sustainable use of marine resources are addressed by the Intergovernmental Agreement on the Environment. This 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 proposed reserves 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 governments 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 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 fulfill Australia's international responsibilities and obligations as a signatory to the Convention on Biological Diversity, to provide a means of meeting obligations under the Convention on Migratory Species (Bonn Convention) and to satisfy responsibilities under bilateral agreements for migratory birds with Japan and China. In addition, it supports the World Conservation Union (IUCN) World Commission of Protected Areas Program on promoting the establishment and management of a global representative system of marine protected areas (ANZECC TFPMA, 1998b).

5.2 State Policy Context

In 1984, the new CALM Act provided the first State legislation to create marine conservation reserves, and between 1987 and 1990 seven marine conservation reserves were created. In 2003 and 2004, five new marine conservation reserves were created (Jurien Bay Marine Park, Muiron Islands Marine Management Area, Montebello Islands Marine Park, Barrow Island Marine Park and Barrow Island Marine Management Area). In 1994, the State Minister for the Environment released a report entitled *A Representative Marine Reserve System for Western Australia* that identified about 70 areas in the coastal waters of Western Australia that were worthy of consideration for marine reservation under the CALM Act. In 1997, legislative changes were made to the CALM Act to change the mechanisms by which marine conservation reserve were established, vested and managed. These changes revised statutory consultative protocols for the establishment of marine reserves, provided clear guidance for commercial activities in marine reserves, and established the MPRA. The New Horizons policy released in June 1998 (Government of Western Australia, 1998a) provided policy guidance in respect to the establishment and management of marine conservation reserves.

5.3 Legislative Framework

Under the CALM Act, marine conservation reserves are vested in the MPRA and CALM is responsible for their management. The *Wildlife Conservation Act 1950* (WC Act), which is also administered by CALM, provides legislative protection for flora and fauna across the State's lands and waters. The Department of Fisheries (DoF) is responsible for the management and regulation of recreational and commercial fishing, aquaculture and pearling in CALM Act marine conservation reserves in accordance with the *Fish Resources Management Act 1994* (FRM Act). The *Fishing and Related Industries Compensation (Marine Reserves) Act 1997* provides the mechanism by which the holder of an existing DoF authorisation for commercial fishing, aquaculture, pearling, or fish processing may seek compensation if the commercial value of the authorisation is apparently diminished by the establishment of a marine nature reserve, or exclusion zone in a marine park. 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 impact 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 Department of Environment (DoE) is responsible for controlling pollution of marine waters.

The proposed reserves lie within State territorial waters. Waters seaward of this limit and extending to the 200 nautical mile limit fall under the jurisdiction of the Commonwealth Government. The proposed reserves encompass twenty five islands within its boundaries, which are incorporated into four nature reserves of varying reserve status (Class A, Class B and two Class C nature reserves) vested in the Conservation Commission of Western Australia and managed by CALM. There are also two islands and a portion of a third island that are 5(g) reserves for the purpose of conservation and recreation, also vested in the Conservation Commission of Western Australia. These terrestrial reserves do not form part of the proposed marine reserves and are not covered by this management plan.

5.4 Responsibilities of Authorities and Government Agencies

CALM is responsible for the overall management of marine conservation reserves under the marine reserve provisions of the CALM Act. CALM also collaborates with other agencies and authorities (i.e. MPRA, Conservation Commission of Western Australia, EPA, DoF and local government authorities) that have responsibilities within marine reserves and in the surrounding waters and coastal areas, to ensure the various regulatory and management practices are complementary. In some cases Memoranda of Understanding (MOUs) are developed to facilitate cooperation and promote operational efficiency. MOUs exist for the Rowley Shoals Marine Park and the Ningaloo Marine Park. An MOU between the EPA and the Department of Industry and Resources (DoIR) has been developed to guide assessment of petroleum activities, including within marine conservation reserves (Appendix II). This is an important document in relation to the management of the proposed reserves.

The MPRA plays an important role in the development of marine conservation policy, management plans and in auditing CALM's management of marine conservation reserves vested in the Authority. The audit function is an important role aimed to ensure that CALM's management of these reserves is meeting stated objectives and targets. The management plan provides the principal framework by which the MPRA will carry out this function.

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

Table 1: State authorities and agencies with responsibilities in the proposed Dampier Archipelago Marine Park and Cape Preston Marine Management Area

Marine Parks and Reserves Authority	• vesting body for the marine conservation reserves; • provides policy advice to the Minister for the Environment; and • audits management plan implementation by CALM.
Department of Conservation and Land Management	• manages marine conservation reserves vested in MPRA. This includes the: a) preparation of management plans; b) implementation of the management plan; c) coordination with other agencies; d) implementation of education 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.
Department of Fisheries	• manages and regulates commercial and recreational fishing, aquaculture and pearling in marine conservation reserves; and • lead role in enforcement of fisheries legislation within the marine reserve.
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 Coordinating 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.
Department of Environment	• 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.
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 artifacts 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 legislation that control mineral and petroleum exploration and development; and • regulates petroleum industry operations.

6 DESCRIPTION OF MANAGEMENT ISSUES

Management of the proposed reserves aims to maintain the ecological and social values of the reserves in the long-term. Recreational and commercial activities will be provided for where these activities are compatible with maintaining the reserves' values. To assess the compatibility of uses it is important to undertake a risk assessment, which considers the range of existing and potential pressures on the reserves' key values and their associated ecological and social implications. The level of risk posed by existing and/or potential pressures on the values of the reserves can be assessed by considering the following factors:

- the *probability* of a pressure occurring;
- the *temporal* scale of the pressure - pressures that continue over a longer time frame are often of greater concern than short-lived pressures;
- the *spatial* scale of the pressure - pressures that affect a large area are often of greater concern than localised pressures;

- the *trophic* level and conservation status of the species affected by the pressure - pressures that impact on lower trophic levels (i.e. primary producers) are of greater concern than those at higher trophic levels (i.e. secondary consumers) as a result of potential cascading effects on the whole ecosystem; and
- the *consequences* – acknowledges that different pressures have different social and political consequences.

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

The pressures on the reserves' values are either a primary or secondary impact of user activities. Therefore, the management plan's strategies for the proposed reserves focus primarily on alleviating the detrimental effects of human activities. These can be direct effects such as clearing of mangrove communities for facilities and infrastructure or impacts on fish stocks due to fishing. Indirect effects on the reserves' values may arise from activities such as littering, inappropriate sewage disposal and downstream effects of activities such as introduction of pests from ballast water discharge or sedimentation from dredging, pipe laying or construction activities. With an increase in users of the proposed reserves, the pressures on the conservation values of the reserves will increase and conflicts between users are likely to emerge. Pro-active strategies involving education and extension programs and active participation of reserve users and the local community in the on-going management of the reserve will be important strategies in ensuring management objectives are met and conflicts minimised.

7 MANAGEMENT OF ECOLOGICAL AND SOCIAL VALUES

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

The format 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 developed in the *Strategic Plan of Action for the National Representative System of Marine Protected Areas: A Guide for Action by Australian Governments* (ANZECC TFMPA, 1999). The objectives, strategies, performance measures and management targets outlined in Section 7 reflect an outcome-based "best practice" approach from which the effectiveness of management can be better assessed. This model has been adopted by the MPRA to facilitate better conservation and management outcomes and a more objective and effective approach to auditing CALM management.

Management Objectives
Management objectives identify **what** the primary aims of management are and reflect the statutory responsibilities of the CALM Act. Objectives have been developed for all of the ecological and social values of the proposed reserves. Where a significant pressure/s on an ecological value has been identified, the management objective addresses the specific pressure/s. When there is not an obvious existing pressure or threat, the management objective provides broader direction to management in relation to protecting the value from the most likely future threats. Management objectives for social values address, where appropriate, the effect of the activity on other reserves' values and the complementary interests of other statutory management arrangements or activities that exist in the reserve.

Management Strategies
Management strategies provide specific direction on **how** the management objective/s for each value might be achieved. All strategies outlined in this plan have been defined as 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 proposed reserves are also designated as *key management strategies* **(H – KMS)**. These strategies will also form part of the performance assessment of reserve management by the MPRA, particularly during the initial years of establishing the reserves (see Section 10 – Performance Assessment). A proposed timeline for implementation of management strategies is outlined in Appendix III. It should be noted that management priorities are likely to alter in response to changes in usage patterns or to new knowledge acquired during the life of the management plan.

Performance Measures

Performance measures are **indicators of management effectiveness** in achieving the reserves' 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 value of the proposed reserves). Performance measures should be quantitative, representative and, where possible, simple and cost-effective. Performance measures for indirect (e.g. nutrient enrichment impacts on corals) and direct (e.g. mooring impacts on corals) impacts should focus on surrogate (e.g. changes in phytoplankton biomass and species composition) and direct (e.g. changes in biodiversity and coral reef cover) measures of the value respectively. Performance measures for some social values have not been developed due to inadequate existing information. These will be developed during the early phase of the implementation of this plan.

In regard to the *active* social values (i.e. those social values that have the potential to impact negatively on the ecological values of the proposed reserves) a different approach to performance assessment is required. This has been termed *Reporting*, and incorporates information on the status nature, level and trend of the human activity. This information is important in monitoring human activities to assist in determining trends in use, and to assist in assessing impacts of the social values on the ecological values of the proposed reserves.

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" and quantitative targets for marine habitats in commercial (aquaculture) areas and unzoned areas of the proposed marine management area will be developed in consultation with stakeholders prior to the finalisation of the management plan following additional habitat mapping to more accurately define the extent of habitats. The long-term target provides a specific benchmark to assess the success or otherwise of management action within the life of the management plan. The short-term target provides a benchmark for management to achieve within a specified time period and, in most cases, is a step to achieving the long-term target. Targets have been developed for all ecological and social values. The targets for *active* social values (e.g. recreational fishing, commercial fishing, nature-based tourism, aquaculture, pearling, ports and shipping, industry and recreational activities) are process-based and are generally stated as "*Implementation of management strategies within agreed timeframes*". 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 reserves. KPIs relate specifically to the management targets for key ecological and social values and reflect the highest conservation (from a biodiversity and ecosystem integrity perspective) and management (social) priorities of the MPRA, CALM and the community. KPIs are a key element of the MPRA audit process (Section 10).

Given the key values and pressures on the area, the KPIs for the proposed reserves will be based on the management targets for water quality, coral reef communities, mangrove communities, subtidal soft-bottom communities, intertidal sand and mudflat communities (including samphire communities), turtles, invertebrates and finfish.

7.1 Ecological Values

Ecological values are the physical, geological, chemical and biological characteristics of an area. The complex seabed and island topography of the Dampier Archipelago and Cape Preston area supports a variety of habitats including coral, seagrass, macroalgae, mangrove, soft-sediment, rocky shore and mudflat communities. An abundances plants, invertebrates and fish inhabit the area and also provide an important food source for seabirds, shorebirds and other large megafauna including dolphins, whales and turtles.

Ecological values also have a social significance in that many social values are functionally dependent on the maintenance of ecological values. Social values are discussed in Section 7.2.

7.1.1 Geomorphology

Ecological value	***Geomorphology:*** *A complex seabed and island topography consisting of islands, islets, headlands, beaches, mudflats, rocky shores, platforms, intertidal and subtidal reef systems, sheltered lagoons and embayments and deep channels and drop-offs.*

Background	The influences of tectonic plate movement, changes in sea levels and more recent oceanic and climatic conditions have resulted in the complex intertidal and subtidal geomorphology of the Dampier Archipelago/Cape Preston region. The 12 major islands and 30 smaller islands, rocky reefs, coral reefs and shoals within the Dampier Archipelago represent the peaks of a drowned landmass, with the islands and shoals rising above submarine plains which gently slope from 5 m deep near the mainland coast to 15 m to 20 m deep at the northern margin. Close to the outer islands, the sea floor descends steeply to more than 30 m, forming the inner part of the North West Shelf. Many of the islands are composed of granite and granophyre, covered in parts by more recent deposits of limestone. The islands range in size and elevation from small rocky islets less than 1 ha to Enderby Island (3,290 ha) and Dolphin Island (3,203 and 120 m above mean sea level). The islands generally have steep and rugged coastal cliffs, large rock piles and rocky shores separated by valleys, beaches and coastal sand plains, although some of the more northerly islands and islets such as Legendre Island are of low elevation and feature superficial sand dunes and beaches. Shoals often form connections between the islands and coral reefs of the Archipelago. The mainland coast between Cape Lambert and Cape Preston is characterised by rocky headlands interspersed with low-lying mudflats and adjoining mangroves fringed inshore by salt marshes, while Nickol Bay, a prominent feature in the proposed marine park, is a large shallow embayment whose shoreline includes rocky shores and limestone pavements. Two major rivers, the Maitland River and Fortescue River, and a number of smaller creeks drain into the proposed marine management area. Development proposals in the area, including new pipelines or shipping channels are subjected to assessment in accordance with the EP Act. The current major pressure on the geomorphology of the proposed reserves has been identified as physical disturbance from pipe-laying activities. Potential pressures on the proposed reserves' geomorphology include further infrastructure development, future dredging for shipping channels and recreational use of coastal landforms. Proposed management of the reserves with regard to geomorphology relates to liaison with industry and other agencies to ensure the importance of the geomorphology is taken into account when proposed developments in the area are assessed. Education of reserve users about the ecological importance of the proposed reserves' geomorphology will be another key management strategy.
Current status	The geomorphology is generally undisturbed, apart from instances where pipelines come ashore, where shipping channels have been dredged and causeways and wharves constructed.
Existing and potential uses and/or pressures	• Physical disturbance from infrastructure development (e.g. seabed pipelines, groynes, marinas). • Physical disturbance from dredging/blasting shipping channels. • Physical disturbance from recreational use of coastal landforms (e.g. vehicles, boat landing). • Physical disturbance from installation of markers and removal of hazards. • Quarrying.

Current major pressure/s	Physical disturbance from pipe-laying activities.
Management objective/s	1. To ensure that the structural complexity of the proposed reserves' geomorphology is not significantly reduced by human activities. 2. To ensure that coastal landforms within the proposed reserves are not degraded by access and use.
Strategies	1. Ensure that approvals and the setting of conditions for new industry, nature-based tourism, commercial fishing, aquaculture and pearling operations are consistent with the management objective and targets for geomorphology and that appropriate monitoring conditions are applied to ensure these outcomes are achieved (CALM, DoE/EPA, industry, WATC, DoF). **(H)** 2. Ensure industry is informed of relevant management objectives and targets for geomorphology (CALM). **(M)** 3. Educate reserve users about the ecological importance of the proposed reserves' geomorphology (CALM). **(M)**

Performance measures	Area of physical disturbance (ha).	**Desired trend/s**	Constant or negative.
Short-term target/s	Not Applicable.		
Long-term target/s	The targets for geomorphology will be as noted below. i. *Sanctuary, special purpose (mangrove protection), special purpose (benthic protection), special purpose (intertidal reef protection)* and *recreation* zones – no change, as a result of human activities. ii. *General use, special purpose (multiple use)* and *special purpose (pearling or aquaculture)* zones of the *marine park* and *conservation areas* of the *marine management area* – no change except in areas approved by the appropriate government regulatory authority. The cumulative area of change is not to exceed 1% of the total area of these zones. iii. *Commercial (aquaculture) areas* and unzoned areas of the *marine management area*[§] - maintained in a natural state, except for areas where some level of acceptable change is approved by the appropriate government regulatory authority.		

[§]Quantitative targets geomorphology, water quality, sediment quality and marine habitats in the commercial (aquaculture) areas and unzoned areas of the marine management area will be developed in consultation with stakeholders prior to the finalisation of the management plan, or early in the life of this management plan, following additional habitat mapping to more accurately define the extent of marine habitats.

7.1.2 Sediment quality

Ecological value	**Sediment quality**: *The sediments of the proposed reserves are generally undisturbed and are essential to the maintenance of a healthy ecosystem.*

Background	Except for areas of high shipping activity (e.g. in the Dampier Port), the sediment quality of the Dampier archipelago/Cape Preston region is generally in an undisturbed condition. High sediment quality is important for the maintenance of healthy ecosystems Development and infrastructure proposals that have the potential to impact on sediment quality in the State are generally subject to assessment under the EP Act. The EPA can set conditions for sediment quality, which are subsequently regulated by the DoE and the DoIR. The current major pressure on sediment quality in the proposed reserves is anti-fouling agent accumulation. Localised impacts on the sediment quality are the result of contamination in areas of high shipping activity such as loading facilities and channels, which results in the accumulation of anti-fouling agents in the sediments. Anti-fouling agents, such as Tributyl tin (TBT) are highly toxic to marine life, such that the recommended water quality guideline for TBT in Australian marine waters is only 2 mg TBT/l. Proposed management to maintain sediment quality in the proposed reserves includes the monitoring of the sediment quality within the reserves, liaison with the DPA to ensure sediment quality monitoring occurs within the Dampier Port, and the maintenance of a pollutants input database.
Current status	The sediment quality is generally in an undisturbed condition, apart from some areas of high shipping activity.
Existing and potential uses and/or pressures	Anti-fouling agent accumulation in areas of high shipping activity (e.g. Dampier Port and wharf facilities).
Current major pressure/s	Anti-fouling agent accumulation in areas of high shipping activity.
Management objective/s	To ensure the sediment quality of the proposed reserves is not significantly impacted by the input of contaminants.
Strategies	1. Ensure a pollutant input database for the proposed reserves is maintained (industry, CALM). **(H)** 2. Establish baseline sediment quality monitoring programs in relation to anti-fouling agents in the proposed reserves (CALM). **(H)** 3. Liaise with the DPA regarding the coordination of monitoring programs for sediment quality within the Dampier area (CALM, DPA). **(M)**

Performance measure/s	Anti-fouling agent concentration in sediment.	**Desired trend/s**	Constant or negative.
Short-term target/s	Not Applicable.		
Long-term target/s	The targets for sediment quality will be as noted below. i. *Sanctuary, special purpose (mangrove protection), special purpose (benthic protection), special purpose (intertidal reef protection)* and *recreation* zones – no change from background$^{\Omega}$ levels, as a result of human activities. ii. *General use, special purpose (multiple use)* and *special purpose (pearling or aquaculture)* zones of the *marine park* and *conservation areas* of the *marine management area* – no change from background$^{\Omega}$ levels, except in areas approved by the appropriate government regulatory authority. The area not meeting ANZECC guidelines is not to exceed 1% (by area) of these zones. iii. *Commercial (aquaculture) areas* and unzoned areas of the *marine management area*§ - maintained in a natural state, except for designated areas where some level of acceptable change is approved by the appropriate government regulatory authority.		

[§]Quantitative targets for geomorphology, water quality, sediment quality and marine habitats in the commercial (aquaculture) areas and unzoned areas of the marine management area will be developed in consultation with stakeholders prior to the finalisation of the management plan, or early in the life of this management plan, following additional habitat mapping to more accurately define the extent of marine habitats.

[Ω]*background* conditions are determined from an appropriate unimpacted reference site, as per the environmental quality management framework referred to in the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC & ARMCANZ, 2000).

7.1.3 Water quality

Ecological value	**Water quality:** *The majority of the waters of the proposed reserves are relatively pristine and are essential to the maintenance of a healthy marine ecosystem.*

Background	The waters of the proposed reserves are relatively undisturbed and are essential to the maintenance of a healthy ecosystem. The broad oceanographic processes and the nature of water circulation in the region influence the transport, dispersal and mixing of sediment, biota and pollutants and consequently the water quality of the area. Nearshore water movements and mixing patterns in the Dampier Archipelago/Cape Preston region are driven primarily by large tidal ranges, local currents and winds, but are also influenced by seabed topography and the steering effect of islands and reefs. The presence of islands and reefs and a relatively expansive shelf region, reduces the ability of the Leeuwin Current and other broad scale regional currents to make any significant incursions into the near-shore zone. Sea surface temperatures within the Dampier Archipelago range from about 18ºC in winter to 31.5ºC in summer, with the near-shore waters having a greater seasonal temperature range than the offshore waters. The smallest range and lowest salinities (35.1 to 36.1 ppt) occur offshore at the 20 m contour, and the largest range and highest salinities (35.45 to 37.1 ppt) occur inshore within 2 km of the Burrup Peninsula. Salinity and temperature differences between the near-shore and mid-shelf regions are expected to drive gentle cross-shelf circulation in the region. The level of suspended material, which varies according to water movement and sediment type, influences water clarity in the region. The offshore reefs of the Archipelago are characterised by a relatively clear water column, while wind, tidal stirring and low throughflow rates within the waters within the inner Archipelago result in local re-suspension of fine sediments. The intermediate zone between offshore and near-shore reefs fluctuates in water clarity depending on seasonal variations in wind and wave action. The National Water Quality Management Strategy provides a framework for water quality management that is based on policies and principles that apply nationwide. It is implemented in Western Australia through the State Water Quality Management Strategy and the State implementation framework (EPA, 2002). Development and infrastructure proposals, which have the potential to impact on water quality in the State are subjected to assessment under the EP Act. Conditions are set for water quality, and are regulated by DoE and the DoIR. The DPA is responsible for the coordination of oil spills occurring within port waters, while the Australian Maritime Safety Authority (AMSA) has responsibility for overseeing appropriate discharge of ballast water from national and international shipping. The current major pressure on water quality in the proposed reserves is discharge of pollutants (nutrients and toxicants) into the water. Pollutant inputs include anti-fouling agents, aquaculture feed wastes and the legal discharge of sewage, ballast or bilge water and storm water run-off. There is also a potential risk of accidental spillage of toxicants such as petroleum products. Sewage discharge from vessels has the potential to increase nutrient levels and to cause health problems for people in direct contact with the water due to elevated bacterial levels. The impact of sewage from vessels will vary considerably at both temporal and seasonally scales, as a consequence of environmental parameters (e.g. water circulation) and human usage patterns (e.g. number of vessels and number of passengers). The State Government adopted a policy for the discharge of sewage from vessels in 2004. The basis of this policy is that three zones will apply in State coastal waters: • Zone 1 - No discharge; • Zone 2 - Discharge only using approved treatment systems; and • Zone 3 - Open for discharge of untreated vessel sewage. The policy outlines a number of guidelines but allows some flexibility in applying the zones in marine conservation reserves. In respect to the proposed reserves, sanctuary zones, special purpose zones, commercial (aquaculture) areas, conservation (flora/fauna protection) areas, the conservation (mangrove protection) area, and waters within 500 m of land and islands are proposed to be designated as no discharge i.e. *Zone 1*. No controls are considered necessary on the seaward side of the reserves (greater than 20 m depth) due to low vessel sewage inputs and extremely high dispersal factors (i.e. high energy environment) and this area will subsequently be classified as *Zone 3*. All other areas of the proposed reserves will be designated as *Zone 2*

	i.e. only allow sewage discharge using approved treatment systems. The water quality, and subsequently the marine communities, of the region are susceptible to a number of other impacts. The risk of oil pollution due to accidental spills in the area is significant given the volume of commercial shipping that passes through Dampier. An oil spill in the proposed reserves or the adjacent port would not only have detrimental effects on water quality, but could also have significant ecological impacts on wildlife such as birds, turtles and marine mammals, and coral reef, mangrove and intertidal communities. Other potential pressures on the water quality of the proposed reserves include litter, shipping-induced turbidity and industrial outfalls. Proposed management to maintain the water quality of the proposed reserves includes monitoring of water quality and pollutant inputs, gaining a better understanding of the processes that contribute to the high water quality and the input of the reserves' values into models and response plans for oil spills. The Dampier Salt Ltd. operation currently draws seawater and discharges bitterns in the Nickol Bay area. Likely expansion of the operation is likely to increase both the uptake and quantity of bitterns discharge. Management targets for water quality will be set appropriately to provide for a mixing zone that provides for the reasonable requirements for expansion of this operation.
Current status	The water is generally in a pristine condition, apart from some localised disturbances.
Existing and potential uses and/or pressures	• Toxicants (e.g. accidental spillage of petroleum products, anti-fouling agents, ballast and bilge water discharge, runoff from mainland). • Nutrients (e.g. vessel, island and mainland sewage discharge, aquaculture feeds). • Introduced pests (e.g. ballast water and hull fouling organisms). • Litter (e.g. from recreational and commercial fishing, pearling, aquaculture, industry, visitors, runoff from mainland). • Sedimentation (e.g. dredging, pipe-laying or construction activities). • Increased temperature or salinity from industrial outfalls. • Impacts to water quality due to hydrological changes as a result of industry developments (e.g. causeways, jetties, groynes).
Current major pressure/s	Discharge or accidental spillage of toxicants and nutrients.
Management objective/s	To ensure the water quality of the proposed reserves is not significantly impacted by the input of contaminants.
Strategies	1. Establish baseline water quality monitoring programs in relation to nutrient enrichment and pollutant inputs to the proposed reserves (CALM). **(H-KMS)** 2. Develop an appropriate understanding of the natural variability of the local water quality conditions in the proposed reserves (CALM). **(H)** 3. Develop an appropriate understanding of the circulation and mixing of the proposed reserves' waters (CALM). **(H)** 4. Establish and maintain a pollutant inputs database for the proposed reserves (CALM, DoE). **(H)** 5. Ensure that approvals and setting of conditions for all new industry, nature-based tourism and aquaculture operations are in accordance with the proposed reserves targets (DoE/EPA, industry, WATC, DoF, CALM). **(H)** 6. Ensure the values of the reserves are fed into predictive models and response plans for oil spills to assist in managing any pollution event that occurs within or adjacent to the proposed reserves (DPI, DPA, CALM). **(M)** 7. Liaise with the DPA regarding the coordination of monitoring programs for water quality within the Dampier area (CALM). **(M)** 8. Inform users of the proposed reserves about Government policy and regulations on vessel sewage disposal (CALM, DoE). **(M)**

Performance measures	1. Nutrients: Chlorophyll *a* and inorganic nitrogen conc. in seawater. 2. Toxicants: conc. in seawater 3. Pathogens: Faecal coliform conc. in seawater. 4. Litter: Mass (kg) of litter at selected monitoring sites.	**Desired trend/s**	1. Constant or negative. 2. Negative. 3. Negative. 4. Negative.
Short-term target/s (KPI)	Not Applicable.		
Long-term target/s (KPI)	The targets for water quality will be as noted below. i. *Sanctuary, special purpose (mangrove protection), special purpose (benthic protection), special purpose (intertidal reef protection)* and *recreation* zones – no change from background[Ω] levels, as a result of human activities. ii. *General use*, *special purpose (multiple use)* and *special purpose (pearling or aquaculture)* zones of the *marine park* and *conservation areas* of the *marine management area* – no change from background[Ω] levels, except in areas approved by the appropriate government regulatory authority. The area not meeting ANZECC guidelines is not to exceed 1% (by area) of these zones. iii. *Commercial (aquaculture) areas* and unzoned areas of the *marine management area*[§] - maintained in a natural state, except for areas where some level of acceptable change is approved by the appropriate government regulatory authority.		

[§]Quantitative targets for geomorphology, water quality, sediment quality and marine habitats in the commercial (aquaculture) areas and unzoned areas of the marine management area will be developed in consultation with stakeholders prior to the finalisation of the management plan, or early in the life of this management plan, following additional habitat mapping to more accurately define the extent of marine habitats.

[Ω]*background* conditions are determined from an appropriate unimpacted reference site, as per the environmental quality management framework referred to in the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC & ARMCANZ, 2000).

7.1.4 Coral reef communities

Ecological value	***Coral reef communities:*** *Intertidal and subtidal reef systems, bommies and pavements with a high diversity of hard corals.*

Background	Coral communities occur throughout the proposed reserves and together, the shallow intertidal and subtidal reef communities comprise 8% (approximately 18,300 ha) of the major marine habitats. The most diverse coral areas in the proposed reserves are found on the seaward slopes of Delambre Island, Hamersley Shoal, Sailfish Reef, Kendrew Island and north-west Enderby Island. Live coral cover can vary greatly from reef to reef, as indicated by contrasting covers of 10 to 60% on Sailfish Reef and Hamersley Shoal, respectively. The proposed reserves have a high diversity of hard corals, with at least 229 species recorded from Western Australian Museum (WAM) surveys (WAM pers. comm.). This diversity of corals may be attributed to the variety of substrates and oceanographic conditions within the proposed reserves, where conditions range from exposed reefs with high wave action, clear water and low sediment deposition rates on the seaward coasts of the outer islands, to the sheltered areas further inshore with high sediment deposition rates and turbid waters. Corals are important primary producers and they provide food, substrate and shelter for a wide variety of marine life including sponges, seastars, sea urchins, crustaceans, molluscs, gastropods, worms and fishes. Some inhabitants of coral communities such as fish, molluscs, ornamental aquarium fish and juvenile corals are targeted by recreational and commercial fishers. Corals are protected throughout the State under the WC Act, except where they can be legally taken under the FRM Act. Corals can be legally collected throughout the State under the FRM Act for commercial purposes, by five fishers who hold a Marine Aquarium Managed Fishery license with an endorsement to take corals. Three of these marine aquarium collectors derive most of their business from the waters of the Dampier Archipelago and the annual maximum take of coral in Western Australia from all licences is 7.5 tonnes (DoF, pers. comm.). In July 2001, the DoF imposed an interim 12 month prohibition on recreational collection of coral and in July 2003, the DoF imposed a prohibition of commercial coral collecting in Cleaverville beach. The prohibitions will remain in place until such time as the Minister for Agriculture, Forestry and Fisheries has endorsed a long-term management strategy for these activities. In addition, development proposals that may impact on corals are subject to an environmental impact assessment by the DoE/EPA in accordance with *Guidance for the Assessment of Environmental Factors. Benthic Primary Producer Habitat Protection* (EPA, 1998a). This statement, which has its basis in the EP Act, indicates that the EPA's environmental objective in regard to benthic primary producer habitat protection is *"... to maintain the integrity of the marine ecosystems of Western Australia to support the widest possible range of environmental values while recognising the current and projected future uses."* (EPA, 1998a). Current major pressures on coral communities identified in the proposed reserves are fishing (which can alter community structure) and physical disturbance from trampling and coral collecting. However, corals are susceptible to a number of potential impacts including nutrient enrichment, introduction of exotic pests and elevation of water temperature from thermal discharges. Proposed management of coral reef communities in the proposed reserves are precautionary, including spatial controls to ensure adequate protection against potential impacts and to allow for monitoring, as well as providing areas free of extractive activities, which will provide coral viewing sites. Proposed management will also include liaison with industry and other agencies to ensure the importance of the coral reef communities is taken into account when proposed developments in the area are assessed. Other proposed management controls include prohibitions on coral collecting, regulation of moorings, education and research. During the planning process for the proposed reserves a range of issues were raised with respect to conflicts between recreational and commercial fishers. In response to these issues it has been proposed that all commercial fishing be prohibited in the western portion of the proposed marine park with the exception of commercial aquarium/specimen (fish, coral and shell) collecting, which is proposed to be phased out of this area within three years of creating the proposed reserves. DoF will develop this proposal in liaison with key stakeholders.

Current status	The coral reef communities are generally in good condition with only limited disturbance evident from human activities.
Existing and potential uses and/or pressures	• Fishing causing the removal of top order predators. • Physical disturbance (e.g. trampling, coral collecting, localised anchoring, installation of pipelines, diver damage, infrastructure development). • Nutrients (e.g. vessel, island and mainland sewage discharges). • Toxicants (e.g. accidental spillage of fuel, oil etc, anti-fouling agents, ballast and bilge water discharge). • Introduction of exotic pests (e.g. from ballast water, hull fouling organisms). • Elevation in water temperature through thermal discharges. • Sedimentation (dredging, pipe-laying or construction activities).
Current major pressure/s	Fishing and physical disturbance from trampling and coral collecting.
Management objective/s	To ensure species diversity and live coral cover in intertidal and subtidal coral communities are not significantly impacted by fishing and human disturbance in the proposed reserves.
Strategies	1. Implement spatial controls to provide for: • monitoring of representative coral communities in areas free of significant human influence (of sufficient size and replicated); • protection of coral communities in key recreation sites; • areas where visitors can view coral reefs in their natural state; and • an appropriate level of protection (CALM). **(H-KMS)** 2. Assess the nature, level and potential impacts of human activities on coral reef communities within the proposed reserve and implement an appropriate monitoring program (CALM). **(H-KMS)** 3. Ensure that approvals and the setting of conditions for new industry, nature-based tourism, pearling, aquaculture and commercial fishing operations are consistent with the management targets for coral reef communities and that monitoring conditions are applied as appropriate to ensure these outcomes are achieved (DoE/EPA, DoF, industry, WATC, CALM). **(H)** 4. Educate reserve users about the ecological importance of coral reef communities and the potential detrimental effects of indiscriminate reef walking, collecting, anchoring and boating on coral reef communities (CALM). **(H)** 5. Initiate research programs to characterise the floral and faunal diversity, and natural variability, of coral communities within the proposed reserve (CALM, DoF). **(M)** 6. Ensure industry is informed of relevant management objectives and targets for coral reef communities within the proposed reserve (CALM). **(M)** 7. Ensure all existing moorings meet a specified environmentally acceptable standard within 3 years, and that all new moorings meet the specified environmentally acceptable standard where these moorings are located in sensitive coral reef communities (DPI, CALM). **(M)** 8. Consider strategies for high anchorage areas, such as anchorage restriction areas or provide moorings in areas where other options are not possible (CALM, DPI). **(L)**

Performance measures	1. Diversity. 2. Biomass (extent in ha) of coral reef communities.	**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 coral diversity as a result of human activity in the proposed reserves. 2. The abundance[Ø] targets for coral reef communities will be as noted below. i. *Sanctuary, special purpose (mangrove protection), special purpose (benthic protection), special purpose (intertidal reef protection)* and *recreation* zones – no change due to human activities. ii. *General use, special purpose (multiple use)* and *special purpose (pearling or aquaculture)* zones of the *marine park* and *conservation areas* of the *marine management area* – no change except in areas approved by the appropriate government regulatory authority. The cumulative area of change is not to exceed 1% (by area) of this habitat in these zones.		

	iii. *Commercial (aquaculture) areas* and unzoned areas of the *marine management area*[§] - maintained in a natural state, except for areas where some level of acceptable change is approved by the appropriate government regulatory authority.

[§]Quantitative targets for geomorphology, water quality, sediment quality and marine habitats in the commercial (aquaculture) areas and unzoned areas of the marine management area will be developed in consultation with stakeholders prior to the finalisation of the management plan, or early in the life of this management plan, following additional habitat mapping to more accurately define the extent of marine habitats.

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

7.1.5 Mangrove communities

Ecological value	**Mangrove communities:** *There are six species of mangrove found in the proposed reserves and extensive mangrove communities line over 50% of the mainland shore. Many of these communities are considered to be of international significance.*

Background	Six species of mangrove are found within the Dampier Archipelago/Cape Preston region, these being the white mangrove (*Avicennia marina*), red mangrove (*Rhizophora stylosa*), club mangrove (*Aegialitis annulata*), ribbed-fruit orange mangrove (*Brugiera exaristrata*), yellow-leaf spurred mangrove (*Ceriops tagal*) and river mangrove (*Aegiceras cornculatum*). Mangrove communities (mangals) account for 3% (approximately 5,950 ha) of the proposed reserves. Most of these communities are along the mainland coast on the tidal flats at Regnard Bay, the Maitland River mouth, King Bay and Nickol Bay. Well-developed communities also occur in some of the sheltered bays on the islands, for example at West Intercourse Island, in Searipple Passage and the southern shores of West Lewis and East Lewis islands. The mangrove communities at the Fortescue River delta, Cape Preston area, West Intercourse Island, Enderby Island, Searipple Passage/Conzinc Bay and Dixon Island have been assessed by Semeniuk (1997) as having international significance from a biodiversity and ecological basis. Mangals are very important primary producers and are of ecological and economic importance. Organisms that inhabit mangrove communities include snails, worms, crabs, shrimps, fish and birds. The most conspicuous species include the large conical snails (*Telescopium telescopium*), gobioid fish (mud skippers), oysters of the genus *Saccostrea* and a variety of barnacles attached to tree trunks and exposed roots. In addition, mangrove communities within the proposed reserves are of biogeographic significance as a centre of fiddler crab biodiversity. Mangals help to stabilise coasts by trapping and binding sediment and controlling coastal erosion, as well as providing habitats and nurseries for a variety of fish and prawn species which are targeted by commercial fishermen. Mangroves are protected throughout the State under the WC Act. In addition, development proposals that may impact on mangrove communities are subject to an environmental impact assessment by the DoE/EPA in accordance with *Guidance Statement for Protection of Tropical Arid Zone Mangroves Along the Pilbara Coastline* (EPA, 2001). This guidance statement, which has its basis in the EP Act, indicates that the EPA's environmental objective in regard to tropical arid zone mangroves of the Pilbara coastline, habitats and dependent habitats is *"... to maintain ecological function and sustainability."* (EPA, 2001). The current major pressure on mangrove communities within the proposed reserves is physical disturbance. Industrial developments may require areas of mangroves to be cleared or alter tidal flow rates and directions and cause mangroves to die, and trampling may occur whilst fishing for mud-crabs. Four-wheel drive vehicles may also impact on mangrove communities. Other potential pressures on the mangrove communities include pollution (particularly oil), dust generated by industrial practices, litter causing a hazard to wildlife and fishing. Proposed management strategies to protect mangals include the implementation of spatial controls to provide for "reference" sites for research an monitoring, education and ensuring that approvals and conditions for new industry and nature-based tourism operations are set in accordance with the EPA Guidance Statement.
Current status	There has been extensive loss of mangroves in the Dampier area due to industrial activities (e.g. salt production, port infrastructure). However, the remaining mangroves in the proposed reserves are generally in a pristine condition apart from some localised disturbances due to human activities.
Existing and potential uses and/or pressures	• Physical disturbance (e.g. clearing for facilities and infrastructure, change in tidal flows/ hydrological regime). • Physical disturbance (e.g. recreational fishing, vehicles, trampling, mud-crabbing). • Recreational fishing (fishing can alter the community structure). • Dust generated from land based activities. • Nutrients (e.g. vessel, island and mainland discharges, industrial outfalls). • Toxicants (e.g. accidental spillage of petroleum products, anti-fouling agents, air pollution, ballast and bilge water discharge). • Litter (e.g. entanglement of wildlife and pollution).

Current major pressure/s	Physical disturbance from industrial developments, vehicles, trampling and mud-crabbing.
Management objective/s	To ensure that mangrove diversity and biomass, and abundance of species that live in mangrove communities, is not significantly impacted by physical disturbance in the proposed reserves.
Strategies	1. Implement spatial controls to provide for: • monitoring of representative mangrove communities in areas free of significant human influence (of sufficient size and replicated); and • an appropriate level of protection for key mangrove communities (CALM). **(H-KMS)** 2. Assess the nature, level and potential impacts of human activities on mangrove communities within the proposed reserves and implement an appropriate monitoring program (CALM). **(H-KMS)** 3. Implement appropriate controls on access to mangrove communities, to provide an appropriate level of protection for mangrove communities (CALM). **(H-KMS)** 4. Initiate research programs to quantify the floral and faunal diversity, and natural variability of mangrove communities in the proposed reserves (CALM). **(H)** 5. Ensure that approvals and setting of conditions for all new industry and nature-based tourism operations are in accordance with the EPA Guidance Statement (DoE/EPA, industry, WATC, DoF, CALM). **(H)** 6. Ensure industry and nature-based tourism operators are informed of relevant management objectives and targets for mangrove communities (CALM). **(M)** 7. Educate reserve users about the detrimental impacts of human activities on mangrove communities in the proposed reserves (CALM). **(M)**

Performance measures	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 mangrove diversity as a result of human activity in the proposed reserves. 2. The abundance[Ø] targets for mangrove communities will be as noted below. i. *Sanctuary, special purpose (mangrove protection), special purpose (benthic protection), special purpose (intertidal reef protection)* and *recreation* zones – no change due to human activities. ii. *General use, special purpose (multiple use)* and *special purpose (pearling or aquaculture)* zones of the *marine park* and *conservation areas* of the *marine management area* – no change except in areas approved by the appropriate government regulatory authority. The cumulative area of change is not to exceed 1% (by area) of this habitat in these zones. iii. *Commercial (aquaculture) areas* and unzoned areas of the m*arine management area*[§] - maintained in a natural state, except for areas where some level of acceptable change is approved by the appropriate government regulatory authority.		

[§]Quantitative targets for geomorphology, water quality, sediment quality and marine habitats in the commercial (aquaculture) areas and unzoned areas of the marine management area will be developed in consultation with stakeholders prior to the finalisation of the management plan, or early in the life of this management plan, following additional habitat mapping to more accurately define the extent of marine habitats.

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

7.1.6 Macroalgal and seagrass communities

Ecological value	**Macroalgal and seagrass communities:** *Extensive subtidal macroalgal and seagrass communities, which are important primary producers and refuge areas for fishes and invertebrates occur within the proposed reserves.*

Background	Macroalgae (seaweeds) dominate submerged limestone reefs and also grow on stable rubble and boulder surfaces in the Dampier Archipelago/Cape Preston region. These communities are most commonly found on shallow limestone pavement in depths less than 10 m. Low relief limestone reefs which are dominated by macroalgae account for 17% (approximately 35,460 ha) of the major marine habitats within the proposed reserves. Brown algae are the most abundant group of algae in the region, with *Sargassum* sp., *Dictyopteris* sp. and *Padina* sp. being the dominant species. The most common green algae are the articulate coralline *Halimeda* sp, while prominent red algal species include crustose corallines, non-corallines and algal turf. Seagrass occurs in the larger bays and sheltered flats of the region. Six species of seagrass are present on the subtidal soft sediment habitats, these being *Cymodocea angustata, Halophila ovalis, Halophila spinulosa, Halodule uninervis, Thalassia hemprichii* and *Syringodium isoetifolium* Seagrasses do not form extensive meadows within the proposed reserves, but rather form interspersed seagrass/macroalgae beds. The most significant areas of seagrass are found between Keast and Legendre islands and between West Intercourse Island and Cape Preston. Macroalgae and seagrasses are important primary producers, trapping light energy from the sun and making it available to the ecosystem. They also provide important habitats for molluscs, sea urchins, sea stars, sea cucumbers, crabs and fishes. Marine turtles feed on algae and seagrass, and the ephemeral seagrass typically found in the area is likely to be the preferred food source for the resident dugong population. Macroalgae and seagrasses are protected throughout the State under the WC Act and the FRM Act. In addition, development proposals that may impact on macroalgal and seagrass communities are subject to an environmental impact assessment by the DoE/EPA in accordance with *Guidance for the Assessment of Environmental Factors. Benthic Primary Producer Habitat Protection* (EPA, 1998a) and *Guidance for the Assessment of Environmental Factors. Seagrass Habitat Protection* (EPA, 1998b). These guidelines, which are based on the EP Act, provide environmental objectives for macroalgae and seagrasses. No current major pressures on macroalgal and seagrass communities in the proposed reserves have been identified and these communities are currently in a good condition in the proposed reserved. They are, however, susceptible to a number of potential impacts including physical disturbance from anchoring and infrastructure, increased nutrient input from aquaculture operations that use feed and sewage discharge and the input of toxicants. Proposed management strategies for macroalgal and seagrass communities include implementing spatial controls to provide monitoring areas that are free of human impact. Proposed management also includes liaison with industry and other agencies to ensure the importance of the macroalgal and seagrass communities is taken into account when proposed developments in the area are assessed. Education and research programs are other key management strategies that will be implemented.
Current status	The macroalgal and seagrass communities are generally in an undisturbed condition, apart from some localised disturbances due to human activity.
Existing and potential uses and/or pressures	• Physical disturbance from industrial development and vessel activity (e.g. anchoring, installation of moorings, pipelines, propeller scour, future shipping channels). • Nutrients (e.g. sewage from vessels, island and mainland discharges, aquaculture feeds). • Toxicants (e.g. accidental spillage of oil, fuel etc, anti-fouling agents, ballast and bilge water discharge, industrial discharge).
Current major pressure/s	None.
Management objective/s	To ensure no loss of species diversity of macroalgal and seagrass communities and that the extent of macroalgal and seagrass communities is not significantly impacted by human activity in the proposed reserves.

Strategies	1. Implement spatial controls to provide for: • monitoring of representative macroalgal and seagrass communities in areas free of significant human influence (of sufficient size and replicated); and • an appropriate level of protection (CALM). **(H-KMS)** 2. Assess the nature, level and potential impacts of human activities on macroalgal and seagrass communities within the proposed reserves and implement an appropriate monitoring program (CALM). **(H-KMS)** 3. Initiate research programs to quantify the floral and faunal diversity, and natural variability of macroalgal and seagrass communities in the proposed reserves (CALM, DoF). **(H)** 4. Ensure that approvals and the setting of conditions for new industry, nature-based tourism, commercial fishing, pearling and aquaculture operations are consistent with the management targets for macroalgal and seagrass communities and that monitoring conditions are applied as appropriate to ensure these outcomes are achieved (DoE/EPA, industry, WATC, DoF, CALM). **(H)** 5. Ensure industry is informed of relevant management objectives and targets for macroalgal and seagrass communities (CALM). **(M)** 6. Educate reserve users about the ecological importance of macroalgal and seagrass communities (CALM). **(M)** 7. Map seagrass communities in relation to their importance to the dugong population in the proposed reserves (CALM). **(M)**

Performance measures	1. Diversity. 2. Biomass.	**Desired trend/s**	1. Constant or positive. 2. Constant or positive.
Short-term target/s	Not Applicable.		
Long-term target/s	1. No loss of macroalgal and seagrass diversity as a result of human activity in the proposed reserves. 2. The abundance[Ø] targets for macroalgal and seagrass communities will be as noted below. i. *Sanctuary, special purpose (mangrove protection), special purpose (benthic protection), special purpose (intertidal reef protection)* and *recreation* zones – no change due to human activities. ii. *General use*, *special purpose (multiple use)* and *special purpose (pearling or aquaculture)* zones of the *marine park* and *conservation areas* of the *marine management area* – no change except in areas approved by the appropriate government regulatory authority. The cumulative area of change is not to exceed 1% (by area) of this habitat in these zones. iii. *Commercial (aquaculture) areas* and unzoned areas of the *marine management area*[§] - maintained in a natural state, except for areas where some level of acceptable change is approved by the appropriate government regulatory authority.		

[§]Quantitative targets for geomorphology, water quality, sediment quality and marine habitats in the commercial (aquaculture) areas and unzoned areas of the marine management area will be developed in consultation with stakeholders prior to the finalisation of the management plan, or early in the life of this management plan, following additional habitat mapping to more accurately define the extent of marine habitats.

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

7.1.7 Subtidal soft-bottom communities

Ecological value	***Subtidal soft-bottom communities:*** *Extensive sand and silt substrates that support a variety of invertebrate species both in and on the sediments.*

Background	Subtidal soft-bottom communities consist of silt or sand and comprise 57% (approximately 122,100 ha) of the major marine habitats of the proposed reserves. These communities are typically bare, but may have seasonal vegetation or permanent patches of seagrass or macroalgae. Silt habitats occur in the sheltered areas of the nearshore region of the Archipelago, while sand occurs more offshore. Soft-bottom communities often support a rich variety of infauna that live in the substrate such as polychaete worms, molluscs and crustaceans. They also support surface dwellers that live above or on the substrate such as flathead, rays, flounder, crabs, bivalve molluscs, gastropods or sea snails, sea urchins and sea stars. Inhabitants may also include filter feeding invertebrates such as sponges, corals, sea whips and sea squirts. Important nursery grounds for juvenile fish may occur where algal beds are formed, while seagrasses provide an important food source for turtles and dugongs. Subtidal soft-bottom communities are protected throughout the State under the WC Act and the FRM Act. In addition, development proposals that may impact on subtidal soft-bottom communities are subject to an environmental impact assessment by the DoE/EPA in accordance with *Guidance for the Assessment of Environmental Factors. Benthic Primary Producer Habitat Protection* (EPA, 1998a). This guidance statement, which has its basis in the EP Act, indicates that the EPA's environmental objective in regard to benthic primary producer habitat protection is *"... to maintain the integrity of the marine ecosystems of Western Australia to support the widest possible range of environmental values while recognising the current and projected future uses."* (EPA, 1998a) Current major pressures on subtidal soft-bottom communities in the proposed reserves include physical disturbance from anchoring, trawling, pipe-laying, dredging and dredge spoil dumping. The communities are also susceptible to pollution, the development of infrastructure and the dumping of solid waste and bitterns from industry. The proposed management of the subtidal soft-bottom communities in the proposed reserves includes spatial controls to provide representative, undisturbed areas of soft-bottom communities to provide "reference" sites for monitoring, research, education and for an appropriate level of insurance against future impacts. Other proposed strategies include increasing the level of knowledge about the nature of these communities, educate reserve users about the detrimental impacts of human activities on these communities and liaison with industry and other agencies when proposed developments in the area are assessed.
Current status	The subtidal soft-bottom communities are generally in an undisturbed condition.
Existing and potential uses and/or pressures	• Physical disturbance (e.g. anchoring, trawling, pipe-laying, dredging and dredge spoil dumping). • Toxicants (e.g. accidental spillage of oil, fuel etc, anti-fouling agents, ballast and bilge water discharge, industrial discharge). • Nutrients (e.g. vessel, island and mainland sewage discharge, aquaculture feeds). • Turbidity (e.g. shipping, industrial development, infrastructure). • Solid waste dumping from industry. • Bitterns discharge from industry. • Discharge of higher temperature water from desalination.
Current major pressure/s	Physical disturbance from anchoring, trawling, pipe-laying, dredging and dredge spoil dumping.
Management objective/s	To ensure no loss of species diversity and that abundance of species in subtidal soft-bottom communities is not significantly impacted by human activities in the proposed reserves.

Strategies	1. Implement spatial controls to provide for: • monitoring of representative subtidal soft-bottom communities in areas free of significant human influence (of sufficient size and replicated); and • an appropriate level of protection (CALM). **(H-KMS)** 2. Assess the nature, level and potential impacts of human activities on subtidal soft-bottom communities within the proposed reserves and implement an appropriate monitoring program (CALM). **(H-KMS)** 3. Identify the location of different types of subtidal soft-bottom communities within the proposed reserves (CALM). **(H)** 4. Initiate research programs to quantify the floral and faunal diversity, and natural variability (particularly of sponge-gardens) of subtidal soft-bottom communities in the proposed reserves (CALM). **(H)** 5. Ensure that approvals and the setting of conditions for new industry, commercial fishing, aquaculture and nature-based tourism operations are consistent with the management targets for subtidal soft-bottom communities and that where appropriate monitoring conditions are applied to ensure these outcomes are achieved (DoE/EPA, industry, DoF, WATC, CALM). **(H)** 6. Prevent damage to sponge communities through controls on anchoring and the installation of moorings where necessary (CALM, DPI, DPA). **(H)** 7. Liaise with the DPA in regard to integrating the management of important sponge communities occurring north of Eaglehawk Island (CALM, DPA). **(M)** 8. Educate reserve users about the detrimental impacts of human activities on subtidal soft-bottom communities (CALM). **(M)**

Performance measures	1. Diversity. 2. Abundance of indicator species.	**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 soft-bottom community diversity as a result of human activity in the proposed reserves. 2. The abundance[Ø] targets for subtidal soft-bottom communities will be as noted below. i. *Sanctuary, special purpose (mangrove protection), special purpose (benthic protection), special purpose (intertidal reef protection)* and *recreation* zones – no change due to human activities. ii. *General use, special purpose (multiple use)* and *special purpose (pearling or aquaculture)* zones of the *marine park* and *conservation areas* of the *marine management area* – no change except in areas approved by the appropriate government regulatory authority. The cumulative area of change is not to exceed 1% (by area) of this habitat in these zones. iii. *Commercial (aquaculture) areas* and unzoned areas of the *marine management area*[§] - maintained in a natural state, except for areas where some level of acceptable change is approved by the appropriate government regulatory authority.		

[§]Quantitative targets for geomorphology, water quality, sediment quality and marine habitats in the commercial (aquaculture) areas and unzoned areas of the marine management area will be developed in consultation with stakeholders prior to the finalisation of the management plan, or early in the life of this management plan, following additional habitat mapping to more accurately define the extent of marine habitats.

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

7.1.8 Intertidal sand and mudflat communities (including samphire communities)

Ecological value	**Intertidal sand and mudflat communities (including samphire communities):** *The intertidal sand and mudflat communities of the proposed reserves are primary producers and have an abundance of invertebrate life, which provides a valuable food source for shorebirds.*

Background	Intertidal sand and mudflat communities (approximately 14% or 30,250 ha of the proposed reserves) occur in sheltered, relatively low energy marine environments that result in depositional conditions. These communities occur along most of the coastline of the proposed reserves. The intertidal sand and mudflat communities are extremely important from a biodiversity conservation perspective because of the high diversity of infauna (particularly molluscs) that live within the substrate of these habitats. Although typically bare of vegetation, these areas are covered with a surface film of micro-organisms that are a rich source of food for the high diversity of invertebrates they support. This includes bivalve shells, lamp shells or brachiopods, worms, crabs and sea urchins. Invertebrates are found both living on the surface of the sand or mud and burrowing into the substrate, where their burrowing activities regularly turn over the sediment. The abundance of invertebrate life found on intertidal sand and mudflat communities provides a valuable food source for larger fish and other organisms which swim over the area at high tide, as well as resident and migratory shorebirds. Intertidal sand and mudflat communities are protected throughout the State under the WC Act and the FRM Act. In addition, development proposals that may impact on intertidal sand and mudflat communities are subject to an environmental impact assessment by the DoE/EPA in accordance with *Guidance for the Assessment of Environmental Factors. Benthic Primary Producer Habitat Protection* (EPA, 1998a). This guidance statement, which has its basis in the EP Act, indicates that the EPA's environmental objective in regard to benthic primary producer habitat protection is *"... to maintain the integrity of the marine ecosystems of Western Australia to support the widest possible range of environmental values while recognising the current and projected future uses."* (EPA, 1998a) The current major pressure on intertidal sand and mudflat communities in the proposed reserves is physical disturbance from industrial developments and vehicles. Communities may also be disturbed by digging for bait and fossicking on the intertidal flats. Intertidal sand and mudflat communities are also susceptible to pollution and the commercial harvest of samphire. Proposed management of the intertidal sand and mudflat communities in the proposed reserves includes zoning to provide for "reference" sites for research and monitoring and an appropriate level of protection for this community against future impacts. Other management strategies include a reduction of the vehicular traffic, research on these communities and liaison with industry and other agencies when proposed developments in the area are assessed.
Current status	The intertidal sand and mudflat communities are generally in an undisturbed condition, apart from some localised disturbance.
Existing and potential uses and/or pressures	• Physical disturbance (e.g. industrial development, changes in hydrological regime, vehicles, digging for bait and fossicking). • Toxicants (e.g. accidental spillage of petroleum products, anti-fouling agents, ballast and bilge water discharge, industrial discharge). • Nutrients (e.g. vessel, island and mainland sewage discharge, aquaculture feeds). • Commercial harvest of samphire. • Dust generated from land based activities. • Fishing for bait and live shells.
Current major pressure/s	Physical disturbance from industrial development and vehicles.
Management objective/s	To ensure no loss of species diversity of intertidal sand and mudflat communities and that abundance of species in sand and mudflat communities is not significantly impacted by physical disturbance from human activity in the proposed reserves.

Strategies	1. Implement spatial controls to provide for: • monitoring of representative intertidal silt and mudflat communities in areas free of significant human influence (of sufficient size and replicated); • an appropriate level of protection; and • protection of algal mats (CALM). **(H-KMS)** 2. Assess the nature, level and potential impacts of human activities on intertidal sand and mudflat communities within the proposed reserves and implement an appropriate monitoring program (CALM). **(H-KMS)** 3. Initiate research programs to characterise the floral and faunal diversity, and natural variability, of intertidal sand and mudflat communities in the proposed reserves (CALM). **(H)** 4. Maintain current hydrological regimes to protect intertidal sand and mudflat communities in the proposed reserves (CALM, industry). **(H)** 5. Ensure that approvals and the setting of conditions for new industry, nature-based tourism and aquaculture operations are consistent with the management targets for intertidal sand and mudflat communities and that, where appropriate, monitoring conditions are applied to ensure these outcomes are achieved (DoE/EPA, industry, WATC, DoF, CALM). **(H)** 6. Manage vehicular traffic on specified areas of intertidal sand and mudflat communities to minimise disturbance (CALM). **(H)** 7. Ensure industry is informed of relevant targets and management objectives for this value (CALM). **(M)** 8. Identify the importance of ecological productivity of intertidal sand and mudflat communities (CALM). **(M)** 9. Educate reserve users about the detrimental impacts of human use on intertidal sand and mudflat communities (CALM). **(L)**

Performance measures	1. Diversity. 2. Biomass (extent in ha) of intertidal sand and mudflat communities.	**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 intertidal sand and mudflat community (including samphire community) diversity as a result of human activity in the proposed reserves. 2. The abundance[Ø] targets for intertidal sand and mudflat communities (including samphire communities) will be as noted below. i. *Sanctuary, special purpose (mangrove protection), special purpose (benthic protection), special purpose (intertidal reef protection)* and *recreation* zones – no change due to human activities. ii. *General use, special purpose (multiple use)* and *special purpose (pearling or aquaculture)* zones of the *marine park* and *conservation areas* of the *marine management area* – no change except in areas approved by the appropriate government regulatory authority. The cumulative area of change is not to exceed 1% (by area) of this habitat in these zones. iii. *Commercial (aquaculture) areas* and unzoned areas of the *marine management area*[§] - maintained in a natural state, except for areas where some level of acceptable change is approved by the appropriate government regulatory authority.		

[§]Quantitative targets for geomorphology, water quality, sediment quality and marine habitats in the commercial (aquaculture) areas and unzoned areas of the marine management area will be developed in consultation with stakeholders prior to the finalisation of the management plan, or early in the life of this management plan, following additional habitat mapping to more accurately define the extent of marine habitats.

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

7.1.9 Rocky shore communities (including intertidal reef platforms)

Ecological value	**Rocky shore communities (including intertidal reef platforms):** *Rocky shores are a major shoreline habitat of the proposed reserves and provide shelter for a variety of intertidal organisms, which in turn provide a valuable food source for shorebirds.*

Background	Rocky shores comprise approximately 40% of the shoreline habitats of the proposed reserves. Rocky shores vary according to rock type and aspect, and include low cliffs, boulders or pavements of igneous, metamorphic or sedimentary substrate. Sedimentary limestone rocky shores consist of cliffs formed by a combination of wave attack, biological erosion, undercutting and rock falls, and often have intertidal platforms associated with them. The large tidal ranges within the proposed reserve result in pronounced horizontal zonation of plants and animals such as oysters, barnacles, crabs and molluscs. In areas of low wave action, such as the east coasts of the islands of the reserves, platforms are often covered by a layer of mud or sand. In more exposed areas, platforms are covered with an algal turf and corals may grow on the outer edges. This habitat supports a myriad of marine animals, whose distribution is controlled by the action of the tides. Bivalve shells, snails, crabs, worms and small fish can seek refuge from desiccation in shallow rock pools at low tide, while larger fish and other marine animals come in to feed on these organisms when the tide is high. The abundance of invertebrate life on rocky shores provides a valuable food source for shorebirds and contributes significantly to the biological diversity of the proposed reserves. Under the FRM Act, the DoF is responsible for the management of the recreational and commercial take of invertebrate species from rocky shore communities. In addition, any development proposals that may impact on rocky shore communities are currently subject to assessment under EP Act. The current major pressures on rocky shore/intertidal reef platform communities are recreational fishing and trampling (reef walking). In addition, rocky shores are vulnerable to pollution from floating debris and contaminants, and strandline litter poses a threat to wildlife that can become entangled. Proposed management of rocky shore communities in the proposed reserves will relate to the use of spatial controls to provide representative, undisturbed rocky shore communities as "reference" sites for research and monitoring, as well as education of reserve users about the importance of these communities. In addition, liaison with industry and other agencies will be undertaken when proposed developments in the area are assessed.
Current status	The rocky shore communities are generally in an undisturbed condition.
Existing and potential uses and/or pressures	• Over fishing by recreational and commercial fishing (including specimen collecting). • Physical disturbance (from reef walking, four-wheel drive vehicles and motorbikes). • Pollution (e.g. floating debris, strand-line litter). • Toxicants (e.g. accidental spillage of petroleum products, anti-fouling agents, ballast and bilge water discharge). • Nutrients (e.g. vessel, island and mainland sewage discharge, aquaculture feeds). • Physical disturbance from industrial development. • Introduced pests.
Current major pressure/s	Recreational and commercial fishing and trampling from reef walking.
Management objective/s	To ensure no loss of species diversity of rocky shore communities and that abundance of rocky shore species are not significantly impacted by fishing and trampling in the proposed reserves.

Strategies	1. Implement spatial controls to provide for: • monitoring of representative rocky shore communities in areas free of significant human influence (of sufficient size and replicated); and • an appropriate level of protection (CALM). **(H-KMS)** 2. Assess the nature, level and potential impacts of human activities on rocky shore communities within the proposed reserves and implement an appropriate monitoring program (CALM). **(H-KMS)** 3. Ensure that approvals and the setting of conditions for new industry and nature-based tourism operations are consistent with the management targets for rocky shore communities and that appropriate monitoring conditions are applied to ensure these outcomes are achieved (DoE/EPA, industry, WATC, DoF, CALM). **(H)** 4. Ensure industry is informed of relevant targets and management objectives for rocky shore communities (CALM). **(M)** 5. Initiate research programs to characterise the flora and fauna diversity and natural variability, of rocky shore communities within the proposed reserves (CALM). **(M)** 6. Educate reserve users about the detrimental impacts of human activities on rocky shore communities in the proposed reserves (CALM). **(M)** 7. Identify areas of rocky shore suitable for specific uses (e.g. industry, recreation) to assist with separation of incompatible uses (CALM). **(L)**

Performance measures	1. Diversity. 2. Abundance of indicator species.	**Desired trend/s**	1. Constant or positive. 2. Constant or positive.
Short-term target/s	Not Applicable.		
Long-term target/s	1. No loss of rocky shore community (including intertidal reef platform) diversity as a result of human activity in the proposed reserves. 2. The abundance[Ø] targets for rocky shore communities (including intertidal reef platforms) will be as noted below. i. *Sanctuary, special purpose (mangrove protection), special purpose (benthic protection), special purpose (intertidal reef protection)* and *recreation* zones – no change due to human activities. ii. *General use, special purpose (multiple use)* and *special purpose (pearling or aquaculture)* zones of the *marine park* and *conservation areas* of the *marine management area* – no change except in areas approved by the appropriate government regulatory authority. The cumulative area of change is not to exceed 1% (by area) of this habitat in these zones. iii. *Commercial (aquaculture) areas* and unzoned areas of the *marine management area*[§] - maintained in a natural state, except for areas where some level of acceptable change is approved by the appropriate government regulatory authority.		

[§]Quantitative targets for geomorphology, water quality, sediment quality and marine habitats in the commercial (aquaculture) areas and unzoned areas of the marine management area will be developed in consultation with stakeholders prior to the finalisation of the management plan, or early in the life of this management plan, following additional habitat mapping to more accurately define the extent of marine habitats.

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

7.1.10 Turtles

Ecological value	**Turtles:** *Green, hawksbill, loggerhead, flatback and leatherback turtles are of special conservation status and are all found in the proposed reserves. It is likely that most of the sandy beaches are used for turtle nesting and Rosemary Island has been identified as the focus for hawksbill turtle nesting in Western Australia.*

Background	Marine turtles are found worldwide in tropical, subtropical and warm temperate waters. Of the seven species of marine turtle, five have been recorded in the proposed reserves, these being green (*Chelonia mydas*), hawksbill (*Eretmochelys imbricata*), loggerhead (*Caretta caretta*), flatback (*Natator depressus*), and leatherback (*Dermochelys coriacea*). There are only a few large nesting populations of the green, hawksbill, and loggerhead turtles left in the world and Australia has the only nesting populations of flatback turtles. The waters of the proposed reserves are used for breeding while the sandy beaches are regularly used for nesting by green, hawksbill, and flatback turtles and occasionally by loggerhead turtles. The turtle nesting beaches of the Dampier Archipelago/Cape Preston region are important at both an international and regional level. Research to date indicates that Rosemary Island is the main focus for hawksbill nesting in Western Australia and the Indian Ocean region. Other important turtle nesting sites within the proposed reserves are on the north-eastern shore of Legendre Island and the western and eastern shores of Delambre Island. Important turtle aggregation sites in the proposed reserves are the waters surrounding Rosemary, Malus, Enderby, Eaglehawk, Legendre and Delambre islands (Figure 4). Turtles are an integral part of the traditional culture of some Aboriginal communities living in coastal areas of northern Australia, where they have spiritual significance, are used for cultural celebrations and ceremonies and are a food source. Visitor observation of turtle nesting behaviour is a popular activity in some areas of northern Australia, making marine turtles potentially economically significant to the nature-based tourism industry. Green, hawksbill, leatherback and flatback turtles are threatened species declared to be vulnerable under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* and the loggerhead is a threatened species declared to be endangered under this Act. Loggerhead, leatherback, green, hawksbill and flatback turtles are threatened species declared to be specially protected under the WC Act. The current major pressure on turtles in the proposed reserves is disturbance to nesting turtles by visitors, as a result of damage to nests and nesting habitat. Other pressures include lights and flares from industry that may attract hatchlings and cause them to become disorientated and more vulnerable to attack from predators such as silver gulls, as well as entanglement and subsequent drowning in litter (e.g. ropes from pearling operations or discarded fishing gear) and traditional hunting and egg extraction. Management of turtles within the proposed reserves will focus on the use of education and seasonal controls on boating (e.g. speed limits) for the protection of turtle nesting and aggregation sites, as well as regulation of the use of appropriate lighting by existing and future industry in the region, where such lighting could impact turtles. Management of turtles in the proposed reserves will be reviewed as new data (e.g. incidence of boat strikes, disturbance from human activity) becomes available during the life of the management plan.
Current status	The turtle population is probably stable in the proposed reserves.
Existing and potential uses and/or pressures	• Physical disturbance to nests and nesting beaches (e.g. people on foot, vehicles, industrial development). • Lights and flares from onshore and offshore facilities (industrial and residential). • Toxicants (e.g. accidental spillage of fuel, oil etc, anti-fouling agents, ballast water discharge, bilge water discharge). • Entanglement in litter. • Ingestion of litter. • Traditional hunting and egg extraction. • Physical disturbance by seismic activity and pipe-laying. • Sewage (vessels, island and mainland developments). • Bycatch from commercial fishing (trawling).

	• Fox predation on eggs. • Physical disturbance of turtles in key feeding and aggregation areas by human activity (e.g. industrial development, vessel activity and boat strikes). • Human exploitation in other countries. • Fibropapilloma virus.
Current major pressure/s	Physical disturbance to nesting turtles by visitors, as a result of physical damage to nests and nesting habitat.
Management objective/s	To ensure no loss of species diversity of turtles and that abundance of turtles is not significantly impacted by visitor disturbance in the proposed reserves.
Strategies	1. Educate reserve users on the possible detrimental impacts of human activities on turtles in the proposed reserves (CALM). **(H-KMS)** 2. Implement a seasonal speed restriction on boating activity within the Rosemary Island area, in consultation with DPI and the community, to protect significant turtle nesting and aggregation sites (DPI, CALM). **(H-KMS)** 3. Ensure that licence conditions for nature-based tourism, industry, commercial fishing and aquaculture and pearling operations contain conditions to minimise the impacts of lights and flares on turtle hatchlings, where appropriate (DoE/EPA, DoF, WATC, industry, CALM). **(H)** 4. Monitor turtle nesting activities to determine the relative importance of nesting beaches and to assess long-term changes in abundance and usage of sites (CALM). **(H)** 5. Determine the impacts of lights on hatchling survival due to disorientation and increase predation (CALM, industry). **(M)** 6. Identify turtle feeding and aggregation areas within the proposed reserve and, where required, implement boating restrictions (in consultation with DPI and the community) to protect significant turtle nesting and aggregation sites (CALM). **(M)** 7. Ensure that mating aggregations and nesting activities of turtles are not significantly disturbed by recreational boating, nature-based tourism, pearling, aquaculture, commercial fishing and industry operations (CALM, industry, EPA). **(M)** 8. Ensure relevant industry activities are undertaken at times and in locations that do not significantly conflict with turtle breeding and nesting through the proposed reserves (CALM, industry). **(M)** 9. Maintain a database of turtle mortality and incidents (e.g. entanglement, boat strikes) in the proposed reserves (CALM, WAM, DoF). **(M)** 10. Work with local aboriginal communities to monitor take of turtles and eggs in the proposed reserves (CALM). **(M)** 11. Facilitate research applicable to the management of turtles in the proposed reserves (CALM). **(L)**

Performance measures	Number of nesting females (by species) on individual beaches.	**Desired trend/s**	Constant or positive.
Short-term target/s (KPI)	Not Applicable.		
Long-term target/s (KPI)	1. No loss of turtle diversity as a result of human activity in the proposed reserves. 2. No loss in turtle abundance[Ø] as a result of human activity in the proposed reserves.		

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

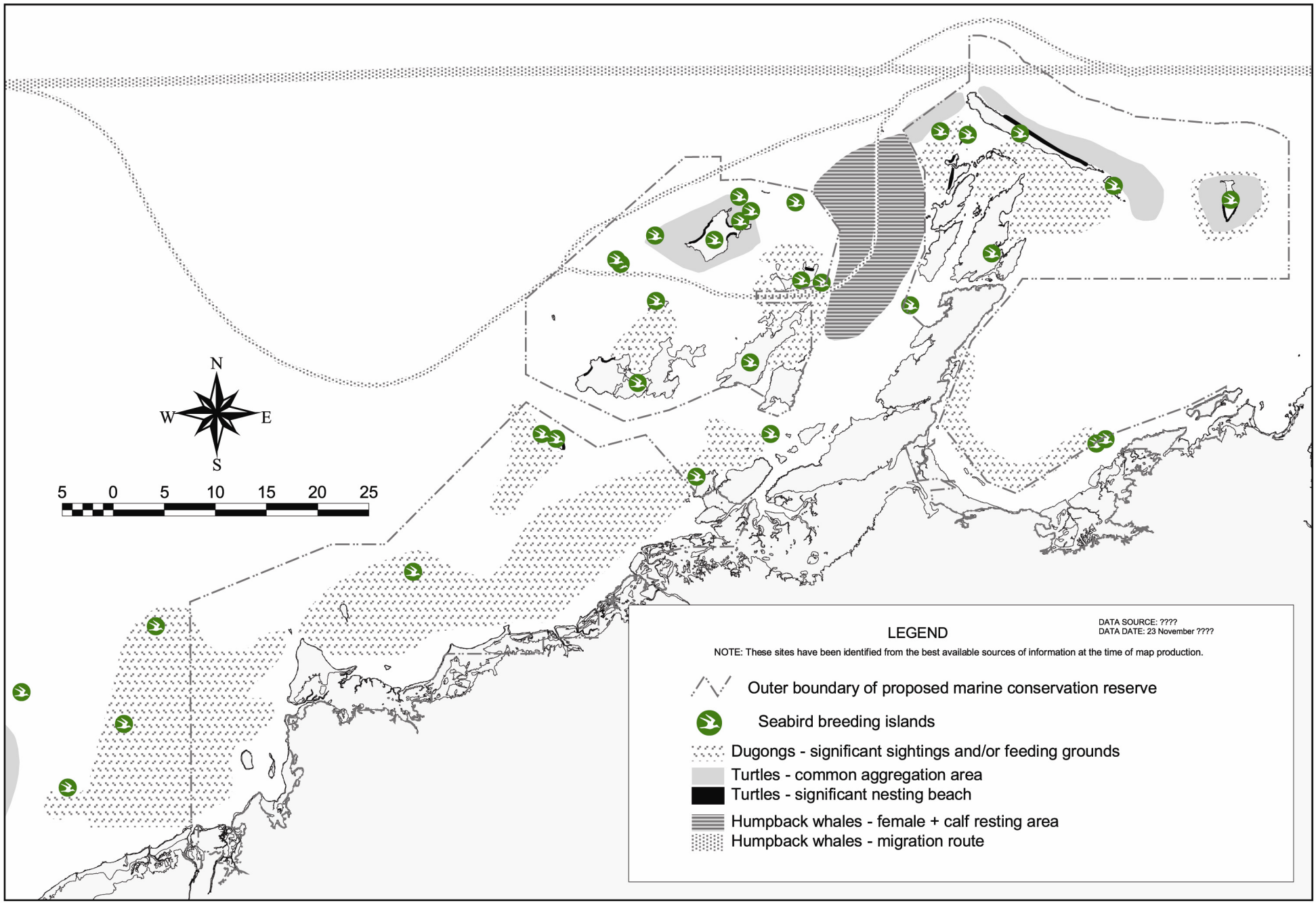


FIGURE 4: Distributions of significant wildlife within the proposed Dampier Archipelago Marine Park and Cape Preston Marine Management Area.

7.1.11 Marine mammals

Ecological value	**Marine mammals:** *Eight species of toothed whale, four species of baleen whale and the dugong have been recorded from the proposed reserves. The humpback whale passes through the area during its annual migration.*

Background	A total of eight species of toothed whale including five species of dolphin, and four species of baleen whale have been recorded from the proposed reserves, including the minke whale, Bryde's whale, blue whale, humpback whale, killer whale, false killer whale, common dolphin, striped dolphin, bottlenose dolphin, indo-pacific humpback dolphin, southern bottlenose dolphin and risso's dolphin. However, it is likely that most of the 36 Indian Ocean whale and dolphin species occasionally visit the area. The annual migration path of the humpback whale (*Megaptera novaeangeliae*) passes through the Dampier Archipelago/Cape Preston region (Figure 4). Humpback whales migrate north to the warm tropical waters off the Pilbara and Kimberley coasts in June and July to give birth and suckle their young. Females occasionally give birth in the waters of the Dampier Archipelago, although the main calving area is further north. Adult humpback whales and their young also frequent the Archipelago on their southern migrations in early spring, and Mermaid Sound is a significant resting area for females with their calves. Non-migratory whale species recorded from the proposed reserves include the Bryde's (*Balaeonptera edeni*) and Minke (*Balaenoptera acutostrata*) whales. Dugongs occur throughout the tropical and sub-tropical Indo-West Pacific, but have been reduced to relict populations separated by large areas in which they are extinct, or close to extinction. In the Dampier Archipelago/Cape Preston region, small numbers of dugongs have been sighted in the shallow, warm waters in bays and between islands, including at East Lewis Island, Cape Preston, Regnard Bay, Nickol Bay and west of Keast Island (Figure 4). Current knowledge on the size of the population, distribution, migratory habits and regional and local importance of the Dampier Archipelago/Cape Preston area for dugongs is limited. Marine mammals have socio-economic significance. Humpback whales are of value to the nature-based tourism industry as the demand for whale watching increases and dugongs are hunted by Aboriginal and Torres Strait Islanders for food. All marine mammals are fully protected under the WC Act. The humpback whale is a threatened species that is declared to be specially protected under the WC Act due to over-exploitation during the whaling era. The dugong is also specially protected under the WC Act. Current major pressures on marine mammals in the proposed reserves are physical disturbance such as boat collisions and noise, human interaction (nature-based tourism) with humpback whales and traditional hunting for dugong and resident cetaceans. Another pressure on marine mammals in the proposed reserves is entanglement in ropes and discarded fishing gear. The WC Act specifies appropriate human interaction with marine mammals; consequently management of the proposed reserves will focus on undertaking further research to determine the importance of the area for marine mammals in the reserves and educating reserve users about marine mammals.
Current status	The population of cetaceans in the proposed reserves is generally undisturbed, however, the population status of dugongs in the proposed reserves is unknown.
Existing and potential uses and/or pressures	• Physical disturbance from human interaction (e.g. nature-based tourism and vessel activity, noise and collisions). • Physical disturbance from seismic activity, blasting, pipe-laying and industrial developments. • Traditional hunting for dugongs and resident cetaceans. • Toxicants (e.g. accidental spillage of oil, fuel etc, anti-fouling agents, ballast and bilge water discharge). • Entanglement in litter (e.g. ropes from pearling operations, discarded fishing gear etc). • By-catch from commercial fishing. • Loss of feeding habitat (seagrass for dugongs).
Current major pressure/s	Physical disturbance to marine mammals such as boat collision and noise, as well as human interaction (nature-based tourism) with humpback whales and traditional hunting for dugongs and resident cetaceans.

Management objective/s	1. To ensure the species diversity and abundance of dugong and resident cetaceans is not significantly impacted by visitor disturbance and traditional hunting in the proposed reserves. 2. To ensure no loss of species diversity of marine mammals and that abundance of migratory cetaceans is not significantly impacted by physical disturbance and human interaction in the proposed reserves.
Strategies	1. Undertake research to ascertain the regional importance of the Dampier Archipelago/Cape Preston area for dugongs and the relative importance of areas within the proposed reserves (CALM). **(H-KMS)** 2. Determine the size of the dugong population and a level of sustainable take of dugong (CALM). **(H-KMS)** 3. In conjunction with local indigenous communities monitor the take of dugong (CALM). **(H-KMS)** 4. Ensure that industry activities are undertaken at times and locations that do not significantly impact on cetacean migration and that developments do not have significant impacts on dugongs, resident cetaceans and migratory cetaceans through the provision of advice to the DoE/EPA (CALM, DoE, industry). **(M)** 5. Educate reserve users on the possible detrimental impacts of human activities on dugongs, resident cetaceans and migratory cetaceans (CALM). **(M)** 6. Maintain records of the mortality of dugong and resident cetaceans in the proposed reserves (CALM). **(M)** 7. Undertake research to ascertain the regional importance of the Dampier Archipelago/Cape Preston area for migratory cetaceans and the relative importance of areas within the proposed reserves (CALM). **(L)**

Performance measures	1. Diversity. 2. Abundance.	**Desired trend/s**	1. Constant or positive. 2. Constant or positive.
Short-term target/s	To gain an understanding of the dugong population numbers taken and sustainability of hunting activities.		
Long-term target/s	1. No loss of marine mammal diversity as a result of human activity in the proposed reserves. 2. No loss of marine mammal abundance[Ø] as a result of human activity in the proposed reserves.		

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

7.1.12 Seabirds

Ecological value	**Seabirds:** *The proposed reserves are a significant rookery for seabird and provide important feeding and resting areas for migrating shorebirds.*

Background	The Dampier Archipelago/Cape Preston region is a nesting area for at least 16 species of seabirds. Many of the islands and rocks in the area are known breeding grounds for a variety of seabirds, including wedge-tailed shearwaters (*Puffinus pacificus*), caspian terns (*Sterna caspia*), bridled terns (*Sterna anaethetus*) and roseate terns (*Stern dougallii*). The small islands and islets such as Goodwyn Island, Keast Island and Nelson Rocks provide important undisturbed nesting and refuge sites and Keast Island provides one of the few nesting sites for pelicans in Western Australia. Many of the sea and shorebirds are resident in the area throughout the year, however, the proposed reserves is also an important area for a variety of migratory shorebird species that journey from Asia and the Arctic Circle to feed on the worms, bivalves and other invertebrates in the intertidal sand and mud flat and mangrove communities. Seabird and shorebird colonies which breed on the island nature reserves and rocky outcrops that are scattered throughout the area are protected from introduced ground predators, such as foxes and feral cats, which occur on the mainland. As well as being of ecological significance, these seabird colonies are one of the attractions for people who visit these islands. All birds are fully protected under the WC Act. Many of the seabirds and shorebirds within the proposed reserves are covered by international treaties with Japan and China, so that Australia has an international obligation to protect these species. The current major pressures on seabirds in the proposed reserves are physical disturbance from boats, helicopters, people and infrastructure development and loss of suitable coastal habitat (e.g. mangrove communities, intertidal sand and mud flats and rocky shores). Seabirds and other ground nesting species are vulnerable to human disturbance at their rookery and roosting sites and are particularly susceptible to loss of their breeding and nesting habitat. Other potential pressures include toxicants, litter and provision of food sources causing an increase in silver gull numbers. Disturbance of seabird rookeries on the islands in the proposed reserves will be addressed under a separate management plan for these terrestrial reserves. There is a need to determine the major feeding areas for seabirds to ensure these are maintained. Proposed management strategies to protect seabirds in the proposed reserves will include implementation of spatial controls to provide protection to seabird nesting and roosting areas, education of reserve users on the ecological significance of the proposed reserves' seabird populations and the potential detrimental impacts of human disturbance, and monitoring of populations of seabirds.
Current status	The seabird population is probably stable in the proposed reserves.
Existing and potential uses and/or pressures	• Physical disturbance from human activity (e.g. boats, helicopters, visitors, industry development). • Loss of suitable habitat (e.g. mangrove communities, intertidal sand and mud flats and rocky shores). • Toxicants (e.g. accidental spillage of petroleum products, ballast and bilge water discharge). • Provision of food sources causing an increase in silver gull numbers. • Litter (entanglement).
Current major pressure/s	Physical disturbance from human activity (e.g. boats, helicopters, visitors, industry development) and loss of suitable habitat.
Management objective/s	To ensure no loss of species diversity of seabirds and that abundance of seabirds is not significantly impacted by physical disturbance or loss of habitat in the proposed reserves.

Strategies	1. Implement spatial and temporal controls to provide for: • protection of significant sites (breeding, feeding, roosting) for seabirds and shorebirds; and • protection of large seabird and shorebird aggregations (CALM). **(H-KMS)** 2. Encourage the completion and implementation of CALM management plans for the island reserves adjacent to the proposed reserves (CALM). **(H)** 3. Identify significant breeding, feeding and roosting sites for seabirds and shorebirds in the proposed reserves (CALM). **(M)** 4. Ensure that important seabird and shorebird breeding, feeding and roosting areas are not significantly affected by human activities (CALM, industry). **(M)** 5. Educate reserve users on the ecological significance of the proposed reserves' seabird and shorebird populations and the potential detrimental impacts of human disturbance (CALM). **(M)** 6. Monitor populations of seabirds and shorebirds, both migratory and non-migratory (CALM). **(L)**

Performance measures	See management plan for island/terrestrial reserve.	**Desired trend/s**	See management plan for island/terrestrial reserve.
Short-term target/s	Not Applicable.		
Long-term target/s	1. No loss of seabird and shorebird diversity as a result of human activity in the proposed reserves. 2. No loss of seabird and shorebird abundance[Ø] as a result of human activity in the proposed reserves.		

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

7.1.13 Finfishes

Ecological value	**Finfishes:** *A diverse finfish fauna of 736 species contributes significantly to the biodiversity of the proposed reserves.*

Background	A total of 736 fish species have been recorded in the Dampier Archipelago (Hutchins, 2003) The fish fauna is part of a tropical inshore fauna that extends from Shark Bay to Queensland and has a prominent component of coral reef species and many species that inhabit mangroves. The majority of the fish species have eggs or larvae that are dispersed in the water column so it is likely that recruitment is supplemented from elsewhere, such as the Rowley Shoals and outer reefs upstream in the Leeuwin Current. Similarly, it is likely that the proposed reserves are an important source of recruits for more southerly destinations along the Western Australia coast. In a recent WAM survey (WAM pers. comm.), sites with the greatest topographic complexity had the most diverse fish fauna, with the north side of Legendre Island being the most diverse. Some of the fish species found in the proposed reserves are important to recreational and commercial fishers. These include coral trout (*Plectropomus* sp.), tusk fish (*Cheorodon* sp.) and rock cod. Game fishing tends to focus more on deeper water pelagic species such as marlin (*Makaira* sp.), sailfish (*Istiophorus* sp.), spanish mackerel (*Scomberomorus* sp.), golden trevally (*Gnathanodon* sp.) and turrum (*Caranx* sp.). Divers may have close encounters with large potato cods (*Epinephelus tukula*) or manta rays (*Manta birostris*). Under the FRM Act, the DoF is responsible for the management of the recreational and commercial take of finfish species. Fish stocks are managed through a wide range of management tools, including size and bag limits, gear restrictions, licences and closed seasons. Three species that occur in the proposed reserves are totally protected under Western Australian fisheries legislation, the potato cod, the hump head maori wrasse (*Cheilinus undulatus*) and the whale shark (*Rhincodon typus*). Impacts on targeted fish stocks from recreational fishing and the degradation of critical habitats have been determined to be current major pressures on the finfishes of the proposed reserves. The Pilbara region has the highest rate of boat ownership per capita in Australia, and consequently local residents have good access to local recreational fishing sites within the proposed reserves. Other threats to fishes include commercial fishing and pollution. The management of finfish species that are extracted needs to consider the viability of the populations of these species in the context of maintaining the values of the proposed reserves. Fisheries management scales are rarely reconciled with the spatial scales of marine conservation reserves and as a result, populations of some species in a reserve could become locally depleted even though the fishery is being managed on a sustainable basis at the broader scale. To overcome this potential problem, consideration is required as to the appropriateness of recreational and/or commercial extraction of these species and whether specific finfish species should be protected in part or all of the proposed reserves. This decision would be based on a number of factors including species distribution, abundance, life history and an assessment of the ecological and social importance of the species in the context of the proposed reserves (e.g. “icon” species). Species for which extraction is considered appropriate will be managed by DoF, in accordance with sustainable development principles. The remaining species will be protected throughout the proposed reserves using appropriate legislation. Another key management strategy is the education of reserve users about the detrimental impacts of human activities on fish stocks in the proposed reserves. DoF are currently undertaking a review of recreational fishing in the Pilbara and Kimberley regions. This review was been released for comment in July 2004 and outlines a series of recommendations on future management of recreational fishing. In particular it recommends the implementation of new bag limits and new legal size limits as well as addresses other issues, for example research, resource sharing, possession limits and protection of vulnerable species. During the development of the plan, a series of sanctuary zones were suggested in the western part of the marine park, however due to local opposition by recreational fishing interests these zones have been removed from the proposal. Nonetheless, the Government recognises the important conservation values of the area and the current level of recreational fishing effort. Consequently it is proposed that a review of recreational fishing regulations for the Pilbara and

	Kimberley that is currently underway be broadened to consider whether catch restrictions need to be tightened in the proposed marine park to ensure that stocks of targeted species are maintained at appropriate levels in the proposed marine park. These revised management arrangements will be developed by the DoF taking into consideration the views of the community including the public submissions made to this indicative management plan. During the planning process for the proposed reserves a range of issues were raised with respect to conflicts between recreational and commercial fishers. In response to these issues it has been proposed that all commercial fishing be prohibited in the western portion of the proposed marine park with the exception of commercial aquarium/specimen (fish, coral and shell) collecting, which is proposed to be phased out of this area within three years of creating the proposed reserves. It has also been proposed that commercial prawn trawling be prohibited within one nautical mile of the Nickol Bay coastline. DoF will develop these proposals in liaison with key stakeholders.
Current status	The finfish populations are generally in an undisturbed condition, apart from some localised impacts on selected site-attached species.
Existing and potential uses and/or pressures	• Recreational fishing (e.g. spear, net and line fishing). • Degradation of critical habitats as a result of human activity. • Commercial fishing (e.g. line and trap fishing, aquarium collecting). • Toxicants (e.g. industrial discharges, accidental spillage of petroleum products, anti-fouling agents). • Seawater intakes (juveniles). • Physical disturbance of juveniles and nursery areas (e.g. industrial development, blasting and dredging). • Introduction of marine pests (e.g. ballast water, hull fouling organisms). • Finfish aquaculture (e.g. introduction of disease, non-endemic species and genetics).
Current major pressure/s	Fishing and degradation of critical habitats as a result of human activity.
Management objective/s	1. To ensure no loss of species diversity of finfishes in the proposed reserves. 2. To ensure that the abundance of non-target finfishes is not impacted by fishing and activities that degrade critical habitats in the proposed reserves. 3. To manage target finfish species for ecological sustainability within the proposed reserves.
Strategies	1. Implement spatial controls to provide for: • protection of important fish spawning and aggregation sites and nursery areas in the proposed reserves; • protection against localised depletion or extinction of fish species; • an appropriate level of protection; and • monitoring of fish populations in areas free of significant human influence (of sufficient size and representative) (CALM, DoF). **(H-KMS)** 2. DoF to revise recreational fishing management arrangements (e.g. bag and size limits) for targeted finfish species within the proposed marine park to ensure targeted finfish stocks are maintained at appropriate levels in the Archipelago (DoF). **(H-KMS)** 3. Identify finfish species that will be protected from recreational and commercial fishing in the proposed reserves, and in liaison with the DoF, provide the necessary legislative protection to achieve this (DoF, CALM). **(M)** 4. Educate reserve users about the detrimental impacts of human activities on finfish stocks in the proposed reserves (CALM). **(M)** 5. Facilitate research to characterise finfish diversity and abundance in the proposed reserves (DoF, CALM). **(M)** 6. Quantify the level and significance of catch of target species and by-catch for both recreational and commercial fishing activities in the proposed reserves and, if necessary, and in accordance with DoF By-catch Action Plans, implement measures to reduce and manage the catch and by-catch of finfish species in the proposed reserves (DoF, CALM). **(M)**

Performance measures	1. Diversity. 2. Abundance.	**Desired trend/s**	1. Constant or positive. 2. Constant or positive.
Short-term	No loss of finfish abundance ^{Ø} in the *sanctuary zones* of the *marine park* and *conservation areas*		

target/s (KPI)	*(flora/fauna protection)* in the *marine management area* as a result of human activity within the proposed reserves.
Long-term target/s (KPI)	1. No loss of finfish diversity as a result of human activity in the proposed reserves. 2. No loss of protected finfish species abundance[Ø] as a result of human activities in the proposed reserves. 3. Abundance and size composition of finfish species in *sanctuary zones* of the *marine park* and *conservation areas (flora/fauna protection)* in the *marine management area* to be at natural levels. 4. Management targets for abundance of target finfish species in all other areas to be determined by the DoF in consultation with CALM and stakeholders.

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

7.1.14 Invertebrates

Ecological value	**Invertebrates:** *A high diversity and abundance of invertebrate fauna within the proposed reserves is an important food source for a variety of marine animals including migratory birds and fishes.*

Background	Marine invertebrates are those marine animals without a backbone and include corals, sponges, rock lobster, squid, cuttlefish, shells, jellyfishes, seastars and anemones. The proposed reserve has a high diversity and abundance of invertebrate species, which is attributed to the wide range of habitats. The invertebrate fauna comprises tropical species, which are common throughout the Indo-West Pacific region. Knowledge of the invertebrate fauna of the proposed reserves is incomplete, although some survey work has been undertaken. Data from these limited surveys indicates that the Dampier Archipelago/Cape Preston area is home to over 1,227 species of molluscs, 438 species of crustaceans, 275 species of sponges and 286 species of echinoderms (WAM pers. comm.). This diversity is higher than that of the Ningaloo Marine Park to the south west and the Montebello/Barrow islands area to the west. In fact, the species diversity of some of these fauna groups such as the echinoderms is likely to be the highest in Western Australia (WAM pers. comm.). Many invertebrate groups are not well known and further research into other invertebrate groups is likely to result in similar numbers of new species. The invertebrate fauna is a food source for fishes and migratory birds and several invertebrate species, including oysters, squid, sea cucumbers and shells are targeted by commercial and recreational fishers and collectors. Under the FRM Act, the DoF is responsible for the management of the recreational and commercial take of invertebrate species. Recreational and commercial fishing is considered the current major pressure on the invertebrate populations of the proposed reserves. Invertebrates are susceptible to a number of other impacts, including human activities, which pollute the environment and degrade critical habitats. The management of invertebrate species that are extracted needs to consider the viability of the populations of these species in the context of maintaining the values of the proposed reserves. Fisheries management scales are rarely reconciled with the spatial scales of marine conservation reserves and as a result, populations of some species in a reserve could become locally depleted even though the fishery is being managed on a sustainable basis at the broader scale. To overcome this potential problem, consideration is required as to the appropriateness of recreational and/or commercial extraction of these species and whether specific invertebrate species should be protected in part or all of the proposed reserves. This decision would be based on a number of factors including species distribution, abundance, life history and an assessment of the ecological and social importance of the species in the context of the reserves (e.g. “icon” species). Species for which extraction is considered appropriate will be managed by DoF, in accordance with Sustainable Development principles. The remaining species will be protected throughout the proposed reserves using appropriate legislation. Another key management strategy is the education of reserve users about the detrimental impacts of human activities on invertebrates in the proposed reserves. DoF are currently undertaking a review of recreational fishing in the Pilbara and Kimberley regions. This review was been released for comment in July 2004 and outlines a series of recommendations on future management of recreational fishing. In particular it recommends the implementation of new bag limits and new legal size limits as well as addresses other issues, for example research, resource sharing, possession limits and protection of vulnerable species. During the development of the plan, a series of sanctuary zones were suggested in the western part of the marine park, however due to local opposition by recreational fishing interests these zones have been removed from the proposal. Nonetheless, the Government recognises the important conservation values of the area and the current level of recreational fishing effort. Consequently it is proposed that a review of recreational fishing regulations for the Pilbara and Kimberley that is currently underway be broadened to consider whether catch restrictions need to be tightened in the proposed marine park to ensure that stocks of targeted species are maintained at appropriate levels in the proposed marine park. These revised management

	arrangements will be developed by the DoF taking into consideration the views of the community including the public submissions made to this indicative management plan. During the planning process for the proposed reserves a range of issues were raised with respect to conflicts between recreational and commercial fishers. In response to these issues it has been proposed that all commercial fishing be prohibited in the western portion of the proposed marine park with the exception of commercial aquarium/specimen (fish, coral and shell) collecting, which is proposed to be phased out of this area within three years of creating the proposed reserves. It has also been proposed that commercial prawn trawling be prohibited within one nautical mile of the Nickol Bay coastline. DoF will develop these proposals in liaison with key stakeholders.
Current status	The invertebrate populations are generally in an undisturbed condition.
Existing and potential uses and/or pressures	• Recreational and commercial fishing (e.g. shell and bait collecting). • Incidental recreational and commercial extraction (i.e. bycatch). • Pollution (e.g. industrial discharge, sediment, anti-fouling agents, iron-ore dust). • Degradation of critical habitats as a result of human activities (e.g. industrial development). • Nutrients (e.g. vessel, island and mainland sewage discharge). • Introduction of marine pests (e.g. ballast water, hull fouling organisms).
Current major pressure/s	Fishing and by-catch from recreational and commercial fishers.
Management objective/s	1. To ensure no loss of species diversity of invertebrates in the proposed reserves. 2. To ensure that the abundance of non-target invertebrate species is not impacted by recreational fishing and activities that degrade critical habitats in the proposed reserves. 3. To manage target invertebrate species for ecological sustainability within the proposed reserves.
Strategies	1. Implement spatial controls to provide for: • monitoring of invertebrates in areas free of significant human influence (of sufficient size and replicated); • protection of important invertebrate spawning and aggregation sites; • prevention of localised depletion or extinction of invertebrate species; and • an appropriate level of protection (CALM). **(H-KMS)** 2. DoF to revise recreational fishing management arrangements (e.g. bag and size limits) for targeted invertebrate species within the proposed marine park to ensure targeted invertebrate stocks are maintained at appropriate levels in the Archipelago (DoF). **(H-KMS)** 3. Identify invertebrate species that will be protected from recreational and commercial fishing in the proposed reserves, and in liaison with DoF, provide the necessary legislation to achieve this (DoF, CALM). **(M)** 4. Quantify the level and significance of catch of target species and by-catch for both recreational and commercial fishing activities in the reserves, and if necessary, and in accordance with DoF By-Catch Action Plans, implement measures to manage the catch and by-catch of invertebrate species in the proposed reserves (DoF, CALM). **(M)** 5. Educate reserve users about the detrimental impacts of human activities on invertebrates in the proposed reserves (CALM). **(M)** 6. Facilitate research to characterise invertebrate diversity and abundance in the proposed reserves (CALM). **(M)**

Performance measures	1. Diversity. 2. Abundance.	**Desired trend/s**	1. Constant or positive. 2. Constant or positive.
Short-term target/s (KPI)	No loss of invertebrate abundance ^{Ø} in the *sanctuary zones* of the *marine park* and *conservation areas (flora/fauna protection)* in the *marine management area* as a result of human activity within the proposed reserves.		

Long-term target/s (KPI)	1. No loss of invertebrate diversity as a result of human activity in the proposed reserves. 2. No loss of protected invertebrate species abundance[Ø] as a result of human activities in the proposed reserves. 3. Abundance and size composition of invertebrate species in *sanctuary zones* of the *marine park* and *conservation areas (flora/fauna protection)* in the *marine management area* to be at natural levels. 4. Management targets for abundance of target invertebrate species in all other areas to be determined by the DoF in consultation with CALM and stakeholders.

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

7.2 Social Values

Social values are those cultural, aesthetic, recreational and economic characteristics of an area. The Dampier Archipelago and Cape Preston area is culturally, recreationally and economically significant to Western Australians. Shell middens, artefacts and rock art date back 20,000 years of Aboriginal use and the area is culturally and recreationally significant to Aboriginal people who continue to hunt and fish in the area. The Pilbara has the highest rate of boat ownership in Australia and many of the people who own boats undertake recreational fishing, diving, snorkelling and nature appreciation activities.

Dampier Port is the largest port by tonnage in Australia and is the major export base for the States salt, iron ore, oil and gas. There are several industries that operate in the vicinity of the proposed reserves including salt production and petroleum exploration and production. The variety of marine life and pristine water quality supports commercial fishing, aquaculture and pearling.

This plan aims to strike a balance between protecting the marine environment for future generations and facilitating and managing the increasing commercial and recreational usage of the area.

7.2.1 Aboriginal heritage

Social value	**Aboriginal heritage:** S*hell middens, artefacts and rock art remain as testimonies to a rich history of Aboriginal habitation dating back 20,000 years. There is still a strong Aboriginal identity in the region today and the area is culturally and recreational significant to Indigenous people.*

Background	The history of Aboriginal habitation in the Dampier Archipelago/Cape Preston region dates back 20,000 years. The Dampier Archipelago contains a rich collection of Aboriginal rock art engravings, some of which are the earliest examples of Aboriginal art that exist in Australia. The Dampier Archipelago, Burrup Peninsula and adjacent coastal areas were once home to Aboriginal people known as the Yaburarra or "island" people. Archaeological features found in the Archipelago include mythological and ceremonial sites, graves, rock shelters, standing stones, artifact quarries, burials and middens. Shell middens and evidence of fish traps, testify to the strong association the Aboriginal people in this area had for the sea. There is also evidence that these people used rafts to travel between the islands and made extensive use of the abundant marine life for food. Some of the islands in the western Archipelago were also visited by the Mardudhunera people, who lived on the mainland. According to Aboriginal elders in the region today, the Yaburarra people originally numbered 100 to 120, but their numbers declined following the introduction of diseases such as smallpox and exploitation of their food and water sources. It is also likely that the Yaburarra people were exploited for labour, and there were violent confrontations with European settlers, for example, the Flying Foam Massacre in 1868. Although the majority of local Aboriginal people live in towns such as Karratha, Roebourne and Wickham, individuals and families retain strong ties to particular sites. Despite disruptions to traditional life, Aboriginal people seek to retain social, religious and personal bonds with their traditional lands. There are sites of important historical Aboriginal significance in the area, including the Flying Foam Massacre sites and many significant art sites on the Burrup Peninsula such as the Climbing Men, Deep Gorge and Kangaroo Valley (Figure 5). Current aboriginal usage of the area includes camping and fishing. Limited hunting of turtle and dugong also occurs. Aboriginal heritage is protected under the *Aboriginal Heritage Act 1972* and traditional hunting of turtle and dugong is permitted under the WC Act. There are four native title claims over the proposed reserve (Figure 6), and all are currently awaiting mediation in the Federal Court. Marine management issues in regards to Aboriginal heritage in the proposed reserve include potential human impacts on historical sites (e.g. physical disturbance, litter) and the involvement of Aboriginal people in the management of the proposed reserve. Under traditional law, Aboriginal people are responsible for, and obliged to protect, preserve and manage areas, sites and objects of Aboriginal significance associated with that country. In traditional terms, management includes protection and preservation of physical sites and objects as well as the traditional knowledge pertaining to them. A fundamental dimension of cultural knowledge to Aboriginal people today is the "meaning" of the land as it reveals the record of creation and the history of human activity. These responsibilities and obligations are of continuing importance to

	Aboriginal people, particularly with respect to teaching cultural heritage to the young. Proposed management strategies include increasing the level of knowledge regarding the significance of Aboriginal heritage in the area and the involvement of Aboriginal people in the management of the proposed reserve. Joint management arrangements may be made in the future to allow both the obligations of traditional owners of the area to be expressed and the objectives of the proposed reserve by the public to be met.
Requirements	• Protection of heritage sites. • Recognition of heritage value and traditional activities. • Equitable access to sites. • Involvement of Aboriginal people in the management of the proposed reserves.
Management objective/s	1. To ensure that, in collaboration with local Aboriginal people and the relevant management authorities, human activities do not significantly impact on sites of significance to Aboriginal people in the proposed reserve. 2. To involve local Aboriginal people in the management of the proposed reserve.
Strategies	1. Implement spatial controls to provide for the protection of, and appropriate access to, Aboriginal heritage sites (CALM). **(H-KMS)** 2. Ensure there is appropriate Aboriginal representation on the Management Advisory Committee (CALM). **(H-KMS)** 3. Develop mechanisms, in collaboration with local Aboriginal groups and relevant authorities, which ensure Aboriginal people have meaningful involvement in the management of the proposed reserve (CALM, DIA, local Aboriginal groups). **(H)** 4. Investigate opportunities for integrated joint management arrangements through a "Park Council" or similar body for all lands and waters within the Dampier Archipelago and Cape Preston area for which CALM has a management responsibility (CALM). **(H)** 5. Develop, in collaboration with the local Aboriginal community, a greater understanding of the significance of the area to Aboriginal people (CALM, PNTS, local Aboriginal groups). **(H)** 6. Distribute educational material to promote understanding, appreciation and enjoyment of cultural values of the area to schools and to visitors of the proposed reserve (CALM, WAM, WATC, DIA). **(M)**

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

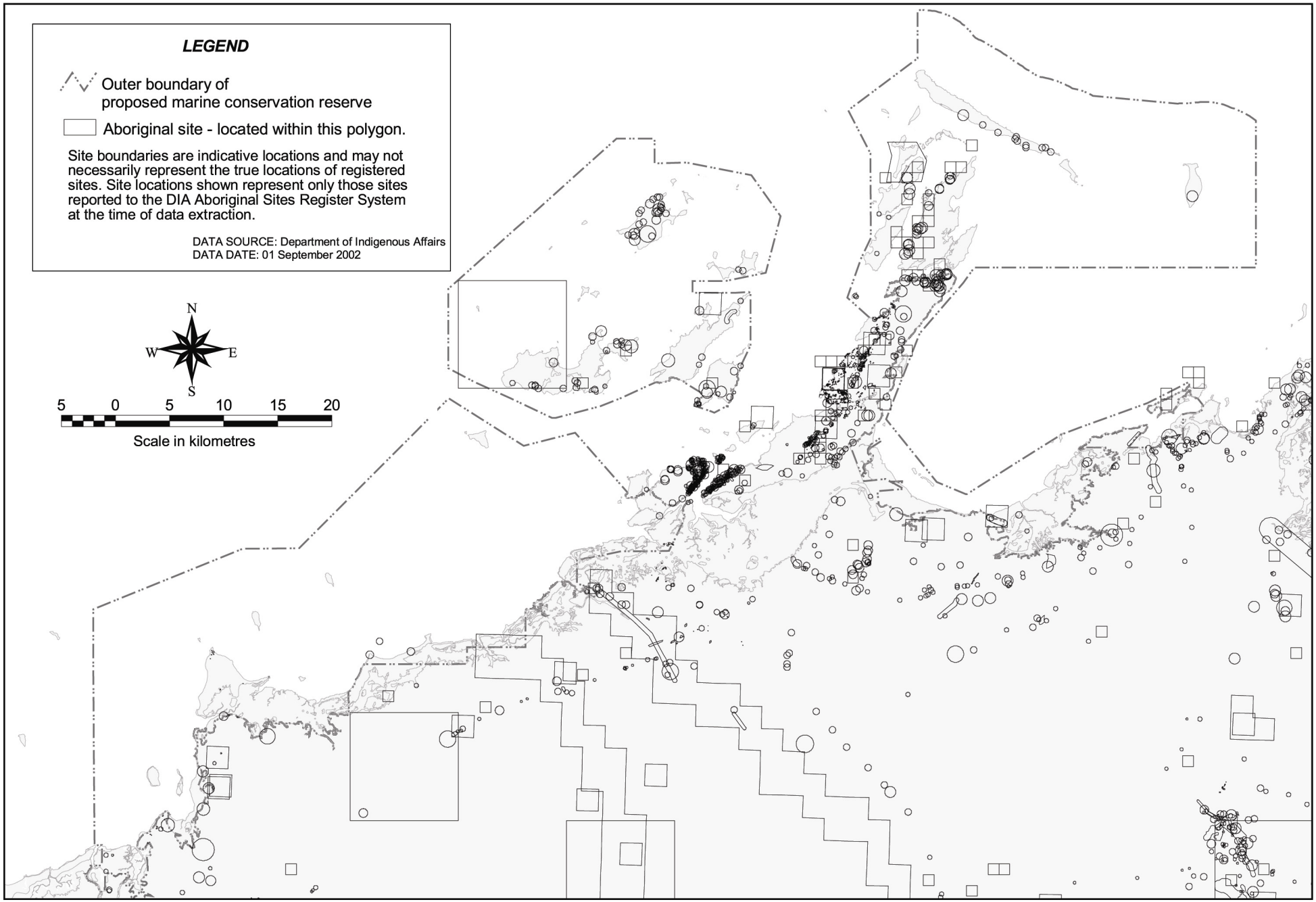


FIGURE 5: Aboriginal heritage sites within and adjacent to the proposed Dampier Archipelago Marine Park and Cape Preston Marine Management Area.

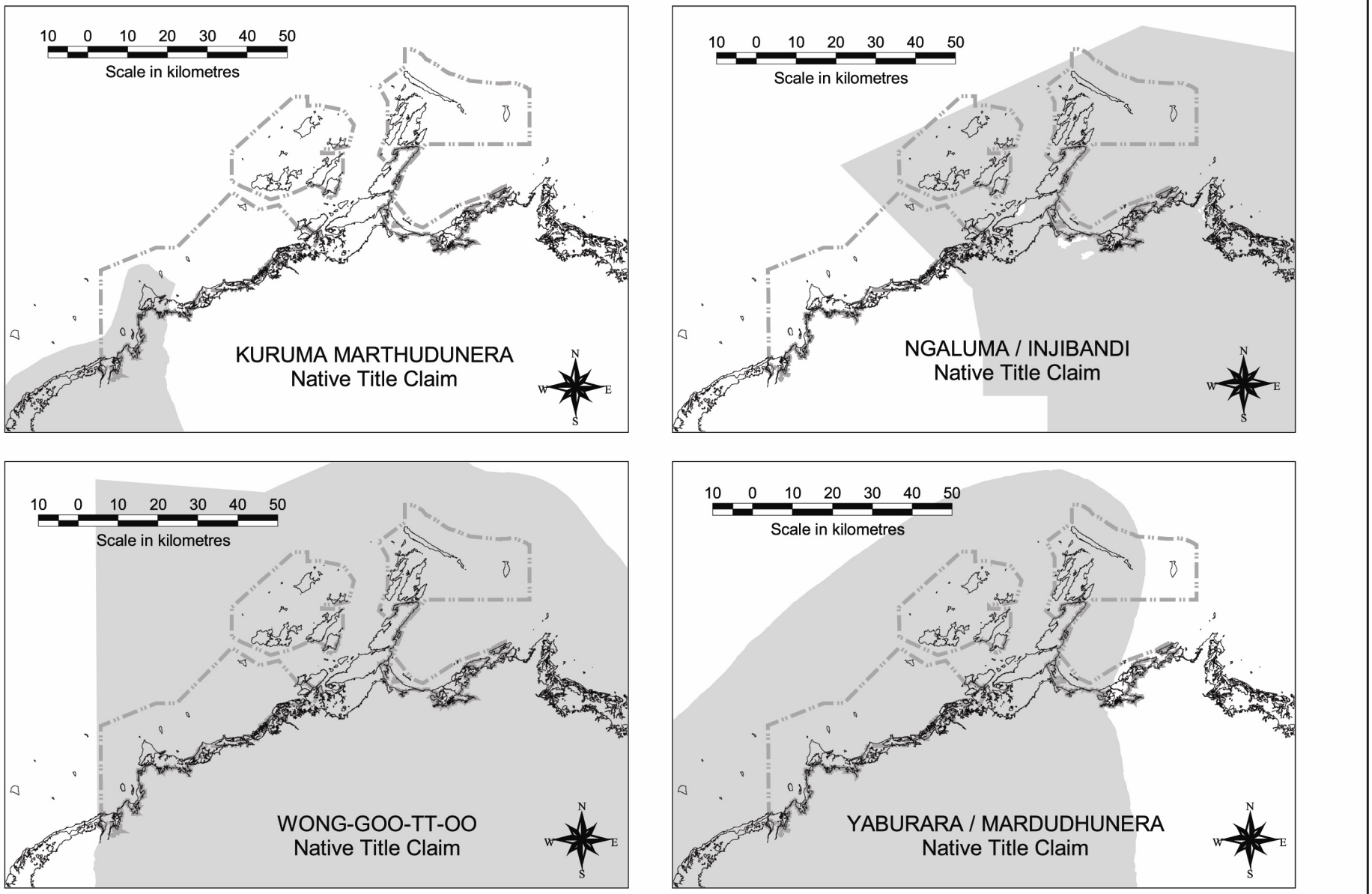


FIGURE 6: Native title claims within and adjacent to the proposed Dampier Archipelago Marine Park and Cape Preston Marine Management Area.

7.2.2 Maritime history

Social value	**Maritime history:** *The Dampier Archipelago/Cape Preston region has a history of European contact dating from 1628, which includes pearling, whaling and fishing for turtles.*

Background	The Dampier Archipelago/Cape Preston region has a rich maritime heritage. The islands were first charted in 1628 for the Dutch East India Company, however European ships may have ventured into the Archipelago as early as 1618. The earliest recorded European landing was by William Dampier in 1699, but it was Nicholas Baudin who sailed the islands of the Archipelago in 1801 aboard the *Geographe* and named them, as a group, Dampier's Archipelago. Numerous shipwrecks in the Dampier Archipelago/Cape Preston region survive as testimonies to the treachery of the coastline including many pearling luggers from the nineteenth century, the 30 tonne yacht *Sedjatra* from World War II, which was wrecked off the north west tip of Enderby Island, and a Catalina flying boat belonging to the 10th Air Wing of the United States Navy, which was wrecked on Enderby Island during the same period. More recently, during cyclone Orson in 1989, a dredging barge broke its moorings off West Lewis Island and was wrecked on Eaglehawk Island. It is likely, given the nature of the waters of the proposed reserves, that there are other wrecks within the Archipelago that are as yet undiscovered. The natural resources of the proposed reserves have been harvested for many years. The pearling industry flourished in the region during the nineteenth century with Cossack, Flying Foam Passage and Dolphin Island used as the main bases for the pearling fleets. Relics of their operations exist in Black Hawke Bay on Gidley Island. The commercial fishing industry was established during the late 1800s. In addition to the extracted of oysters and long line fishing for finfish, turtles and their eggs were commercially extracted until 1936. Humpback whales were hunted for a short period in the 1870s and tripots used to boil the blubber to extract whale oil remain today on Malus Island. Pre-1900 shipwrecks and artefacts are protected under the *Marine Archaeology Act 1973* and the *Historic Shipwrecks Act 1976*. The Western Australian Maritime Museum (WAMM) has statutory responsibility for management of these wrecks. The main management issues with regards to maritime history in the proposed reserves are potential human impacts on important historical sites (e.g. litter, physical disturbance, nature-based tourism). Proposed management of maritime history within the proposed reserves will focus on the education of users of the proposed reserves.
Requirements	• Protection of historical sites. • Identification of new sites.
Management objective/s	To ensure that, in collaboration with the WAMM, human activities do not significantly impact on historic sites or shipwrecks, whether known or yet to be discovered, in the proposed reserves.
Strategies	1. Distribute educational material regarding conservation of the maritime history of the area to visitors of the proposed reserves (WAMM, CALM). **(M)** 2. Advise reserve users of the relevant regulations under the *Heritage of Western Australia Act 1990*, the *Marine Archaeology Act 1973* and the Commonwealth *Historic Shipwrecks Act 1976*, where appropriate (WAMM, CALM). **(M)** 3. Identify new sites of historic importance within the proposed reserves (CALM). **(L)**

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

7.2.3 Nature-based tourism

Social value	**Nature-based tourism:** *The proposed reserves offer a wide range of attractions and opportunities for visitors to the area, with popular visitor activities including diving, fishing, and wildlife appreciation.*

Background	The proposed reserves offer a wide range of attractions for visitors to the area and was identified as a Pilbara Priority Tourism Destination Area by the WATC. The natural rugged beauty, attractive underwater scenery and both the variety and abundance of native fauna, including large marine wildlife, provide a valuable experience for visitors who enjoy the natural environment. There are opportunities for diving, snorkelling, fishing, boating, wildlife appreciation, island tours, camping, four wheel driving and a limited amount of surfing. The large-scale industrial developments also attract interest, and visitor centres and lookouts have been developed to cater for this market. Tourism is also generated through interest in the cultural heritage and history of the area, including the extensive rock art of the Burrup, and historical buildings at Cossack and Roebourne. In 2001/2002, a total of 251,000 domestic tourists visited the Pilbara region, spending approximately $193 million (Western Australian Tourism Commission pers. comm.). The percentage of these tourists who visited the proposed reserves is unknown, however given the proximity of the proposed reserves to Karratha and Dampier, it is likely that a large proportion visited the coastal areas if not the islands and waters of the Archipelago. Several charter boats operators take fishing and nature appreciation tours in the waters of the proposed reserves. Until 2000, there was no requirement that charter operators be licensed. However DoF consider a "precautionary approach" is required with regard to the charter fishing industry, which will be capped at current levels, until the relative impact of charter fishing activities is established (DoF, 2000). As such, a system of Fishing Tour Operators Licence will be implemented, the granting of which is subject to meeting a set of selection criteria which includes, among others, a demonstrated involvement with/investment in the industry prior to 12 September 1997. Aquatic nature-based tourism by its nature is believed to have less of an impact than charter fishing, and in recognition of this, DoF is also implementing an Aquatic Eco-tourism Licence, the number of which will not be capped at current levels (DoF, 2000). Human interactions with wildlife are controlled through codes of conduct under the WC Act. Nature-based tourism has the potential to make an important contribution to protecting the region's ecosystems by fostering a greater understanding of the environment. However unless carefully managed, visitation has the potential to cause environmental damage, particularly as the numbers of visitors continues to increase. This includes increases in litter, impacts on fish stocks due to fishing, damage to coastal and island landforms and disturbance to seabirds, marine mammals and nesting turtles. Management strategies for nature-based tourism in the proposed reserves will focus on the management of tourism activities in a manner that is consistent with maintaining the reserves' values, maintenance of the values on which the commercial nature-based tourism industry depends, and maintenance of a viable nature-based industry in the proposed reserves. The proposed zones in which nature-based tourism activities are permitted are listed in Table 2 and 3.
Requirements	• High water quality. • Clean beaches. • High aesthetic quality of marine environment. • Provision of "undisturbed" areas for nature appreciation. • Equitable and easy access to the natural values of the reserve in appropriate zones.
Management objective/s	1. To maintain the ecological and social values of the proposed reserves in areas that are important to nature-based tourism. 2. To manage nature-based tourism in a manner that is consistent with maintaining the proposed reserves' values. 3. Cooperate with the nature-based tourism industry and the WATC in developing, supporting and maintaining a sustainable nature-based tourism industry based around the proposed reserves.

Strategies	1. Implement spatial controls to provide for: • monitoring and assessment of key ecological processes and the level of impact of nature-based tourism activities within the proposed reserves (representative and of sufficient size); • equitable access for nature-based tourism to appropriate zones within the reserves; • protection of nature-based tourism opportunities; and • protection against possible impacts of nature-based tourism on the ecological values (CALM). **(H-KMS)** 2. License all commercial nature-based tourism operators within the proposed reserves with appropriate conditions (CALM). **(H-KMS)** 3. Develop Codes of Practice for nature-based tourism operations in the proposed reserves including: • performance measures; • desired trends; • short-term and long-term management targets; and • monitoring and reporting requirements (WATC, CALM). **(H)** 4. Raise awareness of nature-based tourism operators regarding the possible detrimental impacts of tourism on the ecological values through education and participation in management (CALM). **(L)**

Reporting	To be developed.
Target/s	Implementation of management strategies within agreed timeframes (Appendix III).

7.2.4 Commercial fishing

Social value	**Commercial fishing:** *The proposed reserves are used by commercial fishers targeting prawns, finfish and sharks. On a smaller scale beche de mer, molluscs and aquarium fish are also targeted.*

Background	Currently the major commercial fishing activities in the area are prawn trawling, finfish trapping and wet lining (Figure 7). There are two prawn fisheries within the Dampier Archipelago/Cape Preston region, these being Onslow and Nickol Bay. The Onslow Prawn Managed Fishery extends from Dampier to Onslow. There are currently 31 licensed vessels, and the total catch in 2001 was estimated at 63 tonnes worth approximately $0.9 million (DoF, 2002). The Nickol Bay Prawn Managed Fishery extends east from Dampier to east of Port Hedland. The fishery operates over trawling areas covering most of Nickol Bay. There are 14 licensed vessels, and the total catch in 2001 was estimated at 22 tonnes with an estimated value of $0.3 million (DoF, 2002). The Pilbara finfish industry has an estimated catch of approximately 3000 tonnes worth $9 million annually (DoF, 2002) and involves trap, line and trawl fishing, however finfish trawling is not permitted in the proposed reserves. The Pilbara Trap Managed Fishery currently involves six licenses for two companies that target demersal scalefish such as snapper, grouper, emperor and jobfish species. Commercial line fishers use drop lines, hand lines and long lines and target similar species as those caught in the trap fishery. The North Coast Shark Fishery uses either shark droplines or shark long lines to target a wide range of species, including the sandbar shark, blacktip shark, tiger shark, pigeye shark and the hammerhead shark. The Fishery stretches from North West Cape to the Northern Territory border with the principal fishing area being inshore from Exmouth to Eighty Mile Beach, and has eight operators with access to the proposed reserve. In 2001 the North Coast Shark Fishery had an annual catch of 272 tonnes of shark and 10 tonnes of scalefish, valued at approximately $0.9 million (DoF, 2002). At a smaller scale beche de mer is permitted to be collected by hand in the proposed reserves and there are currently seven licenses which permit collecting throughout Western Australia. In 1997 the annual catch of beche de mer in the Pilbara region was approximately 55 tonnes worth $444,000 (DCT & PDC, 1999). There are currently 32 commercial shell collectors licensed to operate in Western Australia and the annual catch of molluscs in the Pilbara in 1997 was approximately 106 tonnes valued at $335,000 (DCT & PDC, 1999). There are also 13 aquarium collectors licensed under the Marine Aquarium Managed Fishery to operate in Western Australia. Five of these aquarium collectors have an endorsement to collect corals and three of these derive most of their business from the waters of the proposed reserves. In July 2003, the DoF imposed a prohibition of commercial coral collecting in Cleaverville beach, which will remain in place until such time as the Minister for Agriculture, Forestry and Fisheries has endorsed a long-term management strategy for this activity. Commercial fishing in Western Australian is managed under the FRM Act by DoF. A range of management strategies are used including limitations on fishing gear, closed areas, limits to the number of licences issued and the monitoring of catch and stock levels. In June 2002, the DoF imposed a prohibition under the FRM Act on commercial fishing for mud crabs south of King Sound. Other management strategies include the use of by-catch devices to reduce the impacts of commercial fishing on other values of the proposed reserve. By-catch devices are being phased in (DoF, pers. comm.). Where the establishment of a marine nature reserve or exclusion zone in a marine park is claimed to have reduced the commercial value of a commercial fishing authorisation or a directly related activity, e.g. fish processing, the relevant lessee may be eligible for compensation under the *Fishing and Related Industries Compensation (Marine Reserves) Act 1997.* The main issues in regard to commercial fishing in the proposed reserves are that of localised depletion of fish stocks and habitat damage. The Advisory Committee for the Proposed Dampier Archipelago/Cape Preston Marine Conservation Reserve identified commercial trawl fishing in the proposed reserves as an important issue of public concern and that there is a lack of data available on the environmental impacts of trawling in the proposed reserves. The primary role of marine conservation reserve management in relation to commercial fishing in the proposed reserves is to help maintain the natural values of the proposed reserves on

	which the industry depends and, in liaison with DoF, ensure that commercial fishing activities in the proposed reserves are ecologically and socially sustainable. Management strategies include the use of spatial controls to provide for no-take areas as "reference" sites for research and monitoring opportunities through which the impacts of commercial fishing on the proposed reserves' values can be assessed. During the planning process for the proposed reserves a range of issues were raised with respect to conflicts between recreational and commercial fishers. In response to these issues it has been proposed that all commercial fishing be prohibited in the western portion of the proposed marine park with the exception of commercial aquarium/specimen (fish, coral and shell) collecting, which is proposed to be phased out of this area within three years of creating the proposed reserves. It has also been proposed that commercial prawn trawling be prohibited within one nautical mile of the Nickol Bay coast. DoF will develop these proposals in liaison with key stakeholders. The proposed zones in which commercial fishing is permitted are listed in Table 2 and 3.
Requirements	• High water quality. • Maintenance of key habitats. • Equitable access to fishing grounds within the proposed reserves, except for exclusion areas, e.g. sanctuary zones. • Maintenance of target fish stocks.
Management objective/s	1. To maintain ecological values of the proposed reserves that are important to commercial fisheries. 2. To ensure that, in collaboration with the commercial fishing industry, other user groups and the DoF, existing and potential fishing activities in the proposed reserves are managed in a manner consistent with maintaining the proposed reserves' values. 3. Cooperate with the industry and the DoF in the maintenance of a sustainable commercial fishing industry in the proposed reserves.
Strategies	1. Implement spatial controls to provide for: • monitoring and assessment of key ecological processes and the level of impact of commercial fishing in the proposed reserves (representative and of sufficient size); • equitable access to appropriate zones within the proposed reserves for commercial fishing; • protection of nursery habitats (e.g. mangroves) and spawning sites for commercially targeted species; • opportunities to contribute to the achievement of DoF objectives for the broader management of commercial fishing; • assistance in maintaining fish stocks in the area; and • protection against possible impacts of commercial fishing on the ecological values (CALM). **(H-KMS)** 2. DoF to phase out commercial aquarium/specimen (fish, coral and shell) collecting from the western portion of the proposed marine park within three years of creating the proposed reserves (DoF). **(H-KMS)** 3. DoF to prohibit commercial trawling operations within one nautical mile of the Nickol Bay coast (DoF). **(H-KMS)** 4. Participate in DoF process regarding management of commercial fisheries, including review and amendment, if necessary, of management controls (CALM). **(H)** 5. Ensure commercial fisheries are aware of the spatial controls and any restrictions that may apply to their operations in the proposed reserves (DoF, CALM). **(H)** 6. Monitor commercial fishing catch/effort within the proposed reserves and report the results publicly (DoF). **(M)** 7. Ensure that, through the DoF and Commonwealth Department of Environment and Heritage processes, licensees meet Sustainable Development requirements and reporting (DoF, Department of Environment and Heritage, EPA, CALM). **(M)** 8. Liaise with the MPRA in regard to proposed new fisheries and major changes to existing fisheries (DoF). **(M)** 9. Ensure that the DoF licensing process takes into account MPRA/CALM audit requirements (DoF). **(M)**

Reporting	To be developed.
Target/s	Implementation of management strategies within agreed timeframes (Appendix III).

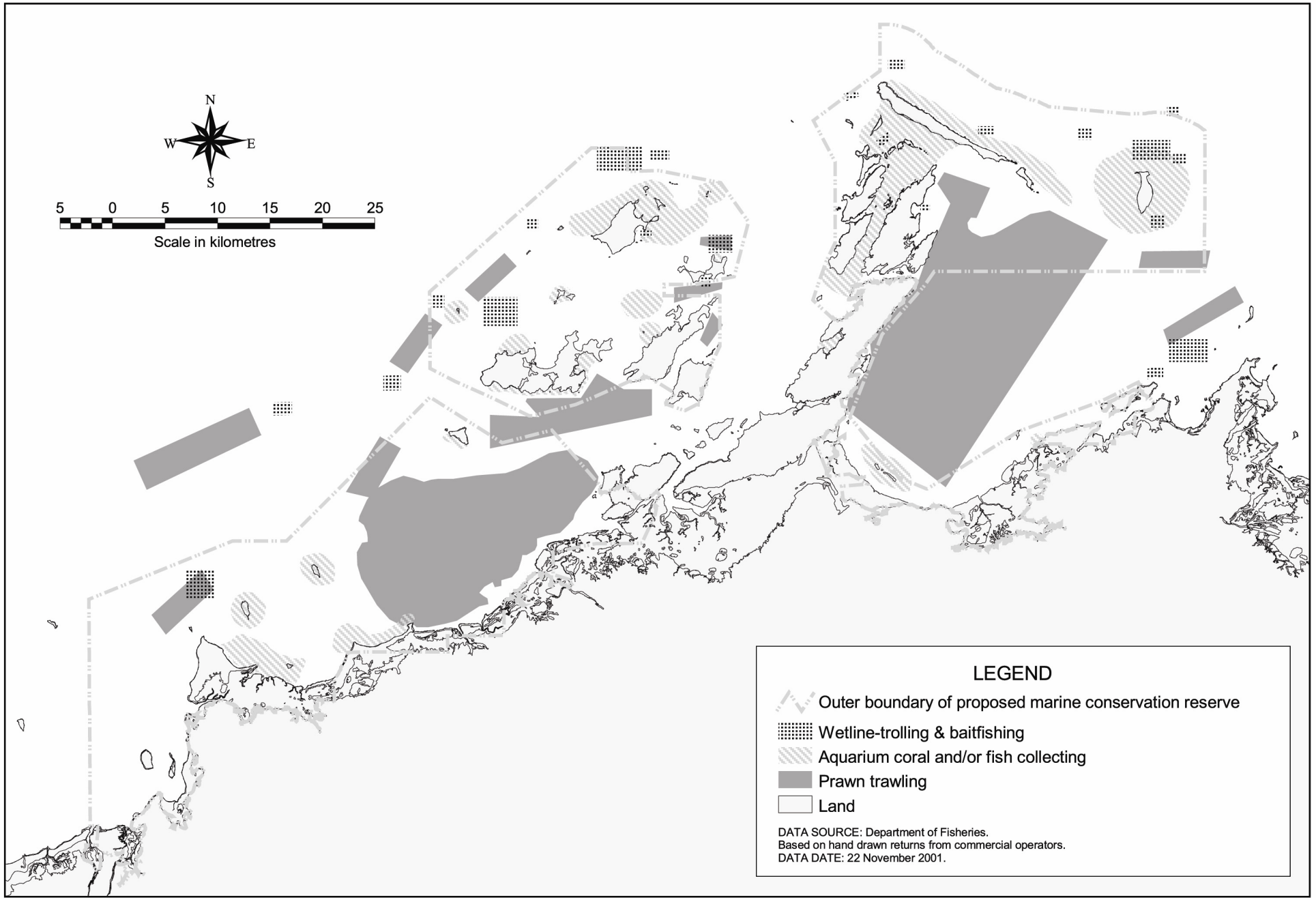


FIGURE 7: Commercial fishing within and adjacent to the proposed Dampier Archipelago Marine Park and Cape Preston Marine Management Area.

7.2.5 Aquaculture

Social value	**Aquaculture:** *The environment of the proposed reserves support the culture of pearls, algae, red claw crayfish and aquarium fishes, and have potential for future development of aquaculture industries in the future.*

Background	Currently, the proposed reserves and surrounding area supports three aquaculture industries those being pearl production (from non *Pinctada maxima* oysters), production of beta-carotene from algae (*Dunaliella salina*) and production of red claw crayfish (*Cherax quadrircarinatus*). The latter two operations being undertaken from land-based sites at Nickol Bay and near Karratha airport respectively (Figure 8). Aquarium fish are also produced at the airport site. There are four licence areas for the culture of non-*maxima* pearls, which are located to the west of West Lewis Island, to the north of Dixon Island, to the west of N.E. Regnard Island, and at Cape Preston. Non-*maxima* pearl production is primarily from the oysters derived from hatchery-produced stock, with some naturally settled spat that is collected locally. The production area for beta-carotene is 304 ha and the algae grown in ponds 200 to 400 mm deep. Beta-carotene is used in a variety of products including pet food, human dietary supplements and food colourings. Management of aquaculture in the proposed reserves is the statutory responsibility of the DoF, under the FRM Act. Mechanisms for management include the granting of licences and leases (with associated conditions), and regulations under the FRM Act. Ministerial Policy Guideline Number 8 (DoF, 1998) sets out guidelines for the assessment of aquaculture proposals in the aquatic environment within Western Australia. This involves the referral of the application to the EPA for determination of the level of environmental assessment required under the EP Act. The application is also referred to CALM, the MPRA, plus a range of other government, community and industry groups. Following the consultation process outlined in Ministerial Policy Guideline Number 8, the Executive Director of DoF decides either to grant or refuse the application. Any proposal to grant an application requires the approval of the Minister for Agriculture, Forestry and Fisheries. Details of licence conditions would be developed via existing statutory procedures by the DoF, in collaboration with CALM and DoE. Where the establishment of a marine nature reserve or exclusion zone in a marine mark is claimed to have reduced the commercial value of an aquaculture licence or lease, the licensee or lessee may be eligible for compensation under the *Fishing and Related Industries Compensation (Marine Reserves) Act 1997*. Although the use of the proposed reserves for aquaculture is currently low, there is a high potential for the development of aquaculture in the area, including prawn, fish, mud crab, marine microalgae, artemia and marine ornamental aquaculture. Management issues and environmental concerns associated with aquaculture are predominantly associated with the amenities and equipment. There is potential for grow-out panels and cages to shade benthic flora and fauna, which can lead to a decrease in primary productivity. Shell grow-out panels, aquaculture cages and the associated ropes and markers have the potential to entangle marine wildlife, litter the water column and nearby beaches and reduce visual aesthetics. Lights associated with facilities can attract and disorientate birds and turtles and prevent hatchlings from reaching the open ocean. Some industries can involve the addition of nutrients into the environment through aquaculture feed, however the nutrient loading associated with effluent from the beta-carotene facility in Nickol Bay is considered negligible. The primary role of marine reserve management in relation to aquaculture in the proposed reserves is to help maintain the natural values of the proposed reserves on which the industry depends and, in liaison with the DoF, ensure that aquaculture within the proposed reserves is socially and ecologically sustainable. Proposed management strategies include spatial controls, which will provide no-take areas as "reference" sites for research and monitoring opportunities through which the impacts of aquaculture on the proposed reserves' values can be assessed. The proposed zones in which aquaculture is permitted are listed in Table 2 and 3.
Requirements	• High water quality. • Equitable access to areas of the proposed reserve within appropriate zones, subject to environmental assessment.

Management objective/s	1. To maintain the ecological and social values of the proposed reserves that are important to the aquaculture industry. 2. To ensure that, in collaboration with the industry and the DoF, the aquaculture industry in the proposed reserves is managed in a manner that is consistent with maintaining the proposed reserves' values. 3. Cooperate with the industry and the DoF to maintain a sustainable aquaculture industry in the proposed reserves.
Strategies	1. Implement spatial controls to provide for: • monitoring and assessment of key ecological processes and the level of impact of aquaculture in the proposed reserves (representative and of sufficient size); • equitable access to appropriate zones within the proposed reserves for aquaculture; and • protection against possible impacts of aquaculture on the ecological values (CALM). **(H-KMS)** 2. Ensure that proposals for nature-based tourism and industry operations do not affect the key ecological requirements (e.g. high water quality) for existing aquaculture operations (CALM, EPA, ACWA, WATC). **(H)** 3. In collaboration with the Aquaculture Council of WA and DoF, assess the need for Codes of Practice and Environmental Management Systems (EMS) for aquaculture in the proposed reserves to ensure social and ecological sustainability (CALM, DoF, ACWA). **(H)** 4. Ensure operators provide an annual status report on the environmental impacts of aquaculture activity in the reserve in accordance with DoF's licence conditions and the MPRA's auditing requirements (ACWA, CALM). **(M)** 5. Provide formal advice to DoF and EPA (as appropriate) in relation to the environmental assessment of proposed aquaculture activity in the reserves (CALM). **(M)** 6. Ensure that the DoF licensing process takes MPRA/Departmental audit requirements into account (DoF). **(M)** 7. Ensure that licensees meet navigational requirements (DoF, DPI). **(L)** 8. Identify potential areas suitable for aquaculture within the proposed reserves (DoF, CALM). **(L)**

Reporting	To be developed.
Target/s	Implementation of management strategies within agreed timeframes (Appendix III).

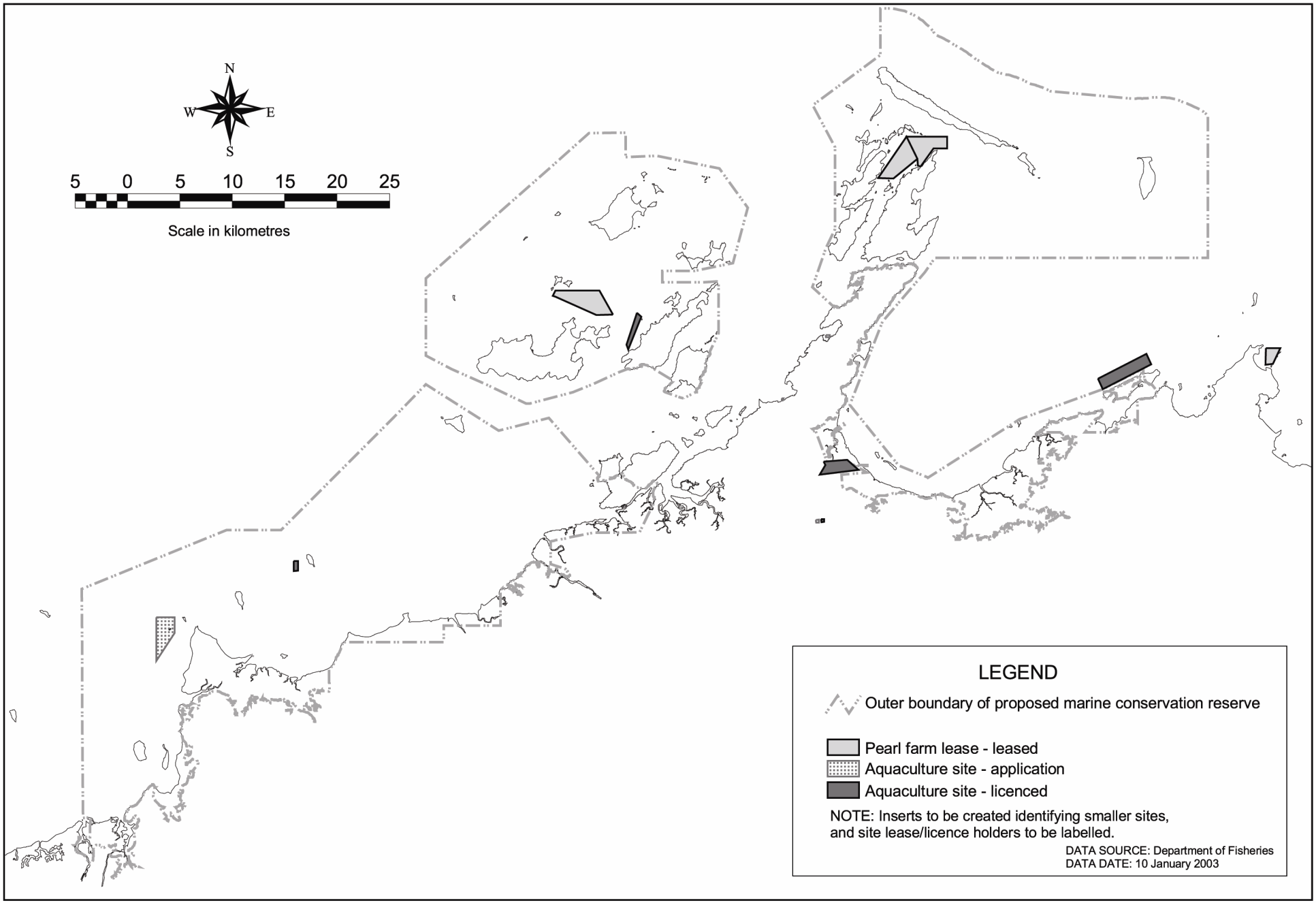


FIGURE 8: Pearling farm leases and aquaculture licences within and adjacent to the proposed Dampier Archipelago Marine Park and Cape Preston Marine Management Area.

7.2.6 Pearling

Social value	**Pearling:** T*he warm water temperatures, high nutrient levels, protection from wave damage, and relatively shallow water in parts of the proposed reserves provide optimal conditions for the production of pearls.*

Background	Pearling is the production of pearls from the oyster species *Pinctada maxima*, which are either collected from the wild or grown in hatcheries. The warm water temperatures, high nutrient levels, protection from wave damage and relatively shallow water of the proposed reserves are considered suitable for pearl production. Although there are currently five pearling leases within the proposed reserves (Figure 8) none of these are currently being utilised. Pearling in Western Australia is managed by DoF under the *Pearling Act 1990*, through the granting of licences, quotas and size limits on the collection of wild oysters, restrictions on hatchery production and restrictions on allowable distances between leases to minimise disease transfer. Ministerial Policy Guideline Number 8 (DoF, 1998) sets out guidelines for the assessment of pearling proposals. Proposals for new pearling activities involves the referral of the application to the DoE/EPA, CALM, the MPRA and a range of other government, community and industry groups. The approval of the Minister for the Environment is also required. Where the establishment of a marine nature reserve or exclusion zone in a marine park is claimed to have reduced the commercial value of a pearling licence or lease, the licensee or lessee may be eligible for compensation under the *Fishing and Related Industries Compensation (Marine Reserves) Act 1997.* The management of human activities that affect the ecological values (i.e. high water quality) that are critical requirements of the industry is a key issue for pearling. While there are concerns about the impacts of pearling, such as shading of benthic fauna by grow-out panels and an associated decrease in primary productivity, research to date does not support these concerns. A review of environmental impacts of pearling (Enzer Marine Environmental Consulting, 1998) concluded that in general the industry is environmentally benign, producing a high value product with a minimum of environmental disruption. However, if not carefully managed, activities associated with pearling could have negative impacts on the ecological and social values of the proposed reserves. This could include impacts from anchoring, sewage disposal, waste disposal, litter, lighting (causing increased predation and disorientation to turtle hatchlings) introduction of marine pests, loss of visual aesthetics and conflicts with other users. The primary role of marine conservation reserve management in relation to pearling in the proposed reserves is to ensure pearling activities are socially and ecologically sustainable and to help maintain the natural values of the proposed reserves on which the industry depends. Management strategies include spatial controls, which will provide no-take areas as "reference" sites for research and monitoring opportunities through which the impacts of pearling on the proposed reserves' values can be assessed. The proposed zones in which pearling is permitted are listed in Table 2 and 3.
Requirements	• High water quality. • Equitable access to areas of the reserves, in appropriate zones, subject to environmental assessment.
Management objective/s	1. To maintain the ecological values of the proposed reserves that are important to the pearling industry. 2. To ensure that, in collaboration with the industry and DoF, the pearling industry in the proposed reserves is managed in a manner that is consistent with maintaining the proposed reserves' values. 3. Cooperate with the industry and DoF in the maintenance of a sustainable pearling industry in the proposed reserves.

Strategies	1. Implement spatial controls to provide for: • monitoring and assessment of key ecological processes and the level of impact of pearling in the proposed reserves (representative and of sufficient size); • equitable access for pearling to appropriate zones within the proposed reserves; and • protection against possible impacts of pearling on the ecological values (CALM). **(H-KMS)** 2. In collaboration with the Pearl Producers Association (PPA) and DoF, develop environmental Codes of Practice for pearling in the proposed reserves to ensure social and ecological sustainability (DoF, PPA, CALM). **(H)** 3. Ensure that proposals for nature-based tourism and industry operations do not affect the key ecological requirements for pearling operations (e.g. high water quality) (CALM, EPA, DoF, ACWA, PPA, WATC). **(H)** 4. Ensure that, through DoF and Commonwealth Department of Environment and Heritage processes, licensees meet Sustainable Development requirements and reporting (DoF, Department of Environment and Heritage, EPA, CALM). 5. Ensure operators provide an annual status report on the environmental impacts of pearling activities in the proposed reserves in accordance with DoF's licence conditions and the MPRA's auditing requirements (PPA, CALM). **(M)** 6. Provide formal advice to DoF and EPA (as appropriate) in relation to environmental assessment of proposed pearling activity in the proposed reserves (CALM). **(M)** 7. Ensure that the DoF licensing process takes MPRA/CALM audit requirements into account (DoF, CALM). **(M)** 8. Ensure through DPI processes that licensees meet navigational requirements (DPI). **(M)**

Reporting	To be developed.
Target/s	Implementation of management strategies within agreed timeframes (Appendix III).

7.2.7 Ports and shipping

Social value	**Ports and shipping:** *The high level of shipping activity in the area is expected to increase with the addition of future port facilities and the expected increase in tonnage of the nearby Dampier Port.*

Background	Dampier Port is the largest port by tonnage in Australia with 82.5 million tonnes of product worth in excess of six billion dollars exported in 2000 (IRC Environment, 2002). The boundaries of Dampier Port encompass Mermaid Sound and include waters to the north, which are used for anchorage of large vessels (Figure 9). The Port also includes the waters between Enderby Island to the north and Eaglehawk and Low islands to the south. The majority of the cargo shipped from this Port is the result of the operations of Hamersley Iron, Woodside Energy and Dampier Salt, all of which operate private wharves. The Parker Point and East Intercourse Island wharf facilities are operated by Hamersley Iron and can accept vessels up to 150,000 and 320,000 dead weight tonnes respectively (DoT & PDC, 1997) and the largest shipment of iron ore to date is 242,500 tonnes (Hamersley Iron, pers. comm.). In addition to the private wharves, the DPA manages a public wharf which is located near Phillip Point and maintains responsibility for safety issues in Hampton Harbour where there is a small marine facility exists serving both commercial and recreation vessels. Future port facilities may be located at Dixon Island, West Intercourse Island and Cape Preston, all of which are within the proposed reserves. There is also a small coastal harbour at John's Creek, Point Samson, which is managed by the DPI. The Dampier Port is managed by the DPA, under the *Port Authorities Act 1999* and port operations are carried out by the private sector. It is a function of the Authority to protect and enhance the environment of the Port. The *Port of Dampier Environmental Management Plan* (IRC Environment, 2002) outlines strategies to minimise the impacts of port operations on the environment. Mechanisms used by the DPA to minimise environmental risks include incident response planning and the adoption of precautionary operational procedures. For example, the DPA has developed an oil spill contingency plan for the Port in preparation of oil spill incidents, and around two million dollars worth of oil spill combat equipment is kept in storage. The DPA has made recommendations with regards to the discharge of ballast water, which complement voluntary guidelines developed by the Australian Quarantine and Inspection Service for the handling and treatment of ballast water in ships entering Australian waters. In order to maintain vessel safety in the event of adverse weather conditions, a number of cyclone moorings have been established in Hampton Harbour, south of West Lewis Island, Flying Foam Passage and Mermaid Strait. Dredging of shipping channels requires DoE approval. The Dampier Port area is excluded from the proposed reserves; however, the reserve surrounds the port which means that port operations have the potential to impact on the values of the proposed reserves as the operation of large vessels in shallow, confined waters inevitably poses some risks for the marine and coastal environments. Management issues include oil spills, introduction of exotic marine pests via the discharge of ballast water, accidents resulting from spills or fires via the transport of various hazardous chemicals and leaching of anti-fouling agents. There is a requirement for two shipping channels, one maintained by Woodside Energy and the other by Hamersley Iron, and dredging and spoil dumping can potentially increase water turbidity and smother marine organisms. In addition, the construction of wharves and causeways can result in significant changes to water flow, which can cause changes in seabed topography and potentially impact on recruitment and dispersal processes. Management strategies for ports and shipping in the proposed reserves have been developed in view of the potential increase in pressure placed on the marine and coastal environment by this growing industry. It is a proposed management strategy that a liaison committee is formed to ensure a coordinated approach to port assessment and reporting requirements. New ports within the proposed reserves will also be formally assessed by the EPA. Spatial controls will also be provided to help manage the potential pressures placed on the marine and coastal environment by this increasing industry.

Requirements	• Access to deep water. • Access to mainland coast. • The ability to carry out dredging. • Equitable access to areas of the proposed reserves in appropriate zones, subject to environmental assessment.
Management objective/s	1. To ensure that, in collaboration with port managers and users, port activities are carried out in a manner compatible with maintaining the proposed reserves' values. 2. To ensure that development of future ports is carried out in a manner that maintains the values of the proposed reserves.
Strategies	1. Implement spatial controls to provide for • monitoring and assessment of key ecological processes and the level of impact of port activities and shipping (representative and of sufficient size); • protection against possible impacts of port activities and shipping on the ecological values; and • equitable access to appropriate zones within the proposed reserves for ports and shipping (CALM). **(H-KMS)** 2. Ensure an integrated approach to port and reserve management (including assessment and reporting requirements) through the establishment of a liaison committee for the Dampier Port and for any future ports (DPA, EPA, CALM). **(H)** 3. Ensure that ports prepare and implement appropriate Environment Management Systems (EMS) to protect the values of the adjacent reserves. **(H)** 4. Provide formal advice to the EPA and DoIR in relation to the environmental assessment of proposed ports and shipping channels in, and adjacent to, the proposed reserves (CALM). **(M)**

Reporting	To be developed.
Target/s	Implementation of management strategies within agreed timeframes (Appendix III).

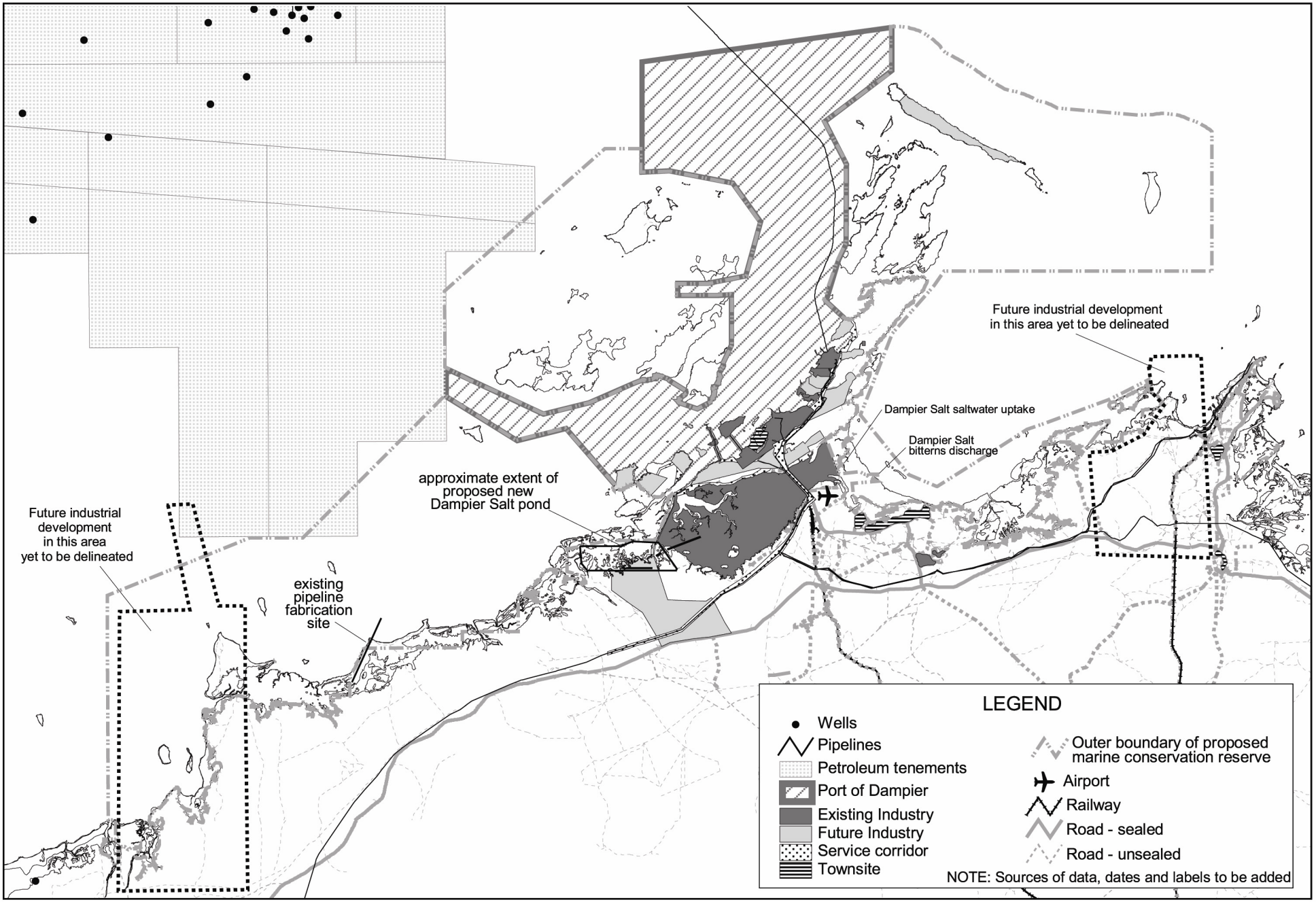


FIGURE 9: Industrial land and water use and associated infrastructure within and adjacent to the proposed Dampier Archipelago Marine Park and Cape Preston Marine Management Area.

7.2.8 Industry

Social value	**Industry:** *Petroleum, iron ore export and salt production are the major industries, which operate in and adjacent to the proposed reserves.*

Background	A number of industries operate in or adjacent to the proposed reserve. The Pilbara region is the State's most productive petroleum area producing 99.3% of the State's oil and 92.2% of the State's gas (DoIR, pers. comm.). Many mining tenements overlap the waters of the proposed reserves (Figure 10). There are also major oil and gas exploration and production sites within 60 km of Karratha, and there are currently two petroleum tenements that are held by Strike Oil, which overlap the proposed reserve (Figure 9). Woodside Energy Ltd. operates the onshore LNG production plant and export wharves for LNG, LPG and condensate, on the Burrup Peninsula. Offshore petroleum production platforms are connected to the onshore plant via a pipeline. The Supply Base in King Bay handles all supply and construction vessels associated with the North West Shelf project. Other support industries operate out of this area and Karratha, including fabrication, industrial machinery hire and fuel distribution. The Woodside Energy operation is one of the largest processing projects in the region, with 7.7 million tonnes of LNG, 1.2 million tonnes of LPG and 4.2 million tonnes of condensate exported in 2001 (Dampier Port Authority, 2002). Salt production is another major industry in the Dampier area. Dampier Salt Ltd. holds a 15,000 ha lease, between Karratha and Dampier, in which evaporation ponds have been constructed. The Dampier Salt operation produces 3.7 million tonnes of salt per year, valued at $60 million (Dampier Salt pers. comm.). Fifty per cent of the salt produced in Dampier is exported to Japan and the remainder goes to south east Asia, Europe, America and a small amount to Africa. Salt from Dampier is used in the production of glass, chlorine and caustic soda. The Dampier Salt Ltd. has plans to potentially expand the area currently used for salt production activities. To accommodate this, the proposed reserve boundaries do not overlap the area that has been identified for expansion of salt production, and also does not include a tidal channel to Nickol Bay that has also been identified as being required for future salt production activities. Should Government not approve the use of these areas for the expansion of the Dampier Salt Ltd. lease, the intention is to include these areas in the proposed reserves. CALM, in liaison with relevant Government agencies and stakeholders, will consider these issues in the public submission period. There are also a number of proposed industry developments, both on the Burrup Peninsula and at Cape Preston, including several potential iron ore processing, base metal processing, LNG, petrochemical and chemical companies and a range of support industries. These include Austeel's iron ore mine, HBI plant and export wharf and Burrup Fertilizer's ammonia plant. Management of mineral, energy and petroleum industries is the responsibility of the DoIR, under the *Mining Act 1978*, *Mining Act Regulations 1981*, *Mine Safety and Inspection Act 1994*, *Mine Safety and Inspection Regulations 1995,* and *Petroleum Act 1967*. The operations of Hamersley Iron, Dampier Salt and Woodside are ratified through four State agreement acts including the *Iron Ore (Hamersley Range) Agreement Act 1963, Dampier Solar Salt, Industry Agreement 1967, North West Gas Development (Woodside) Agreement 1979,* and *Iron Ore Processing (Mineralogy Pty. Ltd.) Agreement Act 2002*. These agreement acts pertain to the establishment and development of these operations in the Dampier Archipelago region and the implications of these particularly relate to the shipping of products through the Dampier Port. All major industry developments are subject to environmental impact assessment by EPA, under the EP Act and are only approved if deemed environmentally acceptable. As part of their license condition, industries must undertake monitoring of the environmental impact of their activities. For example, Dampier Salt monitors the discharge of bitterns, the hypersaline waste product, into Nickol Bay, and monitors the mangroves adjacent to the ponds. Mineral, energy and petroleum industries have the potential to impact on the values of the proposed reserves, and the continual expansion of processing and other industrial facilities and activities have implications for management. Impacts may arise from the need for additional port infrastructure, lights of industrial facilities, disposal of production water and drilling tailings, seismic and other exploration activities, and processing facility operations. The construction of evaporation ponds can potentially alter natural water flow and destroy habitats

	such as mangrove and mudflat communities. Proposed management strategies for industry in the proposed reserves include the use of spatial controls to provide no-take areas as "reference" sites for research and monitoring opportunities through which the impacts of industries on the proposed reserves' values can be assessed. In addition, new industry projects will be subject to licence conditions, and CALM will provide formal advice to the EPA and DoIR in relation to the environmental assessment of proposed industry in, and adjacent to, the proposed reserves. The proposed zones in which industry is permitted are listed in Table 2 and 3. Existing infrastructure (e.g. pipelines) in or adjacent to the proposed reserves will require maintenance from time to time. These ongoing activities and other proposed activities should be conducted in liaison with CALM to minimise the impact on the ecological values of the proposed reserves. A pipeline fabrication site was established on Mardie Station in 1997, and is an important facility for the petroleum industry providing the major mainland site for the fabrication and then towing of pipelines offshore. The project was subject to a Public Environmental Review and approved subject to a number of environmental conditions. The operation of towing pipelines offshore does result in some localised scouring of the seabed in the shallow waters adjoining the shore. The operation of this site will be accommodated within the proposed reserves. It is also important to note that Mineralogy Pty. Ltd. have an exploration permit (E08/636) that overlaps the proposed South West Regnard Islands Conservation (Flora/Fauna Protection) Area in the Cape Preston Marine Management Area.
Requirements	• Access to ports. • Access to seawater intake & discharge points. • Equitable access to areas of the reserve in appropriate zones, subject to environmental assessment.
Management objective/s	1. To ensure that industrial development within the proposed reserves operates in a manner consistent with maintaining the proposed reserves' ecological and social values. 2. Cooperate with industry to minimise impacts of development adjacent to the proposed reserves.
Strategies	1. Implement spatial controls to provide for: • monitoring and assessment of key ecological processes and the level of impact of industry in the proposed reserves (representative and of sufficient size); • protection against possible impacts of industry on the ecological values; and • equitable access to appropriate zones within the proposed reserves for industry (CALM). **(H-KMS)** 2. Ensure that a recognised Environment Management System (EMS) is prepared and implemented for industry projects to protect the values of the proposed reserves (EPA, DoIR, CALM). **(H)** 3. Provide formal advice to the EPA and DoIR in relation to the environmental assessment of proposed industry in, and adjacent to, the proposed reserves (CALM). **(M)** 4. Ensure a coordinated approach to industry assessment and reporting requirements in the proposed reserves (EPA, DoIR, CALM). **(M)**

Reporting	To be developed.
Target/s	Implementation of management strategies within agreed timeframes (Appendix III).

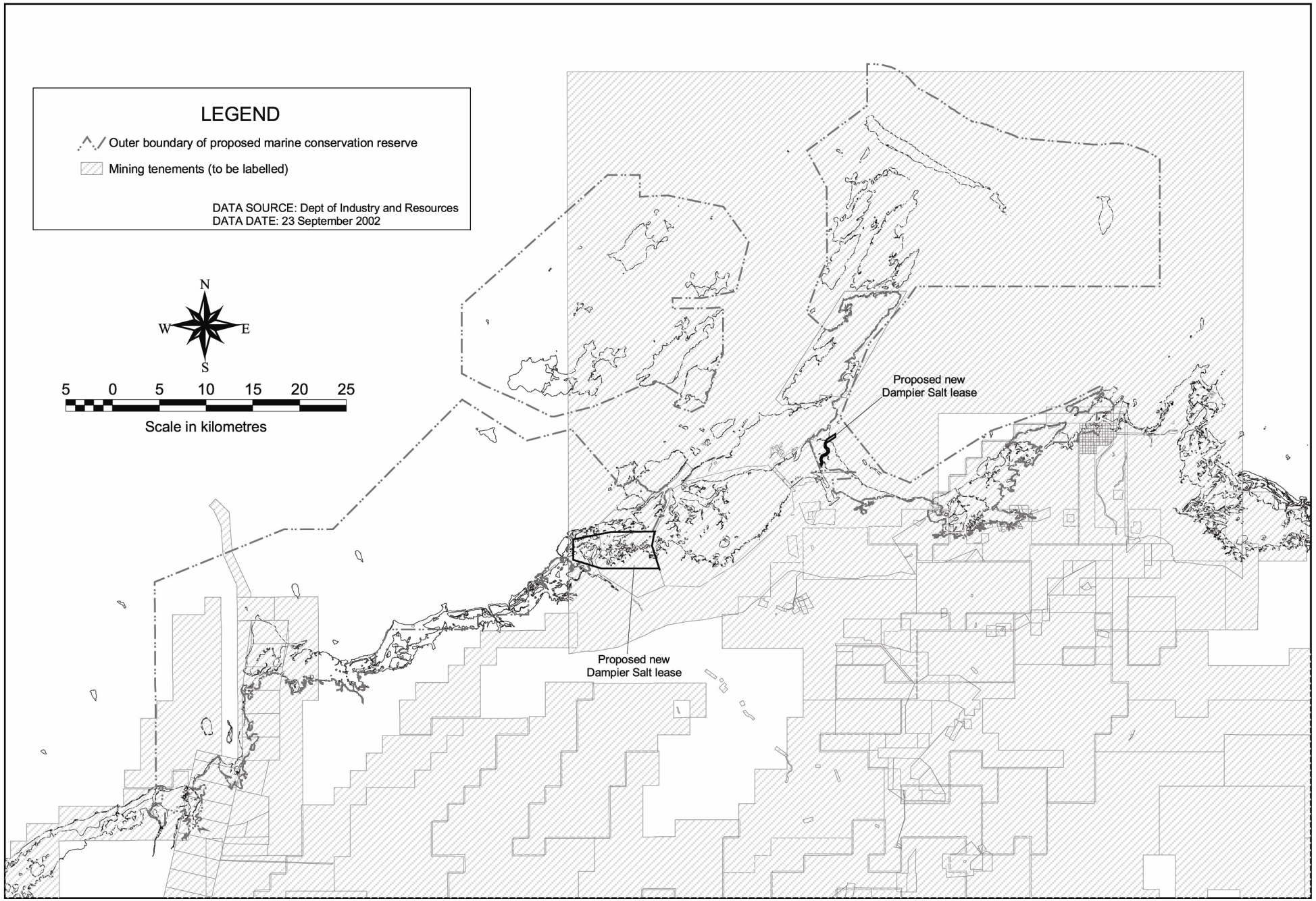


FIGURE 10: Mining tenements within and adjacent to the proposed Dampier Archipelago Marine Park and Cape Preston Marine Management Area.

7.2.9 Recreational activities

Social value	**Recreational Activities:** *The warm climate, island scenery, abundance of wildlife and pristine environment provides for a range of recreation activities including boating, diving and surface water sports.*

Background	Due to its warm climate, stunning island and ocean vistas, abundant wildlife and relatively pristine marine environment, the proposed reserves provide the opportunity for a variety of marine recreation activities (Figure 11 and 12). Boating is a popular recreational activity in Western Australia, with 57,000 private vessels registered with the DPI. Approximately 2,100 of these are registered to owners residing in the towns of Karratha, Dampier, Point Samson, Roebourne, Onslow and Exmouth. The proposed reserves offer excellent boating opportunities with good shelter afforded by the islands and bays. There are a number of locations where small boats can be launched in the area, including sealed ramps at Dampier and John's Creek at Point Samson, and unsealed ramps at Back Beach in Nickol Bay, Cleaverville Creek, Cowrie Cove, Withnell Bay, Hearson's Cove, Maitland River, 40 Mile Beach, and Fortescue River. The proposed reserves offer a variety of unspoilt reefs and other marine habitats, with a variety of large marine mammals, turtles and other charismatic wildlife, making it attractive for divers and snorkellers. Surface water sports in the proposed marine conservation reserves include sailing, water-skiing, sea kayaking and windsurfing. Sailing is popular with yacht clubs in both Dampier and Port Walcott holding annual races around the Dampier Archipelago islands. Swimming is popular at Hearson's Cove, and beaches on the islands of the Dampier Archipelago and the Burrup Peninsula. The coastline offers a wide range of land-based recreational opportunities including walking, camping, four wheel driving, photography, picnicking and appreciation and study of Aboriginal art and nature. Cleaverville, Fortesque River and 40 Mile Beaches are popular for caravan camping, while there are 34 recreational shacks on the islands licensed by CALM to the Dampier Archipelago Recreational Dwellers Association, which provide an accommodation base for users. A number of mechanisms are in place to manage recreational activities in the area of the proposed reserves. The DPI is responsible for all boating regulations including licensing, safety standards, marker buoys, moorings and jetties; however, mooring controls can be delegated to other management agencies. Boat access in the proposed reserves is prohibited adjacent to the beach to protect swimmers, and a speed limit of 8 knots applies in the harbour limits. Access is also limited surrounding wharves, and boating is restricted in Hampton Harbour. A no-swimming zone has been designated surrounding the boat ramps in Dampier and a skiing area has been designated along the south-eastern edge of East Intercourse Island. Whales, dolphins, dugongs, turtles, birds and whale sharks are fully protected under the WC Act and it is an offence to disturb these animals. Wildlife viewing is controlled by a code of conduct, which includes minimum approach distances, maximum boat speeds and use of lights in the vicinity of wildlife. Increases in recreational activities in the future have the potential to impact negatively on the ecological values of the proposed reserves through an increase in the disposal of effluent and rubbish, through inappropriate anchoring and installation of inappropriate moorings in sensitive habitats and by degradation of coastal landforms. The implementation of spatial controls will allow for monitoring, provide protection to key recreation sites, ensure there is equitable access to the proposed reserves for recreational users and provide for protection against possible impacts of recreational activities on the ecological values. Education of reserve users about the impacts of recreational activities and the ecological values of the proposed reserves are also proposed. The proposed zones in which recreational activities are permitted are listed in Table 2 and 3.
Requirements	• High water quality. • High aesthetic quality of the marine environment. • Equitable access to the natural values of the proposed reserve in appropriate zones. • Separation of incompatible activities.

Management objective/s	1. To maintain the ecological and social values of the proposed reserves within areas that are important to recreational activities. 2. To ensure recreational activities are managed in a manner that is consistent with maintaining the proposed reserves' ecological values. 3. To manage recreational activities in a manner that minimises conflict between users of the proposed reserves.
Strategies	1. Implement spatial controls to provide for: • monitoring and assessment of key ecological processes and the level of impact of recreational activities (representative and of sufficient size); • provide protection to key recreation sites; • equitable access to the proposed reserves for recreational users; and • protection against possible impacts of recreational activities on the ecological values (CALM). **(H-KMS)** 2. Educate reserve users about the impacts of recreational activities on the ecological values of the proposed reserves (CALM). **(H)** 3. In collaboration with user groups, develop Codes of Practice to minimise environmental impacts of recreational activities, as appropriate (CALM). **(M)** 4. Determine the nature, spatial patterns, compatibility and potential environmental impacts of all existing recreational activities in the reserves (CALM). **(M)** 5. If necessary, separate incompatible recreational uses within the proposed reserves (CALM). **(M)** 6. Liaise with the DPI to designate speed restrictions where necessary for wildlife protection and/or for safety requirements (CALM, DPI). **(M)** 7. Establish interpretative dive trails in suitable areas within the proposed reserves (CALM). **(L)**

Reporting	To be developed.
Target/s	Implementation of management strategies within agreed timeframes (Appendix III).

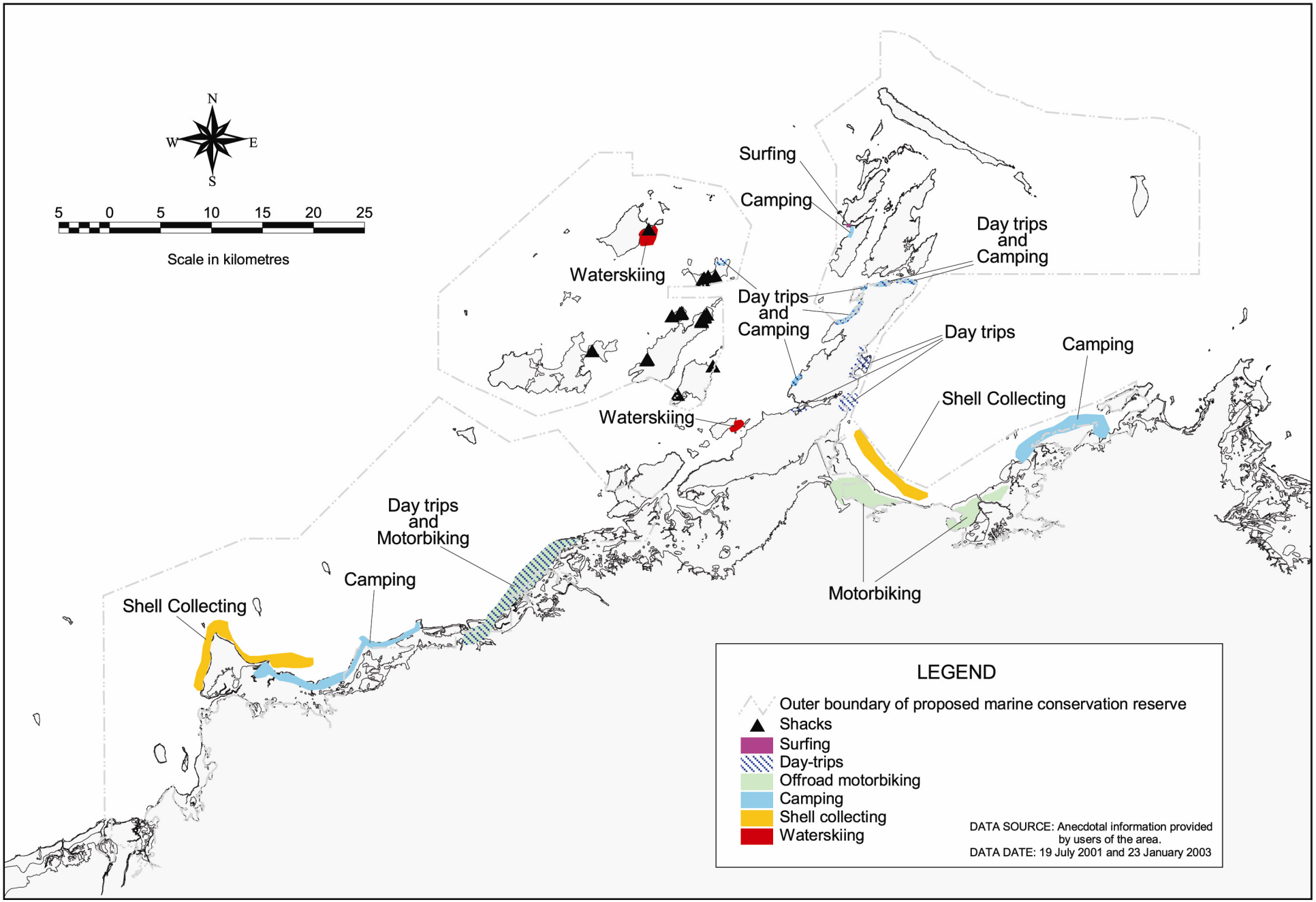


FIGURE 11: Recreational activities (other than fishing and diving) and shack locations within and adjacent to the proposed Dampier Archipelago Marine Park and Cape Preston Marine Management Area.

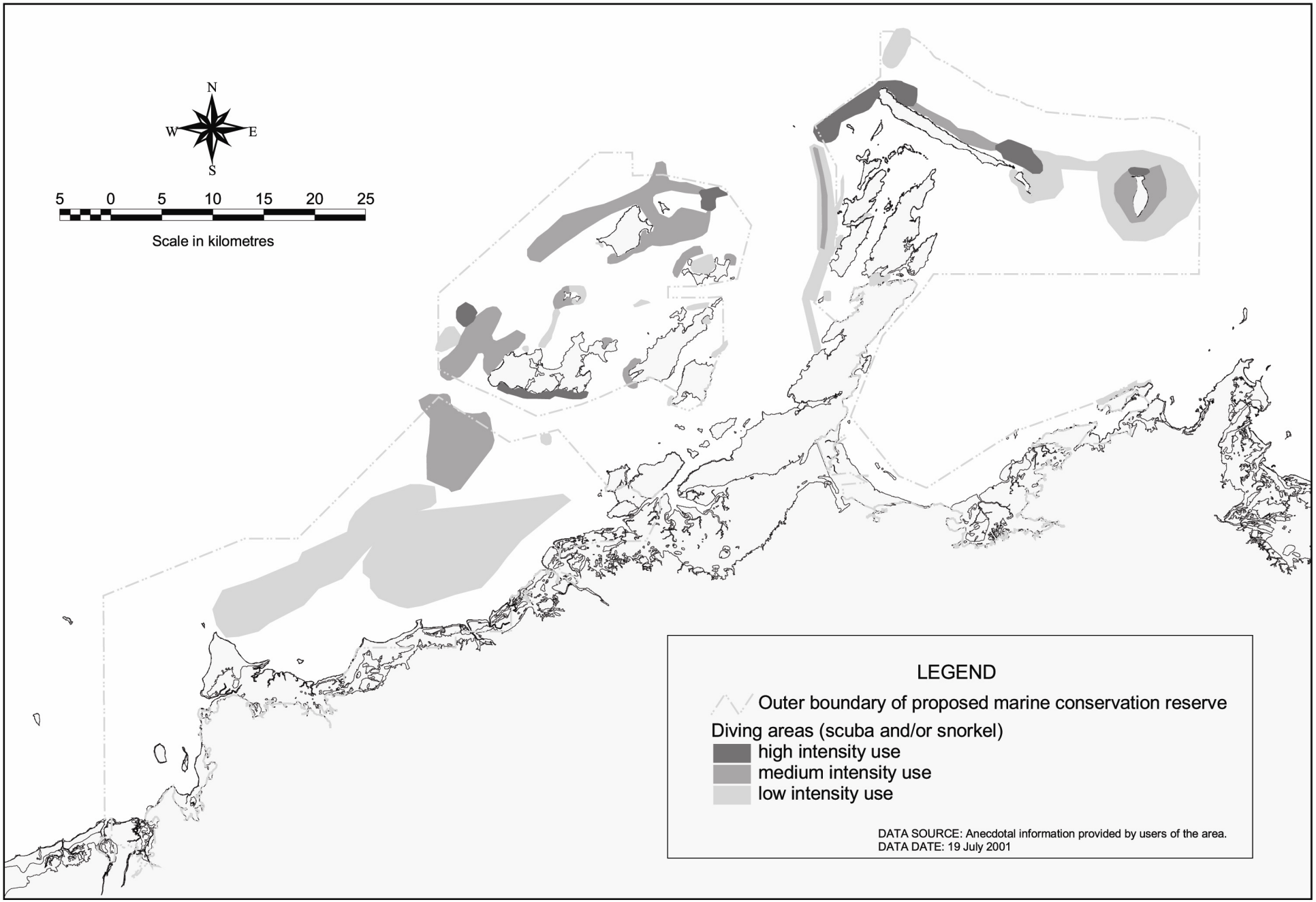


FIGURE 12: Recreational diving within and adjacent to the proposed Dampier Archipelago Marine Park and Cape Preston Marine Management Area.

7.2.10 Recreational fishing

Social value	**Recreational fishing:** *Line fishing, netting and spearfishing are used by fishers to target a variety of pelagic and reef finfish species, mud-crabs, crayfish and other invertebrates.*

Background

Recreational fishing is enjoyed by about 34% of the Western Australian population, which equates to around 600,000 people. The Pilbara region has one of the highest boat ownership rates in Australia, and recreational fishing is a highly popular pursuit. The areas that are accessed by recreational fishers depend on the tide and weather conditions. Fishers tend to fish near coral and subtidal rocky reefs offshore and make use of the artificial habitat provided by the gas pipeline (Figure 13 and 14). Sites close to boat launching access are also used extensively. Game fishers target very large species such as marlin and sailfish in deeper offshore waters, while sport fishers troll for smaller pelagic species such as tuna and mackerel. Line fishers generally target coral trout, spangled emperor, black snapper and trevally, while shore based fishers target Barramundi and Salmon. Netting in the proposed reserves is mainly a shore-based activity. Haul and cast nets are allowed in certain areas, but set nets are not permitted north of Beadon Creek at Onslow. Spearfishing is carried out on both SCUBA and snorkel. Spearfishers operate mainly in the clearer waters offshore where they target coral trout, snapper and cod species. Crabbing for mud and blue manna crabs, and crayfishing, are also popular pursuits as is recreational prawning. Mud crabs are mainly caught near mangroves, blue manna crabs are caught mainly in Nickol Bay and Dampier, while crayfish may be found in most reef areas, although the shallower areas, due to their accessibility, tend to be subject to the highest recreational fishing effort.

The DoF has undertaken a survey on the regional boat-based recreational fishing effort in the Pilbara. Preliminary results from interviews of approximately 4,000 fishers indicate that the annual recreational fishing effort in the Archipelago is approximately 85,000 fisher days. Though the majority of recreational fishers abide by DoF bag and size limits, the total recreational catch in the Archipelago is substantial. Shown below are the top twenty species (by approximate number of individuals taken) caught annually by recreational fishers in the proposed reserves. Many of the fish species targeted by recreational fishers are widespread and common to the Indo-Pacific region and recruitment factors for these species are driven by highly variable environmental factors.

Species	***Approx. No. of individuals taken annually per species***	***Combined estimated tonnes taken annually***
Blue manna crab	*64,000*	*20*
Green mud crab	*6,000*	*6*
Northern calamari, dog mackerel	*5,500*	*13*
Stripey seaperch, blue-lined emperor	*3,500*	*6*
Spangled emperor	*2,500*	*4*
Painted rock lobster, golden trevally, Spanish mackerel, blackspot tuskfish, mangrove jack	*2,000*	*28*
Sweetlip emperor, estuary cod	*1,500*	*5*
Coral trout, bar-cheeked coral trout, Queensland school mackerel, blue-spotted emperor, threadfin salmon, yellowfin bream, chinman cod	*1,000*	*N/A*

Source: Williamson, P.C. *et al.* (In prep).

Recreational fishing is managed by DoF under the FRM Act, using a variety of management tools, to limit catch to sustainable levels. These tools include bag and size limits, gear restrictions, seasonal restrictions and licensing, while potato cod, whale sharks and humpheaded maori wrasse are fully protected in all State Waters. DoF are currently undertaking a review of recreational fishing in the Pilbara and Kimberley regions. This review was been released for comment in July 2004 and outlines a series of recommendations on future management of recreational fishing. In particular it recommends the implementation of new bag limits and new legal size limits as well as addresses other issues, for example research, resource sharing, possession limits and protection of vulnerable species.

The main issues in regard to recreational fishing in the proposed reserves are that of localised

	depletion of target species, the modification of population structures from fishing, by-catch of unwanted non-target species, and associated impacts on the ecological values, for example, from litter and trampling of sensitive habitat. The primary role of marine conservation reserve management in relation to recreational fishing within the proposed reserves is to help maintain the natural values of the proposed reserves on which this activity depends and, in liaison with DoF, ensure that recreational fishing activities in the proposed reserves are ecologically and socially sustainable. In addition, the creation of no-take areas within the proposed reserves will provide "reference" sites for research and monitoring opportunities through which the impacts of recreational fishing on the proposed reserves' values can be assessed. During the development of the plan, a series of sanctuary zones were suggested in the western part of the marine park, however due to local opposition by recreational fishing interests these zones have been removed from the proposal. Nonetheless, the Government recognises the important conservation values of the area and the current level of recreational fishing effort. Consequently it is proposed that a review of recreational fishing regulations for the Pilbara and Kimberley that is currently underway be broadened to consider whether catch restrictions need to be tightened in the proposed marine park to ensure that stocks of targeted species are maintained at appropriate levels in the proposed marine park. These revised management arrangements will be developed by the DoF taking into consideration the views of the community including the public submissions made to this indicative management plan. During the planning process for the proposed reserves a range of issues were raised with respect to conflicts between recreational and commercial fishers. In response to these issues it has been proposed that all commercial fishing be prohibited in the western portion of the proposed marine park with the exception of commercial aquarium/specimen (fish, coral and shell) collecting, which is proposed to be phased out of this area within three years of creating the proposed reserves. It has also been proposed that commercial prawn trawling be prohibited within one nautical mile of the Nickol Bay coastline. DoF will develop these proposals in liaison with key stakeholders. The proposed zones in which recreational fishing is permitted are listed in Table 2 and 3.
Requirements	• High water quality. • Maintenance of species' habitat, nursery and spawning areas. • Equitable access to fishing grounds within the reserves, except for exclusion areas, e.g. sanctuary zones. • Maintenance of recreational fishing experience.
Management objective/s	1. To maintain ecological and social values of the proposed reserves that are important to recreational fishing. 2. To ensure that, in collaboration with the community and DoF, recreational fishing is managed in a manner that is consistent with maintaining the proposed reserves' values. 3. Cooperate with the community and DoF in maintaining quality recreational fishing opportunities in the proposed reserves. 4. Apply the precautionary principle regarding fish stocks.
Strategies	1. Implement spatial controls to provide for: • monitoring and assessment of key ecological processes and the level of impact of recreational fishing in the proposed reserves (representative and of sufficient size); • equitable access to appropriate zones within the proposed reserves for recreational fishing; • protection of nursery habitats (e.g. mangroves) and spawning sites for key recreational fishing species; • opportunities to contribute to the achievement of DoF objectives for the broader management of recreational fishing; • assistance in maintaining fish stocks in the area; and • protection against possible impacts of recreational fishing on the ecological values (CALM). **(H-KMS)** 2. DoF to revise recreational fishing management arrangements (e.g. bag and size limits) for targeted species within the proposed marine park to ensure stocks of targeted species are maintained at appropriate levels in the Archipelago (DoF). **(H-KMS)**

	3. DoF to review management controls (e.g. bag, size and possession limits) on recreational fishing in the proposed reserves and amend these if they are inappropriate (DoF). **(H-KMS)** 4. Ensure recreational fishers are aware of the spatial controls and of restrictions that may apply to their activities in the proposed reserves (DoF, CALM). **(H)** 5. Formulate performance measures and targets for key recreational species that will maintain the quality of recreational fishing in the proposed reserves (DoF). **(M)** 6. Evaluate the sustainability of recreational fisheries in the proposed reserves (DoF, CALM). **(M)** 7. Monitor recreational fishing catch/effort within the proposed reserves (DoF). **(M)** 8. Encourage compliance to recreational fishing restrictions through enforcement activities (e.g. checks at boat ramps) (DoF). **(H)** 9. Educate reserve users on the cumulative impacts of recreational fishing on fish stocks (DoF, CALM). **(M)**

Reporting	To be developed.
Target/s	Implementation of management strategies within agreed timeframes (Appendix III).

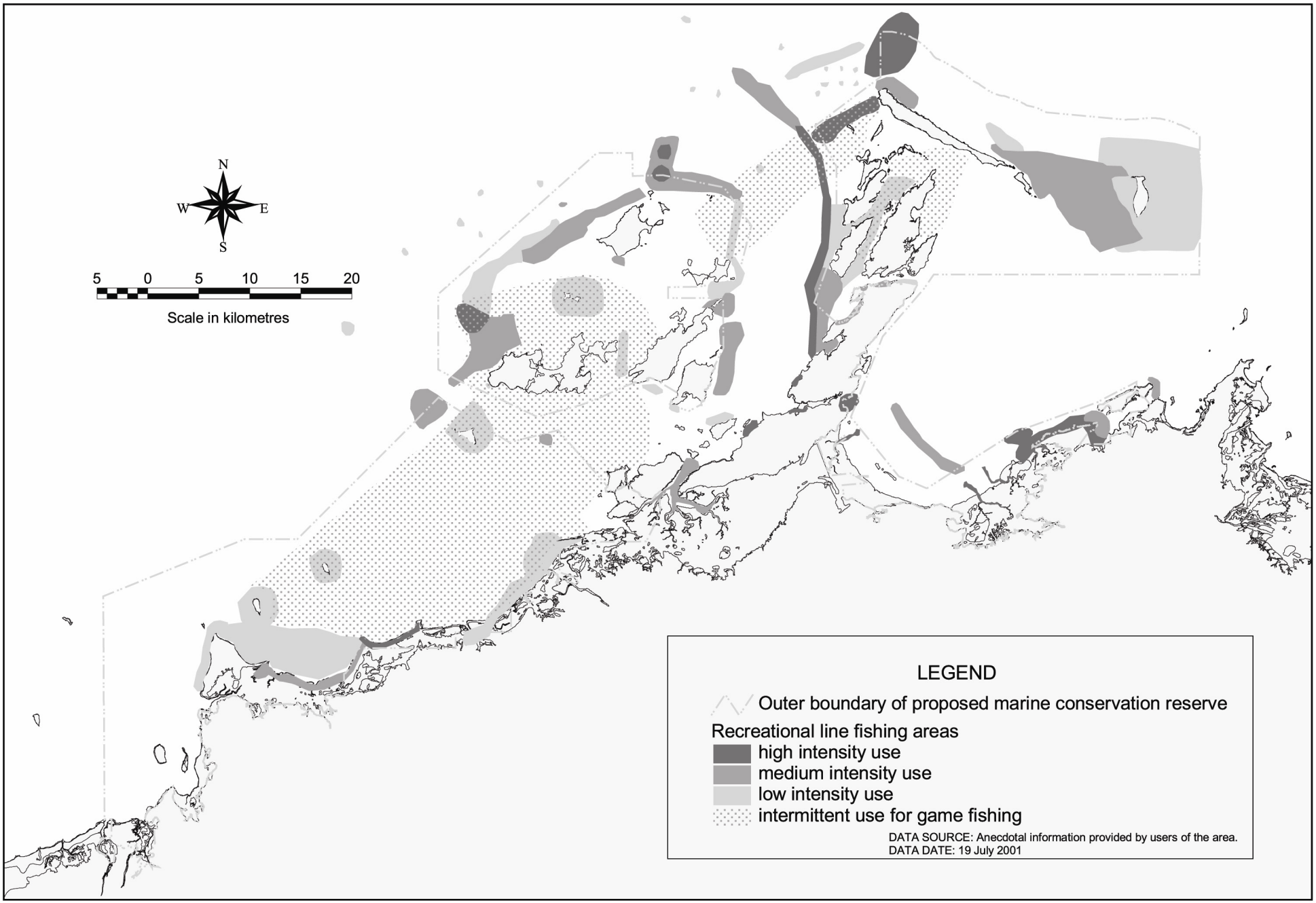


FIGURE 13: Recreational line fishing within and adjacent to the proposed Dampier Archipelago Marine Park and Cape Preston Marine Management Area.

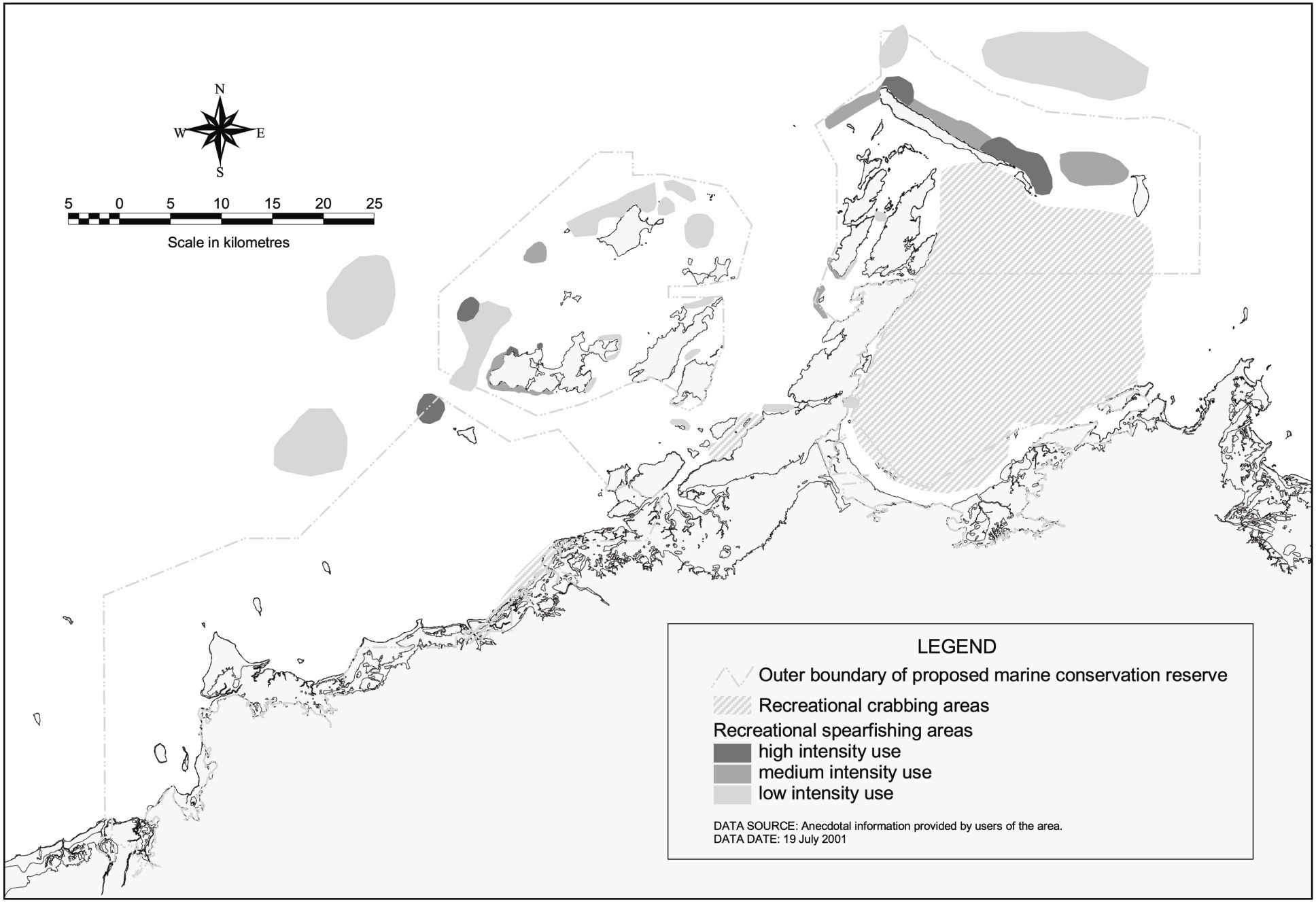


FIGURE 14: Recreational spearfishing and crabbing within and adjacent to the proposed Dampier Archipelago Marine Park and Cape Preston Marine Management Area.

7.2.11 Seascapes

Social value	**Seascapes:** *Panoramic vistas of azure waters, offshore islands, reefs, mangroves and beaches are major aesthetic attractions of the proposed reserves.*

Background	Panoramic vistas of azure waters, offshore islands, reefs, mangroves and beaches are major aesthetic attractions of the Dampier Archipelago/Cape Preston region. These attributes can be enjoyed from the shore, high vantage points along the coast or from the deck of a boat. Many people also consider the industrial developments surrounded by the harsh landscape interesting to view. Underwater vistas of the marine environment are varied and interesting and include unspoilt coral reefs and other attractive marine habitats. The quality of the underwater scenery accounts for the popularity of diving and snorkelling activities in the proposed reserves. Inappropriate structures along the coastline, on the islands and in the surrounding waters have the potential to degrade the aesthetic values of the proposed reserves. Coastal developments and maritime infrastructure projects must be planned with careful consideration of this issue. Potential developers will be informed of the management objectives and targets of the proposed reserves to ensure development proposals do not unnecessarily impact on the seascape value.
Requirements	• Aesthetically pleasing coastal and marine vistas. • Sensitively designed and located offshore and coastal infrastructure.
Management objective/s	To minimise visual intrusions within the proposed reserves.
Strategies	1. Identify and determine the key characteristics and spatial extent of the major seascapes of the proposed reserves (CALM, local government authorities). **(H)** 2. Provide formal advice to the WATC, EPA and local government authorities in relation to ensuring development proposals outside the reserves do not unnecessarily impact on the seascapes of the proposed reserves (CALM, MPRA). **(M)** 3. Ensure potential developers are informed of relevant management objectives and targets of the proposed reserves in relation to seascape values (CALM, local government authorities). **(M)**

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

7.2.12 Scientific research

Social value	**Scientific research:** *The pristine nature and wide variety of the habitats and communities of the proposed reserves combined with the wide range of human activities including heavy industry, ports and shipping, commercial fishing and recreational activities within the proposed reserves provide unique opportunities for ecological and social research.*

Background	The marine biodiversity of the proposed marine conservation reserves is broadly representative of the Pilbara Nearshore marine bioregion. The region is a significant and important source of larval recruitment to reefs further south and has a high habitat and species diversity. The pristine nature of the region, wide range of habitats and communities and relative ease of access combined with the wide range of human activities including heavy industry, ports and shipping, commercial fishing and recreational activities, makes the Dampier Archipelago/Cape Preston area a focus for scientific research. While the biodiversity of the proposed reserves is relatively well understood, knowledge about environmental processes and existing pressures on the proposed reserves' values is limited. There is an expected increase in the amount of scientific research in the region, particularly with the proposal of the reserves. The opportunities that the proposed reserves provides for scientific research is an important value of the area; however, research and monitoring are also important generic management tools used as a management strategy for many of the other values. This is discussed further in Section 8.4 and 8.5. All research within the proposed reserves requires the appropriate research permit issued under the CALM Act, WC Act or the FRM Act. Most scientific research programs have relatively benign sampling methods. However, the combined effects of many destructive research projects has the potential to impact adversely on the ecological values of the marine environment. Conflicts with other human activities can also be an issue for management as scientific research has specific access requirements e.g. access to representative areas free of major human influences for "scientific sites" and areas covering the range of major human activities for "impact sites". Management strategies for the scientific research within the proposed reserves include the implementation of spatial controls to provide for the monitoring and assessment of key ecological processes and the level of human impact as well as equitable access to appropriate zones. Another management strategy is to ensure that proponents of scientific research obtain and comply with appropriate CALM permits. Scientific research is permitted in all areas of the proposed reserves, subject to the appropriate permit (Table 2 and 3).
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 for "impact" sites. • Equitable access to the reserve for ecological and social research opportunities in appropriate zones.
Management objective/s	1. To provide access and opportunities for ecological and social research in the proposed reserves. 2. To ensure ecological and social research is ethical and ecologically sustainable within the proposed reserves.
Strategies	1. Implement spatial controls to provide for: • monitoring and assessment of key ecological processes and level of human impact (areas that are representative and of sufficient size); and • equitable access to the proposed reserves for scientific research (CALM). **(H-KMS)** 3. Assess the nature, level and potential impacts of ecological and social research within the proposed reserves and implement an appropriate monitoring program (CALM). **(H)** 4. Implement a policy of non-destructive sampling in sanctuary and special purpose zones, where possible (CALM). **(M)** 5. Ensure proponents of research and monitoring programs in the proposed reserves obtain and comply with appropriate CALM permits (CALM). **(H)** 6. Ensure the proposed reserves values for scientific research is not diminished as a result of human activities in the proposed reserves (CALM). **(M)** 7. See Section 8.4 and 8.5 (Research and Monitoring).

Reporting	To be developed.
Target/s	Implementation of management strategies within agreed timeframes (Appendix III).

7.2.13 Education

Social value	**Education**: *The unique array of ecological and social values within the proposed reserves combined with the easy access and close proximity of the proposed reserves to regional centres provides opportunities for community education about the marine environment.*

Background	The unique array of ecological and social values within the proposed reserves combined with the easy access and the proximity of the proposed reserves to regional centres provides opportunities for community education about the marine environment. The pristine nature of the region, wide range of habitats and species and variety of human activities provides a focus for education about the proposed reserves and the marine environment. The proposed reserves are used by local schools for educational purposes, and there is great potential for educational uses to increase, particularly with the proposal of the reserves. The opportunity that the proposed reserves provide for education is an important value of the area. However, education is also an important generic management tool used as a management strategy for many of the other values. This is discussed further in Section 8.2. The main management issue in regards to education is conflict with other values. For example, education requires access to the values of the proposed reserves and if these values are diminished as a result of human activity the value of education opportunities will also diminish. Signage and other interpretive materials used for educational purposes also have the potential to degrade other values of the proposed reserves, e.g. seascapes. Proposed management strategies for education in the proposed reserves will focus on implementing spatial controls to provide for equitable access for education.
Requirements	• Equitable access to the proposed reserves for the full range of educational opportunities in appropriate zones.
Management objective/s	To provide access and opportunities for education in the proposed reserves.
Strategies	1. Implement spatial controls to provide for equitable access to the proposed reserves for education (CALM). **(H-KMS)** 2. Ensure the proposed reserves values for education are not diminished as a result of human activities within the proposed reserves (CALM). **(M)** 3. See Section 8.2 Education and Interpretation.

Performance measure/s	1. Survey of visitor knowledge regarding the proposed reserves. 2. Number of current education programs relevant to priority education needs.	**Desired Trend/s**	1. Positive. 2. Positive.
Short-term target/s	To be developed as required.		
Long-term target/s	To be developed as required.		

8 GENERIC MANAGEMENT STRATEGIES

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

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

8.1 Development of an Administrative Framework

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

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

The proposed reserves will comprise part of the National Representative System of Marine Protected Areas. The objective is to build a system of marine protected areas that will be:

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

In respect to the criterion of representativeness, the proposed reserves are representative of the Pilbara Nearshore marine bioregion and include a broad range of habitats, flora and fauna that is typical of this bioregion. In terms of adequacy, the reserves are large, therefore ensuring an appropriate scale of management of the area and the activities that have potential to impact on the ecological values. The management of the proposed reserves is guided by this indicative management plan. The indicative management plan outlines a range of strategies that are recommended to ensure that the ecological values are adequately conserved. One important facet of the management framework is the implementation of a zoning scheme that contributes to the protection and management of the ecological and social values.

The implementation of the zoning scheme is an important strategy for the conservation of marine biodiversity and the management of human use in the proposed reserves. The zoning scheme assists in separating conflicting uses and provides for specific activities such as for aquaculture, pearling, nature-based tourism, scientific study, education, recreation 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 proposed reserves. Specifically, the establishment of sanctuary and special purpose zones will play a key role in the protection of representative areas of important habitat such as coral, mangrove, macroalgal and intertidal sand and mud flat communities. As well as providing a measure of management protection, these 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 reserves' key ecological processes and to obtain critical baseline data to compare against areas of the proposed reserves 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 proposed reserves during the period of the management plan. The nature and extent of zoning should be considered within the context of the other generic management strategies of education and interpretation, surveillance and enforcement, research, monitoring, public participation and direct management intervention (Sections 8.2 – 8.7). Section 62 of the CALM Act provides for classification of zones in any marine conservation reserve as the Minister thinks necessary to give effect to the objects of the CALM Act. In marine management areas zones *may* be created to give effect to the management of the reserve. However, this is not a requirement. In contrast Section 13B (2) of the CALM Act *requires* that marine parks be zoned as one or a combination of specific management zones. These are sanctuary, recreation, general use and special purpose zones.

Sanctuary zones in marine parks 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 state. Specified passive recreational activities consistent with maintaining environmental values may be permitted, but extractive activities, including fishing and traditional fishing and hunting are not. Commercial tourism operations (such as nature-based tours) will be considered where they do not conflict with other uses and will be regulated under the CALM Act.

Recreation zones in marine parks provide for conservation and recreation, including recreational fishing where this is compatible with conservation values. Commercial fishing, pearling and aquaculture are not permitted in these zones.

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

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

Changes to the zoning of the reserves during the life of the management plan can only occur after meeting the statutory public consultation requirements and acquiring the approval of the Minister for the Environment, the Minister for Agriculture, Forestry and Fisheries and the Minister for State Development.

8.1.1 Development of a zoning scheme

The zoning scheme for the proposed reserves was derived primarily through an interactive consultative process with the Advisory Committee for the Proposed Dampier Archipelago/Cape Preston Marine Conservation Reserve and with key community stakeholder groups. The *type* of zone was generally based on the primary purpose of the zone and the level of protection needed. The *location* of zones was generally based on achieving the various management strategies for the ecological values (e.g. having sanctuary zones in representative areas and for monitoring and research), with as least impact as possible on the social values. The *size* of zones has, where possible, been based largely on scientific principles developed by the Great Barrier Reef Marine Park Authority to ensure they are of an adequate size to provide the appropriate level of protection. The *number* of zones and their general spread through the area relates to the requirement to ensure all habitats are represented in these zones and, where possible, to ensure each habitat type is represented in more than one zone.

The development of the zoning plan for the proposed reserves was based on a number of key principles. These included:

- that the zoning scheme should include no-take areas as “insurance” against significant long-term impacts of projected usage;
- that the zoning scheme should provide areas free of significant human impact for research and monitoring;
- the requirement that a network of no-take areas should be comprehensive, adequate and representative;
- 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 with a minimum distance of 10 km (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 restrictions; and
- that, where possible, the placement of zones to achieve the management objectives should be done so as to minimise impacts on the existing and future social values.

The proposed zoning scheme has successfully met most of these criteria.

- The proposed sanctuary zones and conservation areas provide high protection areas that will provide comprehensive opportunities for research and monitoring, and insurance against unacceptable impacts of human activities. These areas have been chosen to ensure all habitats are represented in such zones, and in many cases that also include areas of high biodiversity and ecological importance.
- Sanctuary and special protection zones are larger rather than smaller.
- The zoning scheme has been structured to minimise impacts on the existing users of the area, thereby allowing the important socio-economic activities to continue, and will in some cases, provide for new opportunities (e.g. nature-based tourism).
- The zoning has been developed in liaison with other agencies (e.g. DoF and DPA) to ensure that the zones are consistent with, and where possible enhance, the management of activities in the area.
- Other aspects such as the views of the community, public safety and logistics of surveillance and enforcement have also been taken into account when developing the proposed boundaries of the zones.

Eight zone categories (Section 13b of the CALM Act) will be implemented in the proposed marine park and three classified areas (Section 62 of the CALM Act) will be implemented in the proposed marine management area. These are sanctuary zone, special purpose (mangrove protection) zone, special purpose (benthic protection) zone, special purpose (intertidal reef protection) zone, special purpose (pearling or aquaculture) zone, special purpose (multiple use) zone, recreation zone, general use zone, and conservation (flora/fauna protection) area, conservation (mangrove protection) area, and commercial (aquaculture) area. The zoning scheme for the proposed reserves is shown in Figure 15, 16, 17 and 18. The purpose, names and sizes of the zones are detailed in Sections 8.1.2 and 8.1.3. The activities permitted in each zone are outlined in Table 2 and 3.

The zoning scheme is an important strategy in achieving the strategic objectives of this plan. Specifically the implementation of the zoning scheme is a key strategy in achieving the management objectives for the ecological (*geomorphology, coral reef communities, mangrove communities, macroalgal and seagrass communities, subtidal soft-bottom communities, intertidal sand and mudflat communities, rocky shore communities, turtles, marine mammals, seabirds, finfishes, invertebrates*) and social (*nature-based tourism, commercial fishing, aquaculture, pearling, ports and shipping, industry, recreational activities, recreational fishing, seascapes, scientific research, education*) values.

A summary of the generic administration objectives, strategies and targets is outlined below.

Summary of Generic Administration Objectives, Strategies and Targets

Management objective/s	1. To implement the zoning scheme for the reserves within two years of gazettal. 2. To establish practical and appropriate boundaries for the reserves.
Strategies	1. Gazette appropriate notices under the CALM Act and FRM Act to implement the zoning scheme of the proposed reserves (CALM, DoF). **(H - KMS)** 2. Implement appropriate signage indicating zone boundaries and inform users about the types of zones, reasons for and restrictions on activities in the proposed reserves (CALM, DoF). **(H - KMS)** **3.** MPRA and CCWA to develop an appropriate vesting basis for the management arrangements of the intertidal areas of the reserves (MPRA, CCWA, CALM). **(H-KMS)** 4. In liaison with stakeholders, develop quantitative targets for geomorphology, water quality, sediment quality and marine habitats in commercial (aquaculture) areas and unzoned areas of the marine management area (CALM). **(H-KMS)** 5. Facilitate research on the effectiveness of zoning as an aid to achieving the objectives of the proposed reserves (CALM). **(H)**
Target	Implementation of management strategies within agreed timeframes (Appendix III).

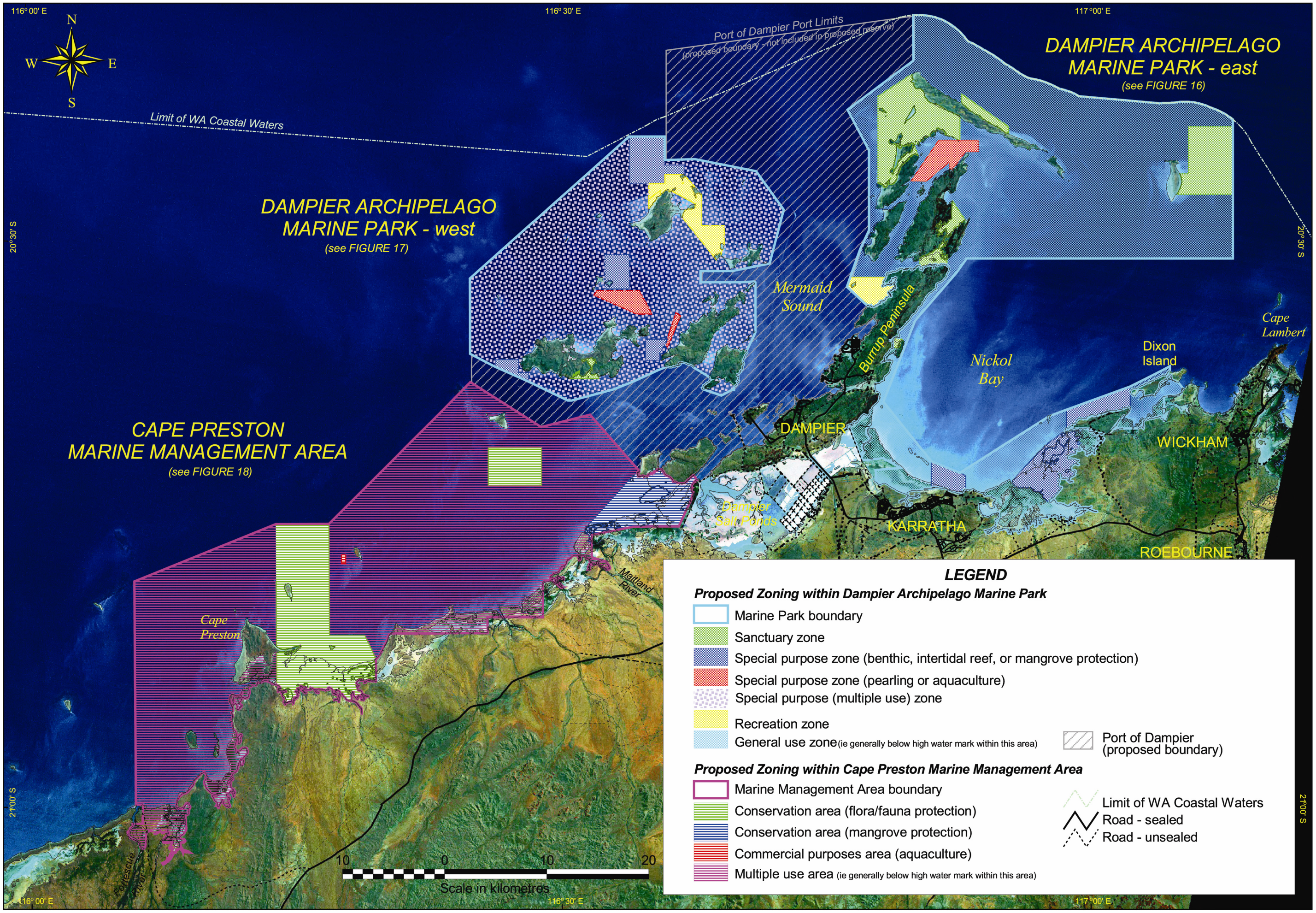


FIGURE 15: Proposed zoning scheme within the proposed Dampier Archipelago Marine Park and Cape Preston Marine Management Area.

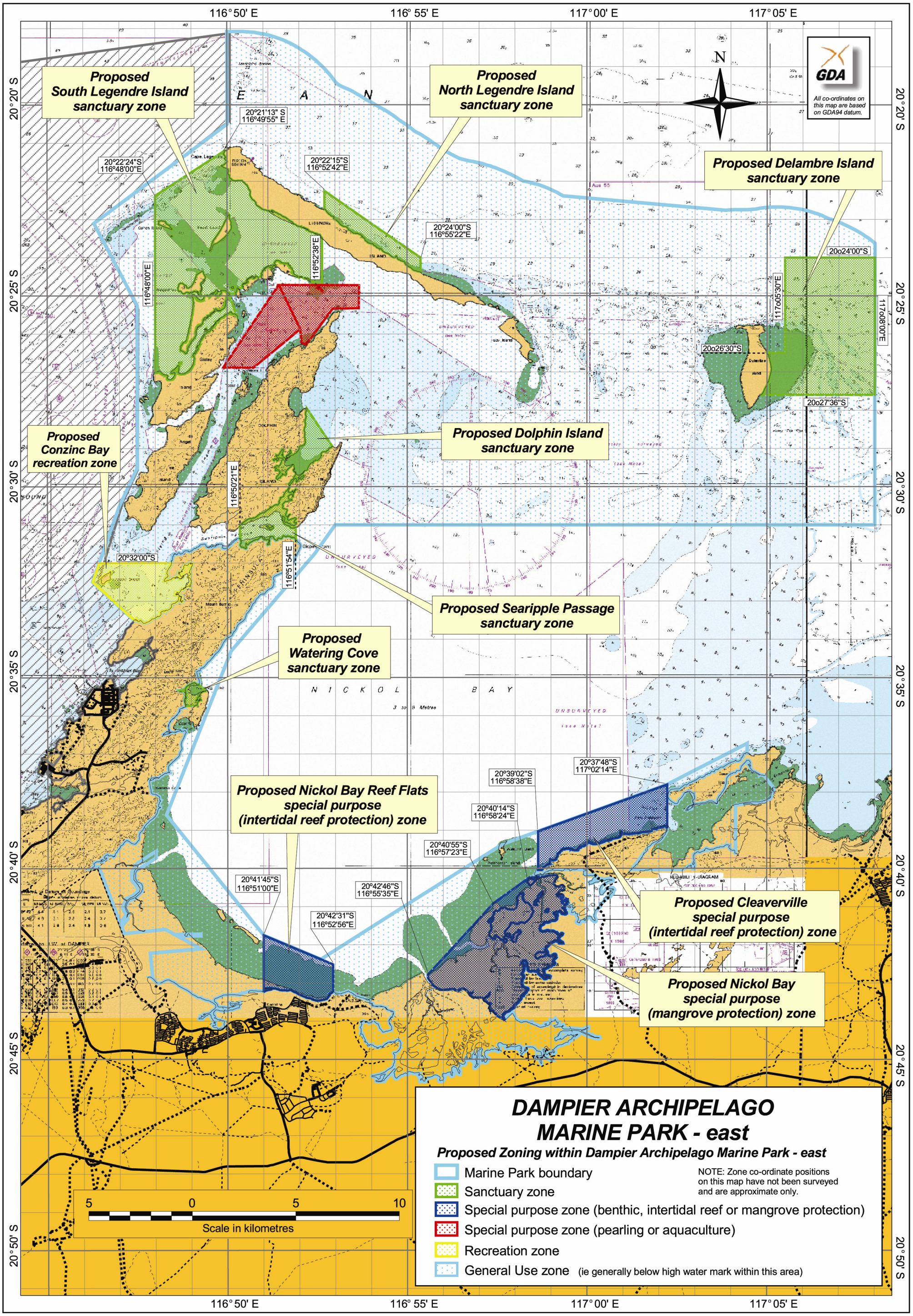


FIGURE 16: Proposed zoning within the eastern portion of the proposed Dampier Archipelago Marine Park.

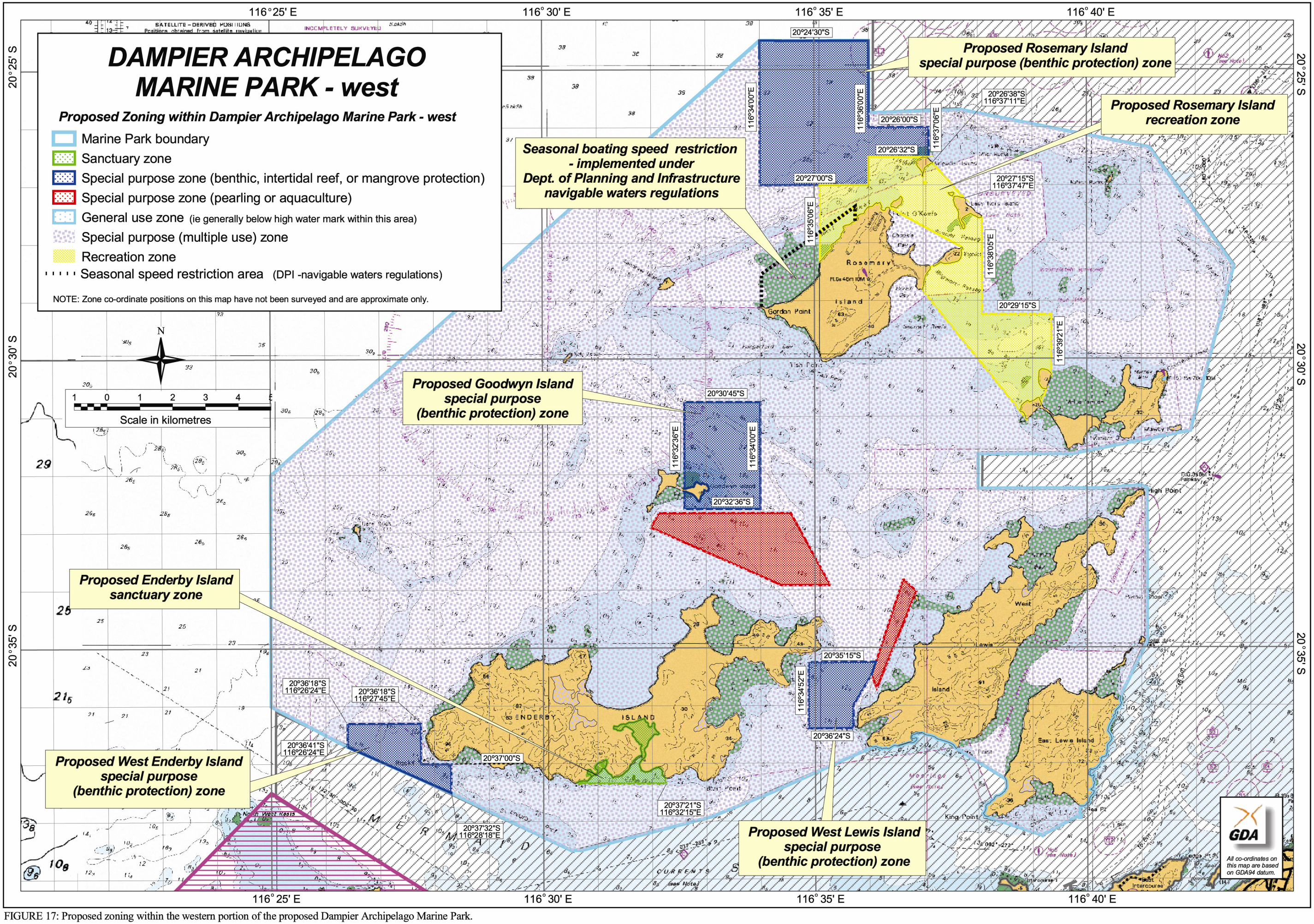
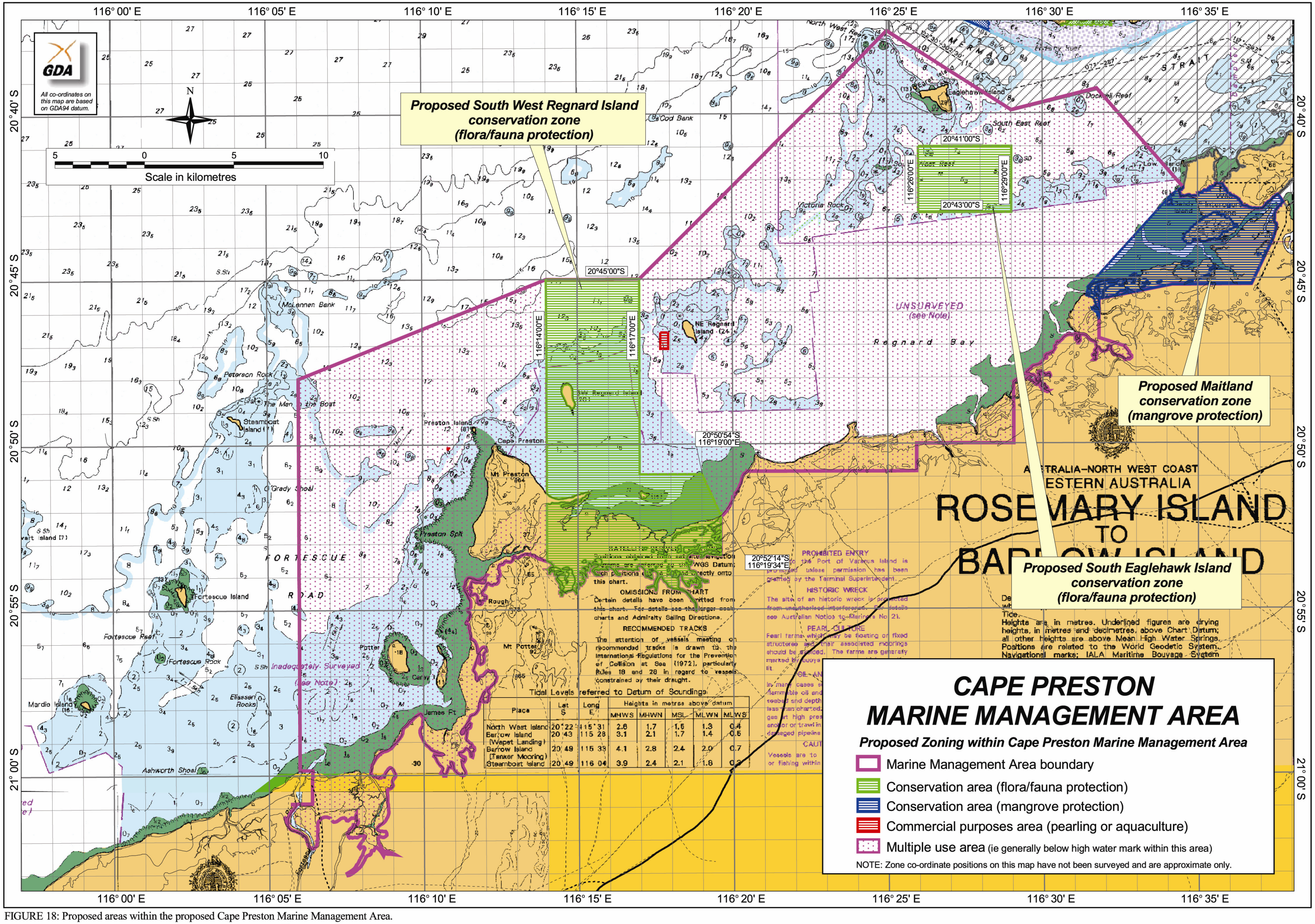


FIGURE 17: Proposed zoning within the western portion of the proposed Dampier Archipelago Marine Park.



Place	Lat S	Long E	Heights in metres above datum				
			MHWS	MHWN	MSL	MLWN	MLWS
North West Island	20 22	115 31	2.6	1.7	1.6	1.3	0.4
Barrow Island (Wapet Landing)	20 43	115 28	3.1	2.1	1.7	1.4	0.5
Barrow Island (Tanker Mooring)	20 49	115 33	4.1	2.8	2.4	2.0	0.7
Steamboat Island	20 49	116 04	3.9	2.4	2.1	1.8	0.6

FIGURE 18: Proposed areas within the proposed Cape Preston Marine Management Area.

Table 2: Uses permitted in each zone of the proposed Dampier Archipelago Marine Park

Activity	Sanctuary zone	Special purpose (mangrove protection) zone	Special purpose (benthic protection) zone	Special purpose (intertidal reef protection) zone	Special purpose (pearling or aquaculture) zone	Special purpose (multiple use) zone	Recreation zone	General use zone
COMMERCIAL								
Pearling [bd]	No	No	No	No	Yes [h]	No	No	Yes
Aquaculture [bd]	No	No	No	No	Yes [h]	No	No	Yes
Commercial beche de mer fishing [bd]	No	No	No	No	Yes [e h]	No	No	Yes
Commercial trap fishing [bd]	No	No	No	No	Yes [e h]	No	No	Yes
Commercial wet lining (non-trolling) [bd]	No	No	No	No	Yes [e h]	No	No	Yes
Commercial trolling [bd]	No	No	No	No	Yes [e h]	No	No	Yes
Commercial prawn trawling [bd]	No	No	No	No	Yes [e h i]	No	No	Yes [i]
Commercial mud crabbing [bd]	No	No	No	No	No	No	No	No
Commercial aquarium collecting (fish & coral) [bd]	No	No	No	No	Yes [e h]	Yes [h]	No	Yes
Commercial specimen collecting (shell) [bd]	No	No	No	No	Yes [e h]	Yes [h]	No	Yes
Mineral & petroleum exploration (seismic) [dg]	Assess	Assess	Assess	Assess	Assess	Assess	Assess	Assess
Petroleum drilling & mineral development [dg]	No	Assess	Assess	Assess	Assess	Assess	No	Assess
Charter fishing activities [bd]	No	Yes [e]	No (except trolling)	No	Yes [e]	Yes [e]	Yes	Yes
Charter non-fishing activities [cd]	Yes [f]	Yes [e]	Yes [e]	Yes [e]	Yes [e]	Yes [e]	Yes	Yes
Trading vessels in transit (i.e. large ships) [a]	No	No	Yes [ef]	N/A	Yes [ef]	Yes [ef]	No	Yes
Commercial vessels in transit (e.g. fishing vessels, barges etc) [a]	Yes [f]	Yes [f]	Yes [f]	N/A	Yes [f]	Yes [f]	Yes [f]	Yes [f]
RECREATIONAL								
Boat access (motor & non-motorised) [af]	Yes [f]	Yes [f]	Yes [f]	Yes [f]	Yes [f]	Yes [f]	Yes [f]	Yes [f]
Access by foot	Yes	No	N/A	Yes [e]	N/A	Yes [e]	Yes	Yes
Vehicle access (car or motorbike)	No	No	N/A	No	N/A	Yes [e]	Yes	Yes
Recreational lobster fishing [b]	No	N/A	No	No	Yes [e]	Yes [e]	Yes	Yes
Recreational line fishing (other than trolling) [b]	No	Yes [e]	No	Yes [e]	Yes [e]	Yes [e]	Yes	Yes
Recreational trolling [b]	No	Yes [e]	Yes [e]	Yes [e]	Yes [e]	Yes [e]	Yes	Yes
Recreational netting [bd]	No	No	No	No	Yes [e]	Yes [e]	Yes	Yes
Spearfishing [b]	No	No	No	No	Yes [e]	Yes [e]	Yes	Yes
Recreational crabbing [b]	No	Yes (from boats only) [e]	No	Yes [e]	Yes [e]	Yes [e]	Yes	Yes

Activity	Sanctuary zone	Special purpose (mangrove protection) zone	Special purpose (benthic protection) zone	Special purpose (intertidal reef protection) zone	Special purpose (pearling or aquaculture) zone	Special purpose (multiple use) zone	Recreation zone	General use zone
Recreational aquarium/specimen collecting [b]	No	No	No	No	No	No	No	No
Snorkelling & diving	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Wildlife interaction [c]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
OTHER								
Proposals for marine infrastructure (e.g. moorings) [ad]	Assess	Assess	Assess	Assess	Assess	Assess	Assess	Assess
Pipelines (including dredging for pipelines)[dg]	No	Assess	Assess	Assess	Assess	Assess	Assess	Assess
Dredging & dredge spoil dumping for shipping activities [d]	No	No	No	No	No	Assess	No	Assess
Research [d]	Yes [e]	Yes [e]	Yes [e]	Yes [e]	Yes [e]	Yes [e]	Yes [e]	Yes
Anchoring (other than emergency anchoring) [a]	Yes [f]	Yes [f]	No	No	Yes [f]	Yes [f]	Yes [f]	Yes [f]

KEY:

a. Subject to the *Western Australian Marine Act 1982*.
b. Subject to the FRM Act and *Pearling Act 1990*.
c. Subject to the CALM Act and WC Act.
d. Licence required from CALM and/or DoF and/or DoIR and/or DoE/EPA.
e. Activities permitted unless the activity is shown to be incompatible with the specified primary purpose of the zone.
f. Restrictions on vessel type, speed etc. and anchoring may be introduced in consultation with the community and major users where vessels are impacting on the ecological and/or social values of an area.
g. Subject to the EP Act.
h. DoF proposes to prohibit commercial fishing from all zones in the western portion of the proposed marine park, except commercial aquarium/specimen (fish, coral and shell) collecting, which will be phased out of this area within three years of creating the proposed reserves.
i. DoF proposes to prohibit commercial prawn trawling within one nautical mile of the Nickol Bay coastline.

Assess Proposal will be assessed by relevant agencies in accordance with standard procedures.
N/A Not applicable

Table 3: Uses permitted in each zone of the proposed Cape Preston Marine Management Area

Activity	Conservation (flora/fauna protection) area	Conservation (mangrove protection) area	Commercial (aquaculture) area	Unzoned areas
COMMERCIAL				
Pearling [bd]	No	No	Yes	Yes
Aquaculture [bd]	No	No	Yes	Yes
Commercial beche de mer fishing [bd]	No	No	Yes [e]	Yes
Commercial trap fishing [bd]	No	No	Yes [e]	Yes
Commercial wet lining (non-trolling) [bd]	No	No	Yes [e]	Yes
Commercial trolling [bd]	No	No	Yes [e]	Yes
Commercial prawn trawling [bd]	No	No	Yes [e]	Yes
Commercial mud crabbing [bd]	No	No	No	No
Commercial aquarium collecting (fish & coral) [bd]	No	No	Yes [e]	Yes
Commercial specimen collecting (shell) [bd]	No	No	Yes [e]	Yes
Mineral & petroleum exploration (seismic) [dg]	Assess	Assess	Assess	Assess
Petroleum drilling & mineral development [dg]	No	Assess	Assess	Assess
Charter fishing activities [bd]	No	Yes [e]	Yes [e]	Yes
Charter non-fishing activities [cd]	Yes [f]	Yes [e]	Yes [e]	Yes
Trading vessels in transit (i.e. large ships) [a]	No	No	Yes [e]	Yes
Commercial vessels in transit (e.g. fishing vessels, barges etc) [a]	Yes [f]	Yes [f]	Yes [f]	Yes [f]
RECREATIONAL				
Boat access (motor & non-motorised) [af]	Yes [f]	Yes [f]	Yes [f]	Yes [f]
Access by foot	Yes	No	N/A	Yes
Vehicle access (car or motorbike)	No	No	N/A	Yes
Recreational lobster fishing [b]	No	N/A	Yes [e]	Yes
Recreational line fishing (other than trolling) [b]	No	Yes [e]	Yes [e]	Yes
Recreational trolling [b]	No	Yes [e]	Yes [e]	Yes
Recreational netting [bd]	No	No	Yes [e]	Yes
Spearfishing [b]	No	No	Yes [e]	Yes
Recreational crabbing [b]	No	Yes [e]	Yes [e]	Yes
Recreational aquarium/specimen collecting [b]	No	No	Yes [b]	Yes [b]
Snorkelling & diving	Yes	Yes	Yes	Yes
Wildlife interaction [c]	Yes	Yes	Yes	Yes
OTHER				
Proposals for marine infrastructure (e.g. moorings) [ad]	Assess	Assess	Assess	Assess
Pipelines (including dredging for pipelines) [dg]	No	Assess	Assess	Assess
Dredging & dredge spoil dumping for shipping activities [d]	No	No	No	Assess
Research [d]	Yes [e]	Yes [e]	Yes [e]	Yes
Anchoring (other than emergency anchoring) [a]	Yes [f]	Yes [f]	Yes [f]	Yes [f]

KEY:

a. Subject to the *Western Australian Marine Act 1982*.
b. Subject to the FRM Act and *Pearling Act 1990*.
c. Subject to the CALM Act and WC Act.
d. Licence required from CALM and/or DoF and/or DoIR and/or DoE/EPA.
e. Activities permitted unless the activity is shown to be incompatible with the specified primary purpose of the zone.
f. Restrictions on vessel type, speed etc. and anchoring may be introduced in consultation with the community and major users where vessels are impacting on the ecological and/or social values of an area.
g. Subject to the EP Act.

Assess Proposal will be assessed by relevant agencies in accordance with standard procedures.
N/A Not applicable.

8.1.2 Zones in the proposed Dampier Archipelago Marine Park

The zoning of the proposed Dampier Archipelago Marine Park comprises seven sanctuary zones (approximately 8,655 ha or 7% of the marine park), one special purpose (mangrove protection) zone (approximately 2,370 ha or 2% of the marine park), four special purpose (benthic protection) zones (approximately 3,310 ha or 3% of the marine park), two special purpose (intertidal reef protection) zones (approximately 1,770 ha or 2% of the marine park), three special purpose (pearling or aquaculture) zones (approximately 2,150 ha or 2% of the marine park), two recreation zones (approximately 2,640 ha or 2% of the marine park), one special purpose (multiple use) zone (approximately 40,325 ha or 33% of the marine park) and all other areas in the marine park not included in sanctuary, recreation, or special purpose zones are zoned for general use (approximately 60,950 ha or 50% of the marine park). The zoning of the proposed Dampier Archipelago Marine Park is shown in more detail in Figure 16 and 17.

Sanctuary zones

Seven sanctuary zones (approximately 8,655 ha or 7% of the marine park) are proposed in the Dampier Archipelago Marine Park and are located at Delambre Island, Dolphin Island, Searipple Passage, Watering Cove, north Legendre Island, south Legendre Island and Enderby Island.

The primary purpose of these zones is to provide areas where natural processes can be studied or appreciated free of significant human influence. These zones provide the opportunity to improve the understanding of the proposed reserves' key ecological processes and to obtain critical comparative data with areas of the proposed reserves 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 a degree of ecological "insurance". A detailed description of the role of "no take" (sanctuary) zones in Western Australia's marine conservation reserve system can be found in Colman & Simpson (1999).

All extractive activities are excluded from the proposed sanctuary zones. However, passive nature-based tourism, some recreational activities, boating and approved scientific research is permitted. The locations of sanctuary zones are shown in Figure 16 and 17 and the permitted activities are shown in Table 2. The names and areas of each zone are shown in Table 4.

Table 4: Names and areas of proposed sanctuary zones in the proposed Dampier Archipelago Marine Park

NAME	APPROXIMATE AREA (HECTARES)
South Legendre Island Sanctuary Zone	4,220
Delambre Island Sanctuary Zone	3,050
North Legendre Island Sanctuary Zone	430
Searipple Passage Sanctuary Zone	350
Dolphin Island Sanctuary Zone	340
Enderby Island Sanctuary Zone	190
Watering Cove Sanctuary Zone	75

A description of the values in each proposed sanctuary zone is provided below.

- **Delambre Island Sanctuary Zone**
  The proposed Delambre Island Sanctuary Zone includes representative areas of nearshore intertidal reef, intertidal and subtidal coral reef communities, subtidal reef pavement, sand and deep-water habitat. The reef system is significantly different in terms of coral diversity and abundance, compared with other outer coral reefs in the proposed reserves and has a distinct ridgeline of broken reef that extends north east from the north eastern tip of the island. The complex oceanography of the area supports a high diversity of finfish and invertebrate species and the proposed sanctuary zone encompasses important turtle aggregation and nesting areas and significant dugong sightings. The boundaries of the proposed Delambre Island Sanctuary Zone have been placed to represent as many ecological values as possible while excluding known areas considered important by the community for camping and beach fishing (southern boundary), speafishing, crayfishing and where possible drift fishing (western boundary).

- **Watering Cove Sanctuary Zone**
  The proposed Watering Cove Sanctuary Zone includes representative areas of mangrove communities and intertidal sand and mudflat communities (including samphire communities) and has a high diversity of

molluscs. The area is considered to have a relatively low level of human usage and a high significance for research and conservation. The boundaries of the proposed Watering Cove Sanctuary Zone have been placed to represent the mangrove and intertidal sand and mudflat communities and the areas of high mollusc diversity, while excluding the area used for recreational fishing north of the mouth of the cove.

- **Searipple Passage Sanctuary Zone**
  The proposed Searipple Passage Sanctuary Zone includes representative areas of mangrove and subtidal coral reef communities. The coral communities in Searipple Passage are considered different to other coral communities in the proposed reserves, as they are susceptible to high turbidity, which makes them important from research and conservation perspectives. The boundaries of the proposed Searipple Passage Sanctuary Zone have been placed to represent the important mangrove and turbid water coral communities while allowing recreational fishing to continue in the west and to avoid potential conflict with trawling activity in the east.

- **Dolphin Island Sanctuary Zone**
  The proposed Dolphin Island Sanctuary Zone includes representative areas of mangrove communities, nearshore intertidal reef and subtidal coral reef communities. The proposed sanctuary zone encompasses important mangrove communities and a high diversity of molluscan fauna. The boundaries of the proposed Dolphin Island Sanctuary Zone have been placed to include the ecological values of the area while excluding the main area used for recreational fishing (the bay to the north-west).

- **North and South Legendre Island Sanctuary Zones**
  The proposed North Legendre Island Sanctuary Zone and South Legendre Island Sanctuary Zone includes representative areas of nearshore intertidal reef, intertidal and subtidal coral reef communities, macroalgal communities and sand. The coral reef system and steep drop-off on the north side of Legendre Island is highly diverse and characteristic of the offshore reef communities in the Dampier Archipelago. The oceanography of the area supports a high diversity of finfish and invertebrate species and the proposed sanctuary zone encompasses important turtle aggregation and nesting areas, significant dugong sightings and humpback whale sightings. The boundaries of the proposed north and south Legendre Island sanctuary zones have been placed to include as many ecological values as possible while excluding know areas considered important by the community for recreational fishing and spearfishing and to avoid possible conflict with the adjacent special purpose (pearling) zones.

- **Enderby Island Sanctuary Zone**
  The proposed Enderby Island Sanctuary Zone includes representative areas of mangrove communities and subtidal coral reef communities. The mangrove communities are considered important for reservation given that they are offshore in relatively clear water and support a high diversity of molluscs. The boundaries of the proposed Enderby Island Sanctuary Zone have been placed to represent the mangrove communities and coral communities.

Special purpose (mangrove protection) zone
One special purpose (mangrove protection) zone (approximately 2,370 ha or 2% of the marine park) is proposed in the Dampier Archipelago Marine Park and will be located at Nickol Bay.

The proposed Nickol Bay special purpose (mangrove protection) zone includes representative areas of mangrove communities and intertidal sand and mudflat communities (including samphire communities), which are of high conservation importance. The boundaries of the proposed Nickol Bay special purpose (mangrove protection) zone have been placed to include the mangrove, mudflat and samphire communities and exclude the north eastern part of the mangroves to allow access for recreational use (e.g. mud-crabbing).

The primary purpose of this zone is for protection of the significant mangrove communities in this area. Only activities that are considered compatible with the protection of the mangroves in this zone will be permitted. The location of the proposed special purpose (mangrove protection) zone is shown in Figure 16 and the permitted activities are shown in Table 2. A description of the values in the special purpose (mangrove protection) zone is provided below.

Special purpose (benthic protection) zones
Four special purpose (benthic protection) zones (approximately 3,310 ha or 3% of the marine park) are proposed in the Dampier Archipelago Marine Park and will be located at Rosemary Island, Goodwyn Island, West Lewis Island and west Enderby Island.

The primary purpose of these zones is for the protection of benthic habitats in these areas, specifically the protection of significant sponge garden habitat. Only activities that are considered compatible with the protection of the benthic habitats in these zones will be permitted. The locations of the proposed special purpose (benthic protection) zones are shown in Figure 16 and 17 and the permitted activities are shown in Table 2. The names and areas of each zone are shown in Table 5.

Table 5: Names and areas of proposed special purpose (benthic protection) zones in the proposed Dampier Archipelago Marine Park

NAME	APPROXIMATE AREA (HECTARES)
Rosemary Island Special Purpose (Benthic Protection) Zone	1,780
Goodwyn Island Special Purpose (Benthic Protection) Zone	810
West Lewis Island Special Purpose (Benthic Protection) Zone	360
West Enderby Island Special Purpose (Benthic Protection) Zone	360

A description of the values in each proposed special purpose (benthic protection) zone is provided below.

- **Rosemary Island Special Purpose (Benthic Protection) Zone**
  The proposed Rosemary Island Special Purpose (Benthic Protection) Zone includes the representative offshore deepwater habitat of the outer Dampier Archipelago. The proposed special purpose zone also encompasses important turtle aggregations and humpback whale sightings. The boundaries of the proposed Rosemary Island Special Purpose (Benthic Protection) Zone have been placed to represent the deep-water habitat of the offshore Dampier Archipelago while allowing for some recreational fishing (trolling) within the zone.

- **Goodwyn Island Special Purpose (Benthic Protection) Zone**
  The proposed Goodwyn Island Special Purpose (Benthic Protection) Zone includes representative areas of nearshore intertidal reef, subtidal coral reef communities, macroalgal communities and sand. The reef system is representative of the fringing reef habitat type, which is characteristic of the mid-archipelago region, and the coral communities south of the island are considered to be of high ecological value. The boundaries of the proposed Goodwyn Island Special Purpose (Benthic Protection) Zone have been placed to represent the reef system and sand, while allowing for some recreational fishing (trolling) within this zone.

- **West Lewis Island Special Purpose (Benthic Protection) Zone**
  The proposed West Lewis Island Special Purpose (Benthic Protection) Zone includes representative areas of subtidal reef platform, which supports highly diverse filter feeder communities (sponge gardens). The sponge gardens of the Dampier Archipelago are important from a conservation perspective, but little is know about its distribution or ecology. The boundaries of the proposed West Lewis Island (Benthic Protection) Zone have been placed to represent the sponge gardens while allowing for some recreational fishing (trolling) within the zone and anchoring, fishing and commercial aquarium collecting adjacent to the zone.

- **West Enderby Island Special Purpose (Benthic Protection) Zone**
  The proposed West Enderby Island Special Purpose (Benthic Protection) Zone includes representative areas of subtidal coral reef communities and subtidal reef pavement. The subtidal reef pavement in the zone supports highly diverse filter feeder communities (sponge gardens) and many other invertebrates (e.g. octocorals and bryzoans). The boundaries of the proposed West Enderby Island Special Purpose (Benthic Protection) Zone have been placed to represent the sponge gardens and high diversity of invertebrates while allowing for some recreational fishing (trolling) within this zone and anchoring, recreational fishing and aquarium sponge collecting outside this zone.

Special Purpose (intertidal reef protection) zones

Two special purpose (intertidal reef protection) zones (approximately 1,770 ha or 2% of the marine park) are proposed in the Dampier Archipelago Marine Park and will be located at Nickol Bay and Cleaverville.

The primary purpose of these zones is for the protection of the reef habitats in these areas of high recreational usage. Only activities that are considered compatible with the protection of the intertidal reefs in these zones will

be permitted. The location of the proposed special purpose (intertidal reef protection) zones are shown in Figure 17 and the permitted activities are shown in Table 2. The names and areas of each zone are shown in Table 6.

Table 6: Names and areas of proposed special purpose (intertidal reef protection) zones in the proposed Dampier Archipelago Marine Park

NAME	APPROXIMATE AREA (HECTARES)
Cleaverville Special Purpose (Intertidal Reef Protection) Zone	1,050
Nickol Bay Reef Flats Special Purpose (Intertidal Reef Protection) Zone	720

A description of the values in each proposed special purpose (intertidal reef protection) zone is provided below.

- **Cleaverville Special Purpose (Intertidal Reef Protection) Zone**
  The proposed Cleaverville Special Purpose (Intertidal Reef Protection) Zone includes representative areas of intertidal coral reef communities, intertidal sand and mudflat communities and silt. The intertidal coral reef is important from conservation, research, education and nature-based tourism perspectives because it is easily accessible and different from other intertidal coral reefs in the Dampier Archipelago (i.e. the environmental conditions in which the coral are susceptible are considered within the upper-limit for coral survival). Tourists and the local community use the area for camping, fishing, snorkelling and coral collecting (recreational and commercial take of coral is now prohibited under the FRM Act) and as a result the coral communities are/have been susceptible to damage caused by collecting and trampling. The boundaries of the proposed Cleaverville Special Purpose (Intertidal Reef Protection) Zone have been placed to provide protection for the intertidal coral reef system.

- **Nickol Bay Reef Flats Special Purpose (Intertidal Reef Protection) Zone**
  The proposed Nickol Bay Reef Flats Special Purpose (Intertidal Reef Protection) Zone includes representative areas of intertidal coral reef communities, intertidal sand and mudflat communities, mangrove communities and silt. The intertidal coral reef is important from conservation, research, education and nature-based tourism perspectives because it is easily accessible and different from other intertidal coral reefs in the Dampier Archipelago (i.e. the environmental conditions in which the coral are susceptible are considered within the upper-limit for coral survival). The area is used for swimming, fishing, and commercial coral collecting. The boundaries of the proposed Nickol Bay Reef Flats Special Purpose (Intertidal Reef Protection) Zone have been placed to represent the intertidal coral reef system while excluding the western area of the reef so that it may continue to be used for commercial aquarium collecting and allowing vehicle access behind the mangroves and cockle collecting east of the proposed zone.

Special purpose (pearling or aquaculture) zones

Three special purpose (pearling or aquaculture) zones (approximately 2,150 ha or 2% of the marine park) are proposed in existing pearling or aquaculture leases within the proposed Dampier Archipelago Marine Park. These are located north of Dolphin Island, west of West Lewis Island and south of Goodwyn Island.

The primary purpose of these zones is pearling or aquaculture. The designation of these zones does not exclude other existing activities; however, if other uses conflict in a significant and unavoidable way with pearling or aquaculture, these activities will not be permitted to occur in these zones. It should be noted that the designation of these zones for the primary purpose of pearling or aquaculture does not provide automatic approval for pearling or aquaculture proposals. All proposals will be assessed in accordance with Ministerial Policy Guidelines Number 8 (DoF, 1998) and only permitted where the use is compatible with the maintenance of the values of the proposed reserves. The location of the proposed special purpose (pearling or aquaculture) zones and aquaculture zones are shown in Figure 16 and 17 and the permitted activities are shown in Table 2.

Recreation zone

Two recreation zones (approximately 2,640 ha or 2% of the marine park) are proposed in the Dampier Archipelago Marine Park and will be located at Conzinc Bay and Rosemary Island.

The recreation zones have the primary purpose of providing an opportunity 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 marine park. Petroleum drilling and production, commercial fishing, pearling, and aquaculture are not permitted in the proposed recreation zones. The location of the proposed recreation zones is shown in Figure 16 and 17 and the permitted activities are shown in Table 2. The names and areas of each zone are shown in Table 7.

Table 7: Names and areas of proposed recreation zones in the proposed Dampier Archipelago Marine Park

NAME	APPROXIMATE AREA (HECTARES)
Rosemary Island Recreation Zone	1,770
Conzinc Bay Recreation Zone	870

A description of the values in each proposed recreation zone is provided below.

- **Conzinc Bay Recreation Zone**
  The proposed Conzinc Bay Recreation Zone includes representative areas of subtidal coral reef communities, macroalgal communities and sand. The area was identified during the advisory committee process as a safe anchorage area for recreational boating with current and future land-based access to the area. Recreation zones are created for conservation and to ensure the priority use of the area for recreational usage is clear and up-front.

- **Rosemary Island Recreation Zone**
  The proposed Rosemary Island Recreation Zone includes representative areas of intertidal and subtidal coral reef communities, macroalgal communities and sand. The reef system is characteristic of the offshore reef system in the Dampier Archipelago and provides a replicate of this habitat. The proposed recreation zone encompasses important turtle aggregation and nesting areas. Recreation zones are created for conservation and to ensure the priority use of the area for recreational usage is clear and up-front.

Special purpose (multiple use) zone
One special purpose (multiple use) area (approximately 40,325 ha or 33% of the marine park) is proposed in the western portion of the proposed Dampier Archipelago Marine Park.

During the planning process for the proposed reserves a range of issues were raised with respect to conflicts between recreational and commercial fishers. In response to these issues it has been proposed that all commercial fishing be prohibited in the western portion of the proposed marine park with the exception of commercial aquarium/specimen (fish, coral and shell) collecting, which is proposed to be phased out of this area within three years of creating the proposed reserves. DoF will develop this proposal in liaison with key stakeholders. The location of the proposed special purpose (multiple use) zone is shown in Figure 16 and the permitted activities are shown in Table 2.

General use zone
All waters of the proposed Dampier Archipelago Marine Park not zoned as sanctuary, special purpose or recreation zone will be zoned as general use (approximately 60,950 ha or 50%of the marine park). The general use zone will provide for recreational and commercial activities to occur, providing that they are compatible with the overall maintenance of the marine park's values. The location of the general use zone is shown in Figure 16 and 17 and the activities permitted are shown in Table 2.

8.1.3 Areas in the proposed Cape Preston Marine Management Area
The zoning of the proposed Cape Preston Marine Management Area comprises two conservation (flora/fauna protection) areas (approximately 12,680 ha or 14% of the marine management area), one conservation (mangrove protection) area (approximately 4,050 ha or 4% of the marine management area), and two commercial (aquaculture) areas (approximately 40 ha or <1% of the marine management area). The remaining area (approximately 75,980 ha or 82% of the marine management area) is unzoned. The zoning of the proposed Cape Preston Marine Management Area is shown in more detail in Figure 18. Comment is also sought on an alternative option for the conservation areas in the Cape Preston Marine Management Area becoming fish habitat protection areas.

Conservation (flora/fauna protection) areas
Two conservation (flora/fauna protection) areas (approximately 12,680 ha or 14% of the marine management area) are proposed in the Cape Preston Marine Management Area and are located south of Eaglehawk Island and South West Regnard Island.

The primary purpose of the conservation (flora/fauna protection) areas is to provide protection of the flora and fauna in these areas. Like sanctuary zones they will also provide areas where natural processes can be studied or appreciated free of significant human influence. These zones provide the opportunity to improve the understanding of the proposed reserves' key ecological processes and to obtain critical comparative data with areas of the proposed reserves 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 a degree of ecological "insurance". A detailed description of the role of "no take" zones in Western Australia's marine conservation reserve system can be found in Colman & Simpson (1999).

Given the primary purpose of these zones for protection of the flora and fauna within the areas all extractive activities are excluded from the proposed conservation (flora/fauna protection) areas. However, passive nature-based tourism, some recreational activities, boating and approved scientific research is permitted. The locations of the conservation (flora/fauna protection) areas are shown in Figure 18 and the permitted activities are shown in Table 3. The names and areas of each zone are shown in Table 8.

Table 8: Names and areas of proposed conservation (flora/fauna protection) areas in the proposed Cape Preston Marine Management Area

NAME	APPROXIMATE AREA (HECTARES)
South West Regnard Island Conservation (Flora/Fauna Protection) Area	10,760
South Eaglehawk Island Conservation (Flora/Fauna Protection) Area	1,920

A description of the values in each proposed conservation (flora/fauna protection) area is presented below.

- **South Eaglehawk Island Conservation (Flora/Fauna Protection) Area**
  The South Eaglehawk Island Conservation (Flora/Fauna Protection) Area includes representative areas of silt and macroalgal communities. The silt habitat in the Dampier Archipelago is considered important form an ecological point of view and it supports a variety of invertebrates. The boundaries of the proposed South Eaglehawk Island Conservation (Flora/Fauna Protection) Area have been placed to provide a replicate of the silt habitat of the Dampier Archipelago and to reduce conflicts with users of the proposed reserves.

- **South West Regnard Island Conservation (Flora/Fauna Protection) Area**
  The proposed South West Regnard Island Conservation (Flora/Fauna Protection) Area includes representative areas of mangrove communities, intertidal sand and mudflat communities (including samphire communities), nearshore intertidal reef, subtidal coral reef communities, seaward coral reef communities, macroalgal communities and sand. The proposed area is representative of the cross-shelf suite of habitats and fringing reef (around South West Regnard Island) that occurs in the Cape Preston region. The proposed area also encompasses important dugong sightings. The boundaries of the proposed South West Regnard Island Conservation (Flora/Fauna Protection) Area have been placed to represent the cross-shelf habitats of Cape Preston including South West Regnard Island in one large sanctuary zone and to exclude the Mardie pipe fabrication site, major mining/petroleum tenements and the proposed commercial (aquaculture) areas at North East Regnard Island and west of Cape Preston.

Conservation (mangrove protection) area

One conservation (mangrove protection) area (approximately 4,050 ha or 4% of the marine management area) is proposed in the Cape Preston Marine Management Area and will be located at Maitland.

The proposed Maitland Conservation (Mangrove Protection) Area includes representative areas of mangrove communities and intertidal sand and mudflat communities (including samphire communities), which are of high conservation importance. The boundaries of the proposed Maitland Conservation (Mangrove Protection) Area was placed to include the mangrove and intertidal sand and mudflat communities while avoiding the Dampier Salt lease area, Maitland Estate proposed developments and the DRD service corridor to West Intercourse Island. In respect to the Maitland Estate, Dampier Salt Ltd. has plans to potentially expand the area currently used for salt production activities. To accommodate this, the proposed reserve boundary does not overlap the area that has been identified for expansion of salt production. Should Government not approve the use of this area for the expansion of the Dampier Salt Ltd. lease, the intention is to include this area in the proposed conservation

(mangrove protection) area of the proposed reserves. CALM, in liaison with relevant Government agencies and stakeholders, will consider this proposal in the public submission period.

The primary purpose of this area is for protection of the significant mangrove communities in the area. Only activities that are considered compatible with the protection of the mangroves in this area will be permitted. The locations of the proposed conservation (mangrove protection) area is shown in Figure 18 and the permitted activities are shown in Table 3. A description of the values of the conservation (mangrove protection) area are presented below.

Commercial (aquaculture) areas
Two commercial (aquaculture) areas (approximately 40 ha or <1% of the marine management area) are proposed in existing aquaculture leases within the proposed Cape Preston Marine Management Area and these are located south of North West Regnard Island and west of Cape Preston.

The primary purpose of these areas is aquaculture. The designation of these areas does not exclude other existing activities. However, if other uses conflict in a significant and unavoidable way with aquaculture, these activities will not be permitted to occur in these areas. It should be noted that the designation of these areas for the primary purpose of aquaculture does not provide automatic approval for aquaculture proposals. All proposals will be assessed in accordance with Ministerial Policy Guidelines Number 8 (DoF, 1998) and only permitted where the use is compatible with the maintenance of the values of the proposed reserves. The location of the commercial (aquaculture) areas are shown in Figure 18 and the permitted activities are shown in Table 3.

Unzoned areas
All waters of the proposed Cape Preston Marine Management Area not classified as conservation (flora/fauna protection), conservation (mangrove protection) or commercial (aquaculture) areas will be unzoned. The unzoned area (approximately 75,980 ha or 82% of the marine management area) will provide for recreational and commercial activities to occur, providing that they are compatible with the overall maintenance of the marine management area's values. The location of the unzoned areas of the proposed reserve is shown in Figure 18 and the permitted activities are shown in Table 3.

8.2 Education and Interpretation

Developing community support for the proposed reserves is critical to the effective implementation of this management plan. The level of public compliance in relation to management controls in the reserves will be directly related to the level of understanding of the values of the proposed reserves and the reasons for regulation of activities in the reserves. The desired outcome of public education is to increase public awareness and understanding of conservation and management issues in the proposed reserves and of the marine environment in general. In a local sense, this increased understanding will help to develop a real sense of community ownership, which will subsequently lead to better protection of the ecological and social values of the proposed reserves. Education programs will initially need to raise awareness of the creation of the proposed reserves and new restrictions on commercial and recreational 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 and a range of education and interpretation infrastructure (e.g. walk or dive trails, interpretative centre) should be considered where appropriate. Specific education strategies are detailed for each ecological and social value in Section 7 and education as a value of the proposed reserves is outlined in Section 7.2.13. A summary of the generic education and interpretation objectives, strategies and targets is outlined below.

Summary of Generic Education and Interpretation Objectives, Strategies and Targets

Management objective/s	1. To enhance community understanding of, and support for, the proposed reserves through education and interpretation programs. 2. To promote education in the proposed reserves.
Strategies	1. Develop and implement, in collaboration with DoF and other relevant agencies, education and interpretation programs to ensure users of the reserves are aware of and understand the values of the reserves, management zones and regulations and the reasons for these controls (CALM, DoF). **(H - KMS)** 2. Develop and distribute to the local community and visitors appropriate education materials about the reserves' values and management (CALM, DoF). **(H)** 3. Provide talks and briefings about the reserves' values, uses and management to local and visiting groups (CALM). **(M)** 4. Provide support, where possible, to local schools, institutions and organisations using the proposed reserves for educational purposes (CALM). **(M)**
Targets	1. Implementation of management strategies within agreed timeframes (Appendix III). 2. 50% of visitors aware of the existence of the reserves, their values and of the restrictions applying to the area within three years of gazettal. 3. 90% of visitors aware of the existence of the reserves, their values and of the restrictions applying to the area within ten years of gazettal.

8.3 Surveillance and Enforcement

This management plan details a range of strategies relating to the management of particular human activities within the proposed reserves. The effectiveness of these strategies will be dependent on the extent to which the users of the reserves abide by these restrictions. The education program is critical to achieving a high level of compliance as in most cases users will support controls where they are clearly aware of what they are and why they have been implemented. There will, however, always be a need to monitor the level of compliance and, where users continue to undertake illegal activities, take action to stop inappropriate behaviour. Given the size of the proposed reserves, remoteness of some of the islands and the resources that would be required to have a CALM enforcement presence in the area year round, it is appropriate that the existing users of the area (industry, pearling, aquaculture, charter operators) play both a self-regulatory and visitor/user regulation role in the surveillance and enforcement program. A summary of the generic surveillance and enforcement objectives, strategies and targets is outlined below.

Summary of Generic Surveillance and Enforcement Objectives, Strategies and Targets

Management objective/s	Maximise public compliance of regulations related to the ongoing management of the proposed reserves.
Strategies	1. Develop and implement a surveillance and enforcement program, in collaboration with DoF, to ensure an adequate level of compliance with zoning restrictions (CALM, DoF). **(H-KMS)** 2. Facilitate cross authorisation of government enforcement officers as appropriate (CALM, DoF, DPI). **(H - KMS)** 3. Develop and implement procedures to ensure coordination between government agencies to maximise efficiency and effectiveness of surveillance and enforcement activities (CALM, DoF, DPI). **(H - KMS)** 4. Facilitate the hydrocarbon, pearling, aquaculture and charter industries, as well as visitors to the reserves, to take an active role in a voluntary surveillance and enforcement program (CALM). **(H)** 5. Appoint honorary enforcement officers as appropriate (CALM, DoF, DPI). **(M)**
Target	Implementation of management strategies within agreed timeframes (Appendix III).

8.4 Research

Developing an understanding of the natural and social environment of the proposed reserves is critical to their effective management. A research program is a key strategy in order to provide background information on the ecological and social environment and provide an understanding of what is "natural" as a benchmark for monitoring programs. Much of this information does not exist at this stage for the proposed reserves and so research programs need to focus on establishing the natural state of key ecological values and processes. Research programs should, ideally, be designed to fill key gaps in current knowledge. However, any increase in knowledge is beneficial. Specific research strategies are detailed for each ecological and social value and are

outlined in Section 7 and scientific research as a value of the proposed reserves is outlined in Section 7.2.12. A summary of the generic research objectives, strategies and targets is outlined below.

Summary of Generic Research Objectives, Strategies and Targets

Management objective/s	1. To obtain an appropriate understanding of the biodiversity and key ecological and social processes within the proposed reserves. 2. To promote ecological and social research in the proposed reserves that improves knowledge of the reserve and the technical basis for management decisions.
Strategies	1. Develop and progressively implement a coordinated and prioritised research program of key values and processes of the proposed reserves (CALM, DoF). **(H - KMS)** 2. Develop and maintain a database of human usage in the proposed reserves (CALM, DoF). **(H - KMS)** 3. Develop and maintain detailed habitat maps and wildlife distribution maps for the proposed reserves (CALM). **(H-KMS)** 4. Identify, prioritise and communicate high priority ecological and social research projects relevant to the management of the proposed reserves to appropriate research organisations via a strategic research plan with the aim of maximising priority research outcomes for the proposed reserves (CALM). **(H - KMS)** 5. Develop and maintain a database of historical and current research in the proposed reserves (CALM). **(H)** 6. Facilitate ecological and social research in the proposed reserves conducted by research, academic and educational institutions by providing financial and logistical assistance (where possible) (CALM, DoF). **(H)**
Target	Implementation of management strategies within agreed timeframes (Appendix III).

8.5 Monitoring

Monitoring the state of the proposed reserves' environment is critical to the effective management of the proposed reserves. A monitoring program is a key strategy to allow the early detection of detrimental changes and provide the trigger for management action to ameliorate potential impacts before they lead to undesirable changes in the reserves' values to occur. The detection of human-induced changes requires an understanding of what is "natural" as a benchmark and this information should be 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 effected area. Specific monitoring strategies are detailed for each ecological and social value and are outlined in Section 7 and scientific research as a value of the proposed reserves is outlined in Section 7.2.12. A summary of the generic monitoring objectives, strategies and targets is outlined below.

Summary of Generic Monitoring Objectives, Strategies and Targets

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

8.6 Public Participation

Developing community support for the proposed reserves is critical to the effective implementation of this management plan. The level of public compliance in relation to management controls in the proposed reserves will be related directly to the level of understanding of the values of the proposed reserves and the reasons for regulation of activities in the proposed reserves. An important early step in the administration of the proposed reserves is the establishment of a community-based Management Advisory Committee (MAC). Its main function would be the provision of advice and assistance to CALM and the MPRA. For example, local stakeholders would be able to raise issues with CALM and the MPRA in matters relating to the reserves' 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	To facilitate on-going community participation in the management of the proposed reserves.
Strategies	1. Establish and maintain a MAC (CALM). **(H - KMS)** 2. Encourage community and local industry involvement in education and interpretation programs (CALM). **(M)** 3. Encourage community and local industry involvement in monitoring programs (CALM). **(M)**
Target	Implementation of management strategies within agreed timeframes (Appendix III).

8.7 Direct Management Intervention

Direct management intervention covers those management strategies that are not related to administration, surveillance and enforcement, education and public participation. Intervention management strategies generally relate to three aspects of management – rehabilitation of degraded areas, visitor facilities and risk management.

Although the majority of the waters and coastal areas in the Dampier Archipelago/Cape Preston area are in a relatively pristine condition, there may be areas that have suffered some localised disturbance from past human use. Anecdotal evidence from current users of the proposed reserves suggests that there may be accumulations of litter in some areas and impacts on mud-crab or finfish stocks. Other impacts may include, for example, sediment contamination or damage to coastal vegetation due to visitor access. 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 prior to gazettal of the proposed reserves and evaluate what, if any, rehabilitation measures should be undertaken. Decisions as to whether it would be appropriate to rehabilitate an area would be based on the ability of an area to recover naturally (i.e. if no further pressure is applied and with no management intervention), the current level of disturbance of the area, ecosystem effects of not carrying out rehabilitation, aesthetic impacts of the disturbance and the cost of rehabilitation.

It is envisaged that the human use of the Dampier Archipelago/Cape Preston area will increase in the future. An increase in visitor numbers may require additional facilities to be provided so as to protect the ecological values from human disturbance (e.g. moorings) and to enhance the visitor experience (e.g. dive trails, pontoons, walk trails on islands). The level of use of the proposed reserves 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 proposed reserves, combined with shallow submerged reefs, strong ocean currents, high winds and seasonal cyclones, pose a high risk to visitors who may be inexperienced in, or unprepared for, such conditions. Additionally, the rugged island coastlines with undercut cliffs may pose a risk to visitors to the islands. As the use of the proposed reserves will probably increase during the life of the management plan, an ongoing visitor risk assessment should be undertaken to identify potential hazards and measures implemented to minimise these.

A summary of the generic intervention objectives, strategies and targets is outlined below.

Summary of Generic Direct Management Intervention Objectives, Strategies and Targets

Management objective/s	1. To remediate, where necessary, existing human impacts on the ecological and social values of the proposed reserves. 2. To provide visitor facilities that minimise environmental impact to, and enhance visitor enjoyment of, the proposed reserves. 3. To take reasonable steps to minimise visitor risk where possible in the proposed reserves.
Strategies	1. Identify areas of existing human impact in the proposed reserves (CALM). **(M)** 2. Assess rehabilitation options and, where appropriate, implement these (CALM). **(M)** 3. Monitor human use (visitor numbers and high use areas) of the proposed reserves and, consistent with available resources, provide visitor facilities where appropriate (CALM). **(M)** 4. Perform regular assessments of visitor risk in the proposed reserves and, where necessary, implement appropriate measures to minimise visitor risk (CALM). **(M)** 5. Implement a program of routine inspection, maintenance and reporting on infrastructure condition (e.g. zone markers and signage) in the proposed reserves (CALM). **(M)**
Target	Implementation of management strategies within agreed timeframes (Appendix III).

9 DEVELOPMENT PROPOSALS WITHIN THE PROPOSED RESERVE

All development proposals within the proposed reserves are subject to the environmental impact assessment requirements of the EP Act and consideration by CALM in the context of the management plan. During the life of the plan there may be proposals for the installation and construction of marine infrastructure associated with petroleum industry facilities (e.g. pipelines), pearling, aquaculture, nature-based tourism operations and infrastructure for public recreational facilities. These could be major developments such as pipelines, or minor works such as the installation of moorings, or navigation markers. The nature of the development will determine the appropriate level of assessment. All assessments should review the proposal in terms of its potential impacts on the reserves' ecological and social values and whether it is consistent with the ecological targets of the proposed reserves.

In relation to petroleum development in marine conservation reserves there are agreed assessment procedures and protocols that are set out in an MOU between the EPA and DoIR (Appendix II). The MPRA have endorsed the approach outlined in the MOU. They will be informed of all proposals submitted within the reserves, although the EPA/DoIR will be the primary mechanism for environmental assessment and approvals. There will not be a duplicated approvals process undertaken by the MPRA for petroleum operations. It should be noted that under this arrangement, the MPRA and CALM will still provide input and advice to the EPA on proposals when requested.

The mooring policy for marine conservation reserves (CALM & MPRA, 2002) 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. At this stage there are no areas of the proposed reserves identified where moorings would not be permitted. Areas in which moorings would be acceptable or necessary from environmental, safety or equity points of view should be identified and the capacity (or number) of environmentally acceptable moorings established. Applications for moorings should be assessed on a case-by-case basis and in relation to criteria established in the mooring policy. A summary of the objectives, strategies and targets for development proposals is 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 proposed reserves (CALM, DoE, MPRA). **(H)** 2. Identify areas in which moorings are acceptable and/or necessary from environmental, safety and equity perspectives (CALM, DoE, DPI). **(M)** 3. Assess mooring applications on a case-by-case basis and in relation to mooring criteria established in the mooring policy (CALM, DoE, MPRA). **(M)**
Target	Implementation of management strategies within agreed timeframes (Appendix III).

10 PERFORMANCE ASSESSMENT

The effectiveness of the management plan for the proposed reserves will be periodically reviewed through a formal auditing and review process. This will be undertaken through an annual assessment carried out by CALM and a formal audit by the MPRA every three years. The audits will include reports on the status of the key ecological values of the proposed reserves and an assessment of the effectiveness of current management strategies as well as providing feedback to the reserve managers.

Overall management performance will be audited by the MPRA via a status report that assesses 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 outlined in Sections 7 - 9. Management targets of selected key ecological and social values of the proposed reserves are used as *key performance indicators* (KPIs) of the effectiveness of reserve management. These are identified in Section 7 by the symbol (*KPI*). The KPIs reflect both the conservation priorities and the management imperatives of the MPRA, CALM and the community. *Key management strategies* (KMS) are identified in Sections 7 - 9 by the symbol (H-KMS).

10.1 Audit by CALM

The prioritised strategies outlined in Sections 7 - 9 of the management plan will be built into annual works programs of CALM's Pilbara Region that is responsible for the day to day management of the proposed reserves. Progress against the KPIs, KMSs and the remaining management targets and strategies will form the basis of an annual status report on the proposed reserves by CALM's Pilbara Region to CALM's Corporate Executive and the MPRA.

10.2 Audit by the MPRA

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

10.3 Review of the Management Plan

The management plan for the proposed reserves will cover management of the reserves for a period of ten years from the date the plan is approved. This is the maximum allowable period that may be set for a management plan, as specified by the CALM Act.

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

10.4 Links with State Environment Reporting

The first Western Australian State of the Environment Report was prepared in 1992 and a second report was published in 1998 (Government of Western Australia, 1998b). These reports provided an overview of the key

marine and terrestrial environmental issues in the State. The DoE will be responsible for ongoing State of the Environment reporting based on the framework contained within the 1998 report. Relevant marine issues covered by this framework are the implementation of a statewide system of marine conservation reserves, biodiversity, degradation of marine habitats, contamination of the marine environment, the introduction of exotic marine species and tourism, fisheries, mining and petroleum industries. The performance assessment of the proposed reserves as described above, 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 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.

11 REFERENCES

ANZECC & ARMCANZ (2000). *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*. National Water Quality Management Strategy Paper No.4. Australian and New Zealand Environment and Conservation Council & Agriculture and Resource Management Council of Australia and New Zealand, Canberra.

ANZECC (1997). *Best Practice in Performance Reporting in Natural Resource Management*. Australian and New Zealand Environment and Conservation Council, Department of Natural Resources and Environment, Melbourne.

ANZECC TFMPA (1998a). *Guidelines for Establishing the National Representative System of Marine Protected Areas*. Australian and New Zealand Environment and Conservation Council, Task Force on Marine Protected Areas. Environment Australia, Canberra.

ANZECC TFMPA (1998b). *Strategic Plan of Action for Establishing the National Representative System of Marine Protected Areas: Public Comment Draft*. Australian and New Zealand Environment and Conservation Council, Task Force on Marine Protected Areas. Environment Australia, Canberra.

ANZECC TFMPA (1999). *Strategic Plan of Action for the National Representative System of Marine Protected Areas: A Guide for Action by Australian Governments*. Australian and New Zealand Environment and Conservation Council, Task Force on Marine Protected Areas. Environment Australia, Canberra.

CALM (1990). *Dampier Archipelago Nature Reserves Management Plan 1990 – 2000*. Management Plan No. 18. Department of Conservation and Land Management, Perth, Western Australia.

CALM (2000). *Dampier Archipelago/Cape Preston Regional Perspective*. Department of Conservation and Land Management, Perth, Western Australia.

CALM & MPRA (2002). *Mooring Policy*. Policy Statement No. 59. Department of Conservation and Land Management and Marine Parks and Reserves Authority, Perth, Western Australia.

Colman J.G. & C.J. Simpson (1999). "*No Take" Areas in Western Australia's Multiple-use Marine Conservation Reserve System*. Marine Management Series Report Number 1. Department of Conservation and Land Management, Perth 11pp.

Commonwealth of Australia (1992). *National Strategy for Ecologically Sustainable Development*. Australian Government Publishing Service, Canberra.

Commonwealth of Australia (1996a). *The National Strategy for the Conservation of Australia's Biological Diversity*. Department of the Environment, Sport and Territories, Canberra.

Commonwealth of Australia (1996b). *The State of the Marine Environment Report for Australia*. Great Barrier Reef Marine Park Authority for the Department of Environment, Sport and Territories, Canberra.

Commonwealth of Australia (1998). *Australia's Oceans Policy*. Environment Australia, Canberra.

Dampier Port Authority (2002). *Port of Dampier 2002 Annual Report*. Dampier Port Authority. Dampier, Western Australia.

DCT & PDC (1999). *Pilbara Economic Perspective: An Update on the Economy of Western Australia's Pilbara Region*. Department of Commerce and Trade and Pilbara Development Commission, Perth, Western Australia.

DoF (1998). *Assessment of Applications for Authorisation for Aquaculture and Pearling in Coastal Waters of Western Australia*. Ministerial Policy Guideline Number 8. Department of Fisheries, Perth, Western Australia.

DoF (2000). *Assessment of Applications for the Granting, Renewal or Transfer of Fishing Tour Licences and Aquatic Eco-Tourism Operators Licences*. Ministerial Policy Guideline Number 12. Department of Fisheries, Perth, Western Australia.

DoF (2002). *State of the Fisheries Report 2001/2002*. Department of Fisheries, Perth, Western Australia.

DoF personal comment. (Unpublished Department of Fisheries data).

DoT & PDC (1997). *Pilbara Regional Transport Strategy*. Department of Transport and Pilbara Development Commission, Perth, Western Australia.

DoT (1999). *The Discharge of Sewage From Vessels Into the Marine Environment – A Draft Discussion Paper*. Department of Transport, Perth, Western Australia.

Enzer Marine Environmental Consulting (1998). *The Environmental Impact of Pearling (Pinctada maxima) in Western Australia*. Report to the Pearl Producers Association Inc. by Enzer Marine Environmental Consulting, Perth, Western Australia.

EPA (1998a). *Guidance for the Assessment of Environmental Factors. Benthic Primary Producer Habitat Protection.* Draft Guidance Statement No. 29. Environmental Protection Authority, Perth, Western Australia.

EPA (1998b). *Guidance for the Assessment of Environmental Factors. Seagrass Habitat Protection.* Draft Guidance Statement No. 22. Environmental Protection Authority, Perth, Western Australia.

EPA (2001). *Guidance Statement for Protection of Tropical Arid Zone Mangroves Along the Pilbara Coastline*. Guidance Statement No. 1, April 2001. Environmental Protection Authority, Perth, Western Australia.

EPA (2002). *Implementation Framework for Western Australia for the Australian and New Zealand Guidelines for Fresh and Marine Water Quality and Water Quality Monitoring and Reporting (Guidelines Nos 4 & 7: National Water Quality Management Strategy).* EPA Bulletin 1078. November 2002. Environmental Protection Authority. Perth, Western Australia.

Government of Western Australia (1994). *New Horizons in Marine Management*. Department of Conservation and Land Management. Perth, Western Australia.

Government of Western Australia (1998a). *New Horizons - The Way Ahead in Marine Conservation and Management*. Department of Conservation and Land Management, Perth, Western Australia.

Government of Western Australia (1998b). *Environment Western Australia 1998: State of the Environment Report*. Department of Environmental Protection, Perth, Western Australia.

Hutchins, J.B. (2003). Checklist of marine fishes of the Dampier Archipelago, Western Australia. F.E. Wells, In: D.I. Walker and D. S. Jones (eds) 2003. *The Marine Flora and Fauna of Dampier Archipelago, Western Australia.* Western Australian Museum, Perth.

IMCRA (1997). *Interim Marine and Coastal Regionalisation for Australia: An Ecosystem-based Classification for Marine and Coastal Environments.* Version 3.2. Environment Australia, Commonwealth Department of the Environment, Canberra.

IRC Environment (2002). *Port of Dampier Environmental Management Plan*. Document E-REP-J01-119-001. REV 0. May 2002. IRC Environment, Perth, Western Australia.

MPRA (2001). *Policy Statement: The Application of the Marine Management Area Reserve Category in a Marine Conservation Reserve Planning Process*. November 2001. Marine Parks and Reserves Authority. Perth, Western Australia.

MPRSWG (1994). *A Representative Marine Reserve System for Western Australia*. Report of the Marine Parks and Reserves Selection Working Group. Department of Conservation and Land Management, Perth, Western Australia.

Osborne, S. & Monks, L. (2000). *An Analysis of Issues Relating to the Proposed Dampier Archipelago/Cape Preston Marine Conservation Reserve*. June 2000. Report: MRI/PI/DAR-47/2000. Marine Conservation Branch, Department of Conservation and Land Management. Perth, Western Australia.

Pearce, A.F. & C.B. Pattiaratchi (1999). The Capes Current: A Summer Countercurrent Flowing Past Cape Leeuwin and Cape Naturaliste, Western Australia. *Continental Shelf Research*, **19**: 401-420.

Pearce, A.F. & D.E. Walker (eds) (1991). The Leeuwin Current: An Influence on the Coastal Climate and Marine Life of Western Australia. Proceedings of a Symposium of the Royal Society of Western Australia and the Western Australian Branch of the Australian Marine Science Association, held at CSIRO Laboratories, Perth, Western Australia, 16 March 1991. *Journal of the Royal Society of Western Australia*, **74**.

Semeniuk, V. (1997). *Selection of Mangrove Stands for Conservation in the Pilbara Region of Western Australia - A Discussion 30th June 1997 (updated 28th July 1997)*. Unpublished report to the Department of Resources Development. V & C Semeniuk Research Group, Perth, Western Australia.

Taylor, J.G. & A.F. Pearce (1999). Ningaloo Reef Currents: Implications for Coral Spawn Dispersal, Zooplankton and Whale Shark Abundance. *Journal of the Royal Society of Western Australia*, **82**: 57-65.

Veron, J.E.N. & L.M. Marsh (1988). Hermatypic corals of Western Australia: Record and Annotated Species List. *Record of the Western Australian Museum*. Supplement **29**. 136p.

Western Australian Museum personal comment. (Unpublished Western Australian Museum survey data).

Western Australian Tourism Commission personal comment. (Source: Bureau of Tourism Research).

Williamson, P.C., Sumner, N.R. & B.E. Malseed (In prep.). *A 12-month Survey of Recreational Fishing in the Pilbara Region of Western Australia During 1999-2000*. Fisheries Research Report. Department of Fisheries, Research Division. Perth, Western Australia.

12 INFORMATION SOURCES

International policies/principles

Kelleher, G., C. Bleakley & S. Wells (1995). *A Global Representative System of Marine Protected Areas*. Vol I-IV. The Great Barrier Reef Marine Park Authority, The World Bank, The World Conservation Union (IUCN). Washington D.C., USA.

United Nations Environment Program (1994) *Convention on Biological Diversity – Text and Annexes.* Switzerland.

National Policy

ANZECC (1998). *ANZECC Interim Marine and Coastal Regionalisation for Australia*: *An Ecosystem-based Classification for Marine and Coastal Environments.* Version 3.3. Australian and New Zealand Environment and Conservation Council. Environment Australia, Canberra.

ANZECC (1999). *Strategic Plan of Action for the National Representative System of Marine Protected Areas: A Guide for Action by Australian Governments*. Australian and New Zealand Environment and Conservation Council. Environment Australia, Canberra.

Commonwealth of Australia (1992). *National Strategy for Ecologically Sustainable Development*. Australian Government Publishing Service, Canberra.

Commonwealth of Australia (1998). *Australia's Oceans Policy*. Environment Australia, Canberra.

Technical literature on the ecology of the region

Bancroft, K. P. (1999). *Resource Assessment Field Survey of the Montebello/Barrow Islands and the Dampier Archipelago/Cape Preston Regions 14-25 June 1999*. Marine Conservation Branch, Department of Conservation and Land Management. Perth, Western Australia.

Bancroft, K. P. & M. W. Sheridan (2000*). The Major Marine Habitats of the Proposed Damper Archipelago/Cape Preston Marine Conservation Reserve*. Marine Conservation Branch, Department of Conservation and Land Management. Perth, Western Australia.

Bancroft, K. P., J. A. Davidson & O. Looker (2000). *Marine Wildlife Distribution in the Proposed Montebello/Barrow Islands and Dampier Archipelago/Cape Preston Marine Conservation Reserves.* Marine Conservation Branch, Department of Conservation and Land Management. Perth, Western Australia.

Bancroft, K. P., M. W. Sheridan & J.A. Davidson (2000). *Developing a Broadscale Habitat Map of the Montebello/Barrow Islands and the Dampier Archipelago/Cape Preston Regions*. Marine Conservation Branch, Department of Conservation and Land Management. Perth, Western Australia.

Blaber, S. J. M., J.W. Young & M.C. Dunning (1985). Community Structure and Zoogeographic Affinities of the Coastal Fishes of the Dampier Region of North-Western Australia*. Australian Journal of Marine and Freshwater Research* **35**: 247-266.

Buchan, S.J. & S.A Stoud (1993). *Review of Oceanography of the North West Shelf and Timor Sea Regions Pertaining to the Environmental Impact of the Offshore Oil and Gas Industry*. Vol. 1 & 2. Prepared by Steedman Science and Engineering. Report for Woodside Offshore Petroleum Pty. Ltd. and the Australian Petroleum Production and Exploration Association.

CALM (1990*). Dampier Archipelago Nature Reserves Management Plan 1990-2000*. Department of Conservation and Land Management. Perth, Western Australia.

CALM (1997*). Generic Information Requirements for the Management of Marine Reserves in Western Australia*. Marine Conservation Branch, Department of Conservation and Land Management, Perth, Western Australia.

CALM (2000). *Dampier Archipelago/Cape Preston Regional Perspective*. Department of Conservation and Land Management, Perth, Western Australia.

Department of Conservation and Environment (1981). *Marine Systems of the Dampier Archipelago*. Department of Conservation and Environment. Perth, Western Australia. Bulletin 109.

Forde, M.J. (1985). *Technical Report on Suspended Matter in Mermaid Sound, Dampier Archipelago*. Department of Conservation and Land Management. Perth, Western Australia. Bulletin 215.

Gordon, D. M. (1988). Disturbance to Mangroves in Tropical-Arid Western Australia: Hypersalinity and Restricted Tidal Exchange as Factors Leading to Mortality. *Journal of Arid Environments,* **15**: 117-145.

Grifsith, J. (1999). *Scleractinian Corals Collected During October 1998 at the Dampier Archipelago*. Western Australian Museum. (Unpublished Report).

Hill, A.K. & L.J. Jonker (2000). *Planning and Pre-declaration Processes for a Marine Protected Area in the Dampier Archipelago/Cape Preston Region*. Marine Conservation Branch, Department of Conservation and Land Management.

Jenner, C. & M.-N. Jenner (1990). *Dampier Archipelago Humpback Whale Project, Western Australia*. Centre for Whale Research. Perth, Western Australia.

Johnson, D.B. & J.A. Stoddart (1987). *Report on Surveys of the Distribution, Abundance and Impact of Acanthaster planci on Reefs Within the Dampier Archipelago (Western Australia)*. Australian Institute of Marine Science. Townsville, Queensland.

Kojan, C. J. (1994). *The Geology and Mineral Resources of the Proposed Dampier Archipelago National Park - Record 1994/2*. Department of Minerals and Energy, Perth, Western Australia.

Meagher & Le Provost (undated). *North West Shelf Development Project: Marine Environment of Dampier Archipelago*. Prepared by Meagher & Le Provost. Report to Woodside Petroleum Development Pty. Ltd. Perth, Western Australia.

Mills, D.A. (1985). *A Numerical Hydrodynamic Model Applied to Tidal Dynamics in the Dampier Archipelago*. Western Australian Department of Conservation and Environment. Bulletin 190.

Mills, D.A., D. R. Pitt & C.J. Simpson (1986). *Summary of Current Meter Data from the Dampier Archipelago 1981-1984*. Western Australian Department of Conservation and Environment. Environmental Note 178.

Reitsema, T.J. & J.T. Spickett (1999). Imposex in *Morula granulata* as Bioindicator of Tributyltin (TBT) Contamination in the Dampier Archipelago, Western Australia. *Marine Pollution Bulletin,* **39(1-12):** 280-284.

Semeniuk, V. & P.A.S. Wurm (1987). The Mangroves of the Dampier Archipelago, Western Australia. *Journal of the Royal Society of Western Australia*, **Vol. 69, Part 2**: 29-87.

Semeniuk, V. P.N. Chalmer & I. Le Provost (1982). The Marine Environments of the Dampier Archipelago, Western Australia. *Journal of the Royal Society of Western Australia*, **Vol. 69, Part 3**: 97-114.

Simpson, C.J. & J. Cary (1998). *Environmental Guidelines and Procedures in Relation to CALM Advise on the Marine Aspects of Aquaculture and Pearling Proposals in Western Australia*. Report No.: MPC – 01/1998, Marine Conservation Branch, Department of Conservation and Land Management. Perth, Western Australia.

Simpson, C.J. & K.P. Bancroft (1998). *A Framework for Prioritising the Establishment of Marine Conservation Reserves in Western Australia – A Position Paper*. Prepared for the MPRA by the Marine Conservation Branch, Department of Conservation and Land Management. Perth, Western Australia.

Simpson, C.J. (1985). *Mass Spawning of Scleractinian Corals in the Dampier Archipelago and the Implications for Management of Coral Reefs in Western Australia*. Western Australian Department of Conservation and Environment. Bulletin 244.

Simpson, C.J. (1987). *Ecology of Scleractinian Corals in the Dampier Archipelago, Western Australia*. PhD Thesis. Department of Zoology, University of Western Australia, Western Australia.

Simpson, C.J., J.G. Colman & A.K. Hill (2002). *A Strategic Framework for Marine Reserve in the Shark Bay World Heritage Property*. Marine Conservation Branch, Department of Conservation and Land Management. Perth, Western Australia.

Wells, F.E., D.I. Walker & D.S. Jones (eds) (2003). *The Marine Flora and Fauna of Dampier, Western Australia*. Proceedings of the Twelfth International Marine Biological Workshop held in Dampier from 24 July to 11 August 2000.

Western Australian Museum (1999). *Biological Survey of the Dampier Archipelago*. Western Australian Museum. Perth, Western Australia.

Pamphlets produced by CALM

- Managing for Sustainable Use
- Marine Conservation Reserves: Management Concepts in Western Australia
- Proposed Marine Conservation Reserves in the Pilbara
- Pilbara Region: Study Areas for Proposed Marine Conservation Reserves
- Marine Management: Working Together on the North West Shelf

Legislation

Aboriginal Heritage Act 1972
Conservation and Land Management Act 1984
Dampier Solar Salt, Industry Agreement 1967
Environmental Protection Act 1986
Environment Protection and Biodiversity Conservation Act 1999
Fish Resources Management Act 1994
Fishing and Related Industries Compensation (Marine Reserves) Act 1997
Heritage of Western Australia Act 1990
Historic Shipwrecks Act 1976
Iron Ore (Hamersley Range) Agreement Act 1963
Western Australian Marine Act 1982
Marine Archaeology Act 1973
Mine Safety and Inspection Act 1994
Mine Safety and Inspection Regulations 1995
Mining Act 1978
Mining Act Regulations 1981
North West Gas Development (Woodside) Agreement 1979
Pearling Act 1990
Port Authorities Act 1999
Petroleum Act 1967
Wildlife Conservation Act 1950

State strategic documents

Government of Western Australia (1994). *New Horizons in Marine Management*. Department of Conservation and Land Management, Perth, Western Australia.

Government of Western Australia (1998). *New Horizons - The Way Ahead in Marine Conservation and Management*. Department of Conservation and Land Management, Perth, Western Australia.

MPRSWG (1994). *A Representative Marine Reserve System for Western Australia*. Report of the Marine Parks and Reserves Selection Working Group. Department of Conservation and Land Management, Perth, Western Australia.

13 APPENDICES

Appendix I: Technical description of the boundaries of the proposed reserves

Proposed Dampier Archipelago Marine Park:

Situated in the Indian Ocean, the proposed Dampier Archipelago Marine Park comprises Western Australian waters, the airspace above those waters, the seabed below those waters, and the subsoil to a depth of 200 metres below that seabed that are -

a) contained within and bounded by a line:
   - i) commencing north of Legendre Island at the intersection of longitude 116º50'00" east and the seaward limit of the Coastal Waters of the State (3 nautical miles seaward of the territorial sea baseline); and
   - ii) extending south along longitude 116º50'00" east to latitude 20º20'30" south;
   - iii) thence south-westerly along the geodesic to the intersection of latitude 20º23'06" south and longitude 116º46'18" east;
   - iv) thence south-easterly along the geodesic to the intersection of latitude 20º25'15" south and longitude 116º47'30" east;
   - v) thence south along longitude 116º47'30" east to latitude 20º29'30" south;
   - vi) thence south-westerly along the geodesic to the intersection of latitude 20º30'30" south and longitude 116º47'00" east;
   - vii) thence south-westerly along the geodesic to the intersection of latitude 20º32'30" south and longitude 116º46'15" east;
   - viii) thence south-easterly along the geodesic to the intersection of longitude 116º47'24" and the High Water Mark at the southern end of Conzinc Bay;
   - ix) thence generally northerly, easterly, and southerly along the High Water Mark around the Burrup Peninsula to *Dampier Solar Salt Industry Agreement Act 1967* mineral lease AML70/253 in Nickol Bay;
   - x) thence north-easterly and south-easterly along the boundary of that mineral lease to *Mining Act (1978)* general purpose lease 47/28;
   - xi) thence north-easterly, south-easterly and south-westerly along the boundary of that general purpose lease back to *Dampier Solar Salt Industry Agreement Act 1967* mineral lease AML70/253;
   - xii) thence south-easterly along the boundary of that mineral lease to *Land Administration Act 1997* DeWitt location 267;
   - xiii) thence north-easterly and south easterly along the boundary of that location to the boundary of *Mining Act (1978)* general purpose lease 47/2;
   - xiv) thence easterly along the boundary that general purpose lease to *Mining Act (1978)* general purpose lease 47/3;
   - xv) thence easterly, southerly, and westerly along the boundary of that general purpose lease back to *Mining Act (1978)* general purpose lease 47/2;
   - xvi) thence easterly along the boundary of that general purpose lease to *Land Administration Act 1997* DeWitt location 267;
   - xvii) thence south-easterly and south-westerly along the boundary of that location to the boundary of *Land Administration Act 1997* reserve 30948;
   - xviii) thence southerly and easterly along the boundary of that reserve to the High Water Mark that is the boundary of *Land Administration Act 1997* reserve 40206;
   - xix) thence generally easterly (and various other directions) generally along the High Water Mark to the narrow point between the mainland and the eastern end of Dixon Island at approximately latitude 20º37'54" south and longitude 117º05'12" east;
   - xx) thence north-westerly via the narrow point between the mainland and the eastern end of Dixon Island to the High Water Mark on Dixon Island;
   - xxi) thence generally north-westerly, south-westerly, and north-easterly along the High Water Mark of Dixon Island to longitude 117º04'27" east;
   - xxii) thence north along longitude 117º04'27" east to latitude 20º36'42" south;
   - xxiii) thence south-westerly along the geodesic to the intersection of latitude 20º37'48" south and longitude 117º02'15" east;
   - xxiv) thence south-westerly along the geodesic to the High Water Mark at the northern most point of Walcott Island;
   - xxv) thence south-westerly along the geodesic to the intersection of latitude 20º42'21" south and longitude 116º52'36" east;

xxvi) thence north-westerly along the geodesic to the intersection of latitude 20º41'45" south and longitude 116º51'00" east;
xxvii) thence north-westerly along the geodesic to the intersection of latitude 20º38'36" south and longitude 116º48'18" east;
xxviii) thence north-easterly along the geodesic to the intersection of latitude 20º34'18" south and longitude 116º50'06" east;
xxix) thence north-easterly along the geodesic to the intersection of latitude 20º31'00" south and longitude 116º53'00" east;
xxx) thence easterly along latitude 20º31'00" south to longitude 117º08'00" east;
xxxi) thence northerly along longitude 117º08'00" east to the seaward limit of the Coastal Waters of the State;
xxxii) thence generally westerly and north-westerly along the seaward limit of the Coastal Waters of the State to the point of commencement;

and

b) contained within and bounded by a line:
i) commencing north of Rosemary Island at the intersection of latitude 20º24'30" south and longitude 116º36'00" east; and
ii) extending west along latitude 20º24'30" south to longitude 116º34'00" east;
iii) thence south-westerly along the geodesic to the intersection of latitude 20º32'00" south and longitude 116º25'00" east;
iv) thence south along longitude 116º25'00" east to latitude 20º36'00" south;
v) thence south-easterly along the geodesic to the intersection of latitude 20º36'42" south and longitude 116º26'24" east;
vi) thence south-easterly along the geodesic to the intersection of latitude 20º37'30" south and longitude 116º28'18" east;
vii) thence south-easterly along the geodesic to the intersection of latitude 20º38'30" south and longitude 116º30'30" east;
viii) thence east along latitude 20º38'30" south to longitude 116º30'42" east;
ix) thence north-easterly along the geodesic to the intersection of latitude 20º37'54" south and longitude 116º33'06" east;
x) thence north-easterly along the geodesic to the intersection of latitude 20º37'30" south and longitude 116º34'12" east;
xi) thence north-easterly along the geodesic through the intersection of latitude 20º36'45" south and longitude 116º36'00" east and extending along that geodesic to the High Water Mark of West Lewis Island;
xii) thence generally easterly along the High Water Mark of West Lewis Island to the southernmost extent of Marks Point;
xiii) thence south-easterly to the High Water Mark at the southernmost extent of the headland of East Lewis Island located at approximately the intersection of latitude 20º37'15" south and longitude 116º38'30" east;
xiv) thence generally south-westerly along the High Water Mark of East Lewis Island to the southernmost extent of King Point;
xv) thence south-easterly along the geodesic to the beacon located at approximately the intersection of latitude 20º38'16" south and longitude 116º39'10" east;
xvi) thence north-easterly along the geodesic to the beacon located at approximately the intersection of latitude 20º37'54" south and longitude 116º39'51" east;
xvii) thence north along longitude 116º39'51" east to the High Water Mark of East Lewis Island;
xviii) thence generally easterly and north-easterly along the High Water Mark to the north-easternmost point of East Lewis Island;
xix) thence north-easterly along the geodesic to the intersection of latitude 20º34'54" south and longitude 116º41'06" east (east of Boiler Rock);
xx) thence north along longitude 116º41'06" east to latitude 20º32'15" south;
xxi) thence north-westerly along the geodesic to the intersection of latitude 20º32'12" south and longitude 116º41'00" east;
xxii) thence south-westerly along the geodesic to the intersection of latitude 20º32'15" south and longitude 116º40'15" east;
xxiii) thence west along latitude 20º32'15" south to longitude 116º38'00" east;
xxiv) thence north along longitude 116º38'00" east to latitude 20º31'39" south;
xxv) thence east along latitude 20º31'39" south to longitude 116º39'45" east;

xxvi) thence north-easterly along the geodesic to the intersection of latitude 20º31'15" south and longitude 116º41'54" east;
xxvii) thence north-easterly along the geodesic to the intersection of latitude 20º28'24" south and longitude 116º42'42" east;
xxviii) thence north-westerly along the geodesic to the intersection of latitude 20º26'21" south and longitude 116º41'09" east;
xxix) thence north-westerly along the geodesic to the intersection of latitude 20º25'42" south and longitude 116º37'42" east;
xxx) thence south-westerly along the geodesic to the intersection of latitude 20º25'45" south and longitude 116º36'00" east;
xxxi) thence north along longitude 116º36'00" east to the point of commencement.

The marine reserve area excludes all allocated and unallocated land landward of the High Water Mark.

NOTES:
1) All geographic coordinates are expressed in terms of the Geocentric Datum of Australia 1994 ("GDA94").
2) All geographic co-ordinates are approximate only and are subject to survey.
3) "Western Australian waters" means all waters -
   a) that are within the limits of the State; or
   b) that are "coastal waters of the State".
4) "coastal waters of the State" has the meaning given to that term in the *Off-shore (Application of Laws) Act 1982* section 2.
5) Low Water Mark (L.W.M) is the ordinary low water mark at spring tides.
6) High Water Mark (H.W.M.) is the ordinary high water mark at spring tides as defined in the *Land Administration Act 1997* section 3.

Proposed Cape Preston Marine Management Area:

Situated in the Indian Ocean, the proposed Cape Preston Marine Management Area comprises Western Australian waters, the airspace above those waters, the seabed below those waters, and the subsoil to a depth of 200 metres below that seabed that are contained within and bounded by a line:

i) commencing north-west of Eaglehawk Island at the intersection of latitude 20º37'30" south and longitude 116º25'00" east; and
ii) extending south-westerly along the geodesic to the intersection of latitude 20º45'00" south and longitude 116º17'00" east;
iii) thence west along latitude 20º45'00" south to longitude 116º14'00" east;
iv) thence south-westerly along the geodesic to the intersection of latitude 20º48'00" south and longitude 116º06'00" east;
v) thence south along longitude 116º06'00" east to the mainland High Water Mark;
vi) thence generally easterly (and various other directions) generally along the High Water Mark to the line along the geodesic joining the co-ordinates of latitude 20º47'25.512" south longitude 116º33'29.304" east and latitude 20º46'54.156" south longitude 116º31'44.148" east;
vii) thence north-westerly along that geodesic to the intersection of latitude 20º46'54.156" south and longitude 116º31'44.148" east;
viii) thence northerly along the geodesic to the intersection of latitude 20º45'43.380" south and longitude 116º31'44.364" east;
ix) thence north-easterly along the geodesic to the intersection of latitude 20º45'17.316" south and longitude 116º34'05.448" east;
x) thence easterly along the geodesic joining the co-ordinates of latitude 20º45'17.316" south longitude 116º34'05.448" east and latitude 20º45'16.452" south longitude 116º36'48.024" east to *Land Administration Act 1997* DeWitt location 480;
xi) thence north-westerly along the boundary of that location to the intersection of that location and the Mean High Water Mark at approximately latitude 20º42'57" south and longitude 116º37'32" east;
xii) thence north-easterly along the Mean High Water Mark to the Port of Dampier boundary as shown on Department of Land Information Statutory Services Plan 20606;

xiii) thence north-westerly along that boundary to the High Water Mark on the south-eastern shore of the easternmost portion of West Intercourse Island;
xiv) thence generally south-westerly and north-westerly along the High Water Mark to the intersection with latitude 20º42'09" south;
xv) thence westerly along latitude 20º42'09" south to the intersection with the High Water Mark on the eastern shore of the westernmost portion of West Intercourse Island;
xvi) thence generally south-westerly and north-easterly along the High Water Mark to the intersection with the geodesic joining the co-ordinates of latitude 20º42'30" south longitude 116º34'45" east and latitude 20º39'15" south longitude 116º31'45" east on the western shore of the eastern portion of West Intercourse Island;
xvii) thence north-west along the geodesic to the intersection of latitude 20º39'15" south and longitude 116º31'45" east;
xviii) thence south-west along the geodesic to the intersection of latitude 20º39'54" south and longitude 116º29'00" east;
xix) thence north-west along the geodesic to the point of commencement.

The marine reserve area excludes all allocated and unallocated land landward of the High Water Mark.

NOTES:
1. All geographic coordinates are expressed in terms of the Geocentric Datum of Australia 1994 ("GDA94").
2. All geographic co-ordinates are approximate only and are subject to survey.
3. "Western Australian waters" means all waters -
   c) that are within the limits of the State; or
   d) that are "coastal waters of the State".
4. "coastal waters of the State" has the meaning given to that term in the *Off-shore (Application of Laws) Act 1982* section 2.
5. Low Water Mark (L.W.M) is the ordinary low water mark at spring tides.
6. High Water Mark (H.W.M.) is the ordinary high water mark at spring tides as defined in the *Land Administration Act 1997* section 3.

Appendix II: Memorandum of Understanding between EPA and DoIR

APPENDIX III: TIMELINE FOR IMPLEMENTATION OF MANAGEMENT STRATEGIES

VALUE	MANAGEMENT STRATEGIES	YEAR									
ECOLOGICAL		**1**	**2**	**3†**	**4**	**5**	**6†**	**7**	**8**	**9**	**10‡**
Geomorphology (EV 7.1.1)	1. Educate reserve users about the ecological importance of the proposed reserves' geomorphology (CALM). **(M)**										
	2. Ensure industry is informed of relevant management objectives and targets for geomorphology (CALM). **(M)**										
	3. Educate reserve users about the ecological importance of the proposed reserves' geomorphology (CALM). **(M)**										
Sediment quality (EV 7.1.2)	1. Ensure a pollutant input database for the proposed reserves is maintained (industry, CALM). **(H)**										
	2. Establish baseline sediment quality monitoring programs in relation to anti-fouling agents in the proposed reserves (CALM). **(H)**										
	3. Liaise with the DPA regarding the coordination of monitoring programs for sediment quality within the Dampier area (CALM, DPA). **(M)**										
Water quality * (EV 7.1.3)	1. Establish baseline water quality monitoring programs in relation to nutrient enrichment and pollutant inputs to the proposed reserves (CALM). **(H-KMS)**										
	2. Develop an appropriate understanding of the natural variability of the local water quality conditions in the proposed reserves (CALM). **(H)**										
	3. Develop an appropriate understanding of the circulation and mixing of the proposed reserves' waters (CALM). **(H)**										
	4. Establish and maintain a pollutant inputs database for the proposed reserves (CALM, DoE). **(H)**										
	5. Ensure that approvals and setting of conditions for all new industry, nature-based tourism and aquaculture operations are in accordance with the proposed reserves targets (DoE/EPA, industry, WATC, DoF, CALM). **(H)**										
	6. Ensure the values of the reserves are fed into predictive models and response plans for oil spills to assist in managing any pollution event that occurs within or adjacent to the proposed reserves (DPI, DPA, CALM). **(M)**										

VALUE	MANAGEMENT STRATEGIES	YEAR									
ECOLOGICAL		**1**	**2**	**3†**	**4**	**5**	**6†**	**7**	**8**	**9**	**10‡**
	7. Liaise with the DPA regarding the coordination of monitoring programs for water quality within the Dampier area (CALM). **(M)**										
	8. Inform users of the proposed reserves about Government policy and regulations on vessel sewage disposal (CALM, DoE). **(M)**										
Coral reef communities * (EV 7.1.4)	1. Implement spatial controls to provide for: • monitoring of representative coral communities in areas free of significant human influence (of sufficient size and replicated); • protection of coral communities in key recreation sites; • areas where visitors can view coral reefs in their natural state; and 1. an appropriate level of protection (CALM). **(H-KMS)**										
	2. Assess the nature, level and potential impacts of human activities on coral reef communities within the proposed reserve and implement an appropriate monitoring program (CALM). **(H-KMS)**										
	3. Ensure that approvals and the setting of conditions for new industry, nature-based tourism, pearling, aquaculture and commercial fishing operations are consistent with the management targets for coral reef communities and that monitoring conditions are applied as appropriate to ensure these outcomes are achieved (DoE/EPA, DoF, industry, WATC, CALM). **(H)**										
	4. Educate reserve users about the ecological importance of coral reef communities and the potential detrimental effects of indiscriminate reef walking, collecting, anchoring and boating on coral reef communities (CALM). **(H)**										
	5. Initiate research programs to characterise the floral and faunal diversity, and natural variability, of coral communities within the proposed reserve (CALM, DoF). **(M)**										
	6. Ensure industry is informed of relevant management objectives and targets for coral reef communities within the proposed reserve (CALM). **(M)**										
	7. Ensure all existing moorings meet a specified environmentally acceptable standard within 3 years, and that all new moorings meet the specified environmentally acceptable standard where these moorings are located in sensitive coral reef communities (DPI, CALM). **(M)**										
	8. Consider strategies for high anchorage areas, such as anchorage restriction areas or provide moorings in areas where other options are not possible (CALM, DPI). **(L)**										
Mangrove communities * (EV 7.1.5)	1. Implement spatial controls to provide for: • monitoring of representative mangrove communities in areas free of significant human influence (of sufficient size and replicated); and • an appropriate level of protection for key mangrove communities (CALM). **(H-KMS)**										
	2. Assess the nature, level and potential impacts of human activities on mangrove communities within the proposed reserves and implement an appropriate monitoring program (CALM). **(H-KMS)**										

VALUE	MANAGEMENT STRATEGIES	YEAR									
ECOLOGICAL		**1**	**2**	**3†**	**4**	**5**	**6†**	**7**	**8**	**9**	**10‡**
	3. Implement appropriate controls on access to mangrove communities, to provide an appropriate level of protection for mangrove communities (CALM). **(H-KMS)**										
	4. Initiate research programs to quantify the floral and faunal diversity, and natural variability of mangrove communities in the proposed reserves (CALM). **(H)**										
	5. Ensure that approvals and setting of conditions for all new industry and nature-based tourism operations are in accordance with the EPA Guidance Statement (DoE/EPA, industry, WATC, DoF, CALM). **(H)**										
	6. Ensure industry and nature-based tourism are informed of relevant management objectives and targets for mangrove communities (CALM). **(M)**										
	7. Educate reserve users about the detrimental impacts of human activities on mangrove communities in the proposed reserves (CALM). **(M)**										
Macroalgal and seagrass communities (EV 7.1.6)	1. Implement spatial controls to provide for: • monitoring of representative macroalgal and seagrass communities in areas free of significant human influence (of sufficient size and replicated); and • an appropriate level of protection (CALM). **(H-KMS)**										
	2. Assess the nature, level and potential impacts of human activities on macroalgal and seagrass communities within the proposed reserves and implement an appropriate monitoring program (CALM). **(H-KMS)**										
	3. Initiate research programs to quantify the floral and faunal diversity, and natural variability of macroalgal and seagrass communities in the proposed reserves (CALM, DoF). **(H)**										
	4. Ensure that approvals and the setting of conditions for new industry, nature-based tourism, commercial fishing, pearling and aquaculture operations are consistent with the management targets for macroalgal and seagrass communities and that monitoring conditions are applied as appropriate to ensure these outcomes are achieved (DoE/EPA, industry, WATC, DoF, CALM). **(H)**										
	5. Ensure industry is informed of relevant management objectives and targets for macroalgal and seagrass communities (CALM). **(M)**										
	6. Educate reserve users about the ecological importance of macroalgal and seagrass communities (CALM). **(M)**										
	7. Map seagrass communities in relation to their importance to the dugong population in the proposed reserves (CALM). **(M)**										

VALUE	MANAGEMENT STRATEGIES	YEAR									
ECOLOGICAL		**1**	**2**	**3†**	**4**	**5**	**6†**	**7**	**8**	**9**	**10‡**
Subtidal soft-bottom communities * (EV 7.1.7)	1. Implement spatial controls to provide for: • monitoring of representative subtidal soft-bottom communities in areas free of significant human influence (of sufficient size and replicated); and • an appropriate level of protection (CALM). **(H-KMS)**										
	2. Assess the nature, level and potential impacts of human activities on subtidal soft-bottom communities within the proposed reserves and implement an appropriate monitoring program (CALM). **(H-KMS)**										
	3. Identify the location of different types of subtidal soft-bottom communities within the proposed reserves (CALM). **(H)**										
	4. Initiate research programs to quantify the floral and faunal diversity, and natural variability (particularly of sponge-gardens) of subtidal soft-bottom communities in the proposed reserves (CALM). **(H)**										
	5. Ensure that approvals and the setting of conditions for new industry, commercial fishing, aquaculture and nature-based tourism operations are consistent with the management targets for subtidal soft-bottom communities and that where appropriate monitoring conditions are applied to ensure these outcomes are achieved (DoE/EPA, industry, DoF, WATC, CALM). **(H)**										
	6. Prevent damage to sponge communities through controls on anchoring and the installation of moorings where necessary (CALM, DPI, DPA). **(H)**										
	7. Liaise with the DPA in regard to integrating the management of important sponge communities occurring north of Eaglehawk Island (CALM, DPA). **(M)**										
	8. Educate reserve users about the detrimental impacts of human activities on subtidal soft-bottom communities (CALM). **(M)**										
Intertidal sand and mudflat communities (including samphire communities) * (EV 7.1.8)	1. Implement spatial controls to provide for: • monitoring of representative intertidal silt and mudflat communities in areas free of significant human influence (of sufficient size and replicated); • an appropriate level of protection; and • protection of algal mats (CALM). **(H-KMS)**										
	2. Assess the nature, level and potential impacts of human activities on intertidal sand and mudflat communities within the proposed reserves and implement an appropriate monitoring program (CALM). **(H-KMS)**										
	3. Initiate research programs to characterise the floral and faunal diversity, and natural variability, of intertidal sand and mudflat communities in the proposed reserves (CALM) **(H)**										
	4. Maintain current hydrological regimes to protect intertidal sand and mudflat communities in the proposed reserves (CALM, industry). **(H)**										

VALUE	MANAGEMENT STRATEGIES	YEAR									
ECOLOGICAL		**1**	**2**	**3†**	**4**	**5**	**6†**	**7**	**8**	**9**	**10‡**
	5. Ensure that approvals and the setting of conditions for new industry, nature-based tourism and aquaculture operations are consistent with the management targets for intertidal sand and mudflat communities and that, where appropriate, monitoring conditions are applied to ensure these outcomes are achieved (DoE/EPA, industry, WATC, DoF, CALM). **(H)**										
	6. Manage vehicular traffic on specified areas of intertidal sand and mudflat communities to minimise disturbance (CALM). **(H)**										
	7. Ensure industry is informed of relevant targets and management objectives for this value (CALM). **(M)**										
	8. Identify the importance of ecological productivity of intertidal sand and mudflat communities (CALM). **(M)**										
	9. Educate reserve users about the detrimental impacts of human use on intertidal sand and mudflat communities (CALM). **(L)**										
Rocky shore communities (including intertidal reef platforms) (EV 7.1.9)	1. Implement spatial controls to provide for: • monitoring of representative rocky shore communities in areas free of significant human influence (of sufficient size and replicated); and • an appropriate level of protection (CALM). **(H-KMS)**										
	2. Assess the nature, level and potential impacts of human activities on rocky shore communities within the proposed reserves and implement an appropriate monitoring program (CALM). **(H-KMS)**										
	3. Ensure that approvals and the setting of conditions for new industry and nature-based tourism operations are consistent with the management targets for rocky shore communities and that appropriate monitoring conditions are applied to ensure these outcomes are achieved (DoE/EPA, industry, WATC, DoF, CALM). **(H)**										
	4. Ensure industry is informed of relevant targets and management objectives for rocky shore communities (CALM). **(M)**										
	5. Initiate research programs to characterise the flora and fauna diversity and natural variability, of rocky shore communities within the proposed reserves (CALM). **(M)**										
	6. Educate reserve users about the detrimental impacts of human activities on rocky shore communities in the proposed reserves (CALM). **(M)**										
	7. Identify areas of rocky shore suitable for specific uses (e.g. industry, recreation) to assist with separation of incompatible uses (CALM). **(L)**										

VALUE	MANAGEMENT STRATEGIES	YEAR									
ECOLOGICAL		**1**	**2**	**3†**	**4**	**5**	**6†**	**7**	**8**	**9**	**10‡**
Turtles * (EV 7.1.10)	1. Educate reserve users on the possible detrimental impacts of human activities on turtles in the proposed reserves (CALM). **(H-KMS)**										
	2. Implement a seasonal speed restriction on boating activity within the Rosemary Island area, in consultation with DPI and the community, to protect significant turtle nesting and aggregation sites (DPI, CALM). **(H-KMS)**										
	3. Ensure that licence conditions for nature-based tourism, industry, commercial fishing and aquaculture and pearling operations contain conditions to minimise the impacts of lights and flares on turtle hatchlings, where appropriate (DoE/EPA, DoF, WATC, industry, CALM). **(H)**										
	4. Monitor turtle nesting activities to determine the relative importance of nesting beaches and to assess long-term changes in abundance and usage of sites (CALM). **(H)**										
	5. Determine the impacts of lights on hatchling survival due to disorientation and increase predation (CALM, industry). **(M)**										
	6. Identify turtle feeding and aggregation areas within the proposed reserve and where required, implement boating restrictions (in consultation with DPI and the community) to protect significant turtle nesting and aggregation sites (CALM). **(M)**										
	7. Ensure that mating aggregations and nesting activities of turtles are not significantly disturbed by recreational boating, nature-based tourism, pearling, aquaculture, commercial fishing and industry operations (CALM, industry, EPA). **(M)**										
	8. Ensure relevant industry activities are undertaken at times and in locations that do not significantly conflict with turtle breeding and nesting through the proposed reserves (CALM, industry). **(M)**										
	9. Maintain a database of turtle mortality and incidents (e.g. entanglement, boat strikes) in the proposed reserves (CALM, WAM, DoF). **(M)**										
	10. Work with local aboriginal communities to monitor take of turtles and eggs in the proposed reserves (CALM). **(M)**										
	11. Facilitate research applicable to the management of turtles in the proposed reserves (CALM). **(L)**										
Marine mammals (EV 7.1.11)	1. Undertake research to ascertain the regional importance of the Dampier Archipelago/Cape Preston area for dugongs and the relative importance of areas within the proposed reserves (CALM). **(H-KMS)**										
	2. Determine the size of the dugong population and a level of sustainable take of dugong (CALM). **(H-KMS)**										
	3. In conjunction with local indigenous communities monitor the take of dugong (CALM). **(H-KMS)**										

VALUE	MANAGEMENT STRATEGIES	YEAR									
ECOLOGICAL		**1**	**2**	**3†**	**4**	**5**	**6†**	**7**	**8**	**9**	**10‡**
	4. Ensure that industry activities are undertaken at times and locations that do not significantly impact on cetacean migration and that developments do not have significant impacts on dugongs, resident cetaceans and migratory cetaceans through the provision of advice to the DoE/EPA (CALM, DoE, industry). **(M)**										
	5. Educate reserve users on the possible detrimental impacts of human activities on dugongs, resident cetaceans and migratory cetaceans (CALM). **(M)**										
	6. Maintain records of the mortality of dugong and resident cetaceans in the proposed reserves (CALM). **(M)**										
	7. Undertake research to ascertain the regional importance of the Dampier Archipelago/Cape Preston area for migratory cetaceans and the relative importance of areas within the proposed reserves (CALM). **(L)**										
Seabirds (EV 7.1.12)	1. Implement spatial and temporal controls to provide for: • protection of significant sites for seabirds (breeding, feeding, roosting); and • protection of large seabird aggregations (CALM). **(H-KMS)**										
	2. Encourage the completion and implementation of Departmental management plans for the island reserves adjacent to the proposed reserves (CALM). **(H)**										
	3. Identify significant breeding, feeding and roosting sites for seabirds in the proposed reserves (CALM). **(M)**										
	4. Ensure that important seabird breeding, feeding and roosting areas are not significantly affected by human activities (CALM, industry). **(M)**										
	5. Educate reserve users on the ecological significance of the proposed reserves' seabird populations and the potential detrimental impacts of human disturbance (CALM). **(M)**										
	6. Monitor populations of seabirds, both migratory and non-migratory (CALM). **(L)**										
Finfish * (EV 7.1.13)	1. Implement spatial controls to provide for: • protection of important fish spawning and aggregation sites and nursery areas in the proposed reserves; • protection against localised depletion or extinction of fish species; • an appropriate level of protection; and • monitoring of fish populations in areas free of significant human influence (of sufficient size and representative) (CALM, DoF). **(H-KMS)**										
	2. DoF to revise recreational fishing management arrangements (e.g. bag and size limits) for targeted finfish species within the proposed marine park to ensure targeted finfish stocks are maintained at appropriate levels in the Archipelago (DoF). **(H-KMS)**										
	3. Identify finfish species that will be protected from recreational and commercial fishing in the proposed reserves, and in liaison with the DoF, provide the necessary legislative protection to achieve this (DoF, CALM). **(M)**										

VALUE	MANAGEMENT STRATEGIES	YEAR									
ECOLOGICAL		**1**	**2**	**3†**	**4**	**5**	**6†**	**7**	**8**	**9**	**10‡**
	4. Educate reserve users about the detrimental impacts of human activities on finfish stocks in the proposed reserves (CALM). **(M)**										
	5. Facilitate research to characterise finfish diversity and abundance in the proposed reserves (DoF, CALM). **(M)**										
	6. Quantify the level and significance of catch of target species and by-catch for both recreational and commercial fishing activities in the proposed reserves and if necessary, and in accordance with DoF By-catch Action Plans, implement measures to reduce and manage the catch and by-catch of finfish species in the proposed reserves (DoF, CALM). **(M)**										
Invertebrates * (EV 7.1.14)	1. Implement spatial controls to provide for: • monitoring of invertebrates in areas free of significant human influence (of sufficient size and replicated); • protection of important invertebrate spawning and aggregation sites; • prevent localised depletion or extinction of invertebrate species; and • an appropriate level of protection (CALM). **(H-KMS)**										
	2. DoF to revise recreational fishing management arrangements (e.g. bag and size limits) for targeted invertebrate species within the proposed marine park to ensure targeted invertebrate stocks are maintained at appropriate levels in the Archipelago (DoF). **(H-KMS)**										
	3. Identify invertebrate species that will be protected from recreational and commercial fishing in the proposed reserves, and in liaison with DoF, provide the necessary legislation to achieve this (DoF, CALM). **(M)**										
	4. Quantify the level and significance of catch of target species and by-catch for both recreational and commercial fishing activities in the reserves, and if necessary, and in accordance with DoF By-Catch Action Plans, implement measures to manage the catch and by-catch of invertebrate species in the proposed reserves (DoF, CALM). **(M)**										
	5. Educate reserve users about the detrimental impacts of human activities on invertebrates in the proposed reserves (CALM). **(M)**										
	6. Facilitate research to characterise invertebrate diversity and abundance in the proposed reserves (CALM). **(M)**										

VALUE	MANAGEMENT STRATEGIES	YEAR									
Social		**1**	**2**	**3†**	**4**	**5**	**6†**	**7**	**8**	**9**	**10‡**
Aboriginal heritage (SV 7.2.1)	1. Implement spatial controls to provide for the protection of, and appropriate access to, Aboriginal heritage sites (CALM). **(H-KMS)**										
	2. Ensure there is appropriate Aboriginal representation on the Management Advisory Committee (CALM). **(H-KMS)**										
	3. Develop mechanisms, in collaboration with local Aboriginal groups and relevant authorities, which ensure Aboriginal people have meaningful involvement in the management of the proposed reserve (CALM, DIA, local Aboriginal groups). **(H)**										
	4. Investigate opportunities for integrated joint management arrangements through a "Park Council" or similar body for all lands and waters within the Dampier Archipelago and Cape Preston area for which CALM has a management responsibility (CALM). **(H)**										
	5. Develop, in collaboration with the local Aboriginal community, a greater understanding of the significance of the area to Aboriginal people (CALM, PNTS, local Aboriginal groups). **(H)**										
	6. Distribute educational material to promote understanding, appreciation and enjoyment of cultural values of the area to schools and to visitors of the proposed reserve (CALM, WAM, WATC, DIA). **(M)**										
Maritime heritage (SV 7.2.2)	1. Distribute educational material regarding conservation of the maritime history of the area to visitors of the proposed reserves (WAMM, CALM). **(M)**										
	2. Advise reserve users of the relevant regulations under the *Heritage of Western Australia Act 1990*, the *Marine Archaeology Act 1973* and the Commonwealth *Historic Shipwrecks Act 1976*, where appropriate (WAMM, CALM). **(M)**										
	3. Identify new sites of historic importance within the proposed reserves (CALM). **(L)**										
Nature-based tourism (SV 7.2.3)	1. Implement spatial controls to provide for: • monitoring and assessment of key ecological processes and the level of impact of nature-based tourism activities within the proposed reserves (representative and of sufficient size); • equitable access for nature-based tourism to appropriate zones within the reserves; • protection of nature-based tourism opportunities; and • protection against possible impacts of nature-based tourism on the ecological values (CALM). **(H-KMS)**										
	2. License all commercial nature-based tourism operators within the proposed reserves with appropriate conditions (CALM). **(H-KMS)**										
	3. Develop Codes of Practice for nature-based tourism operations in the proposed reserves including: • performance measures; • desired trends; • short-term and long-term management targets; and • monitoring and reporting requirements (WATC, CALM). **(H)**										

VALUE	MANAGEMENT STRATEGIES	YEAR									
Social		**1**	**2**	**3†**	**4**	**5**	**6†**	**7**	**8**	**9**	**10‡**
	4. Raise awareness of nature-based tourism operators regarding the possible detrimental impacts of nature-based tourism on the ecological values through education and participation in management (CALM). **(L)**										
Commercial fishing (SV 7.2.4)	1. Implement spatial controls to provide for: • monitoring and assessment of key ecological processes and the level of impact of commercial fishing in the proposed reserves (representative and of sufficient size); • equitable access to appropriate zones within the proposed reserves for commercial fishing; • protection of nursery habitats (e.g. mangroves) and spawning sites for commercially targeted species; • opportunities to contribute to the achievement of DoF objectives for the broader management of commercial fishing; • assistance in maintaining fish stocks in the area; and • protection against possible impacts of commercial fishing on the ecological values (CALM). **(H-KMS)**										
	2. DoF to phase out commercial aquarium/specimen collecting (fish, coral and shell) from the western portion of the proposed marine park within three years of creating the proposed reserves (DoF). **(H-KMS)**										
	3. DoF to prohibit commercial trawling operations within one nautical mile of the Nickol Bay coast. (DoF). **(H-KMS)**										
	4. Participate in DoF process regarding management of commercial fisheries, including review and amendment, if necessary, of management controls (CALM). **(H)**										
	5. Ensure commercial fisheries are aware of the spatial controls and any restrictions that may apply to their operations in the proposed reserves (DoF, CALM). **(H)**										
	6. Monitor commercial fishing catch/effort within the proposed reserves and report the results publicly (DoF). **(M)**										
	7. Ensure that, through the DoF and Commonwealth Department of Environment and Heritage processes, licensees meet Sustainable Development requirements and reporting (DoF, Department of Environment and Heritage, EPA, CALM). **(M)**										
	8. Liaise with the MPRA in regard to proposed new fisheries and major changes to existing fisheries (DoF). **(M)**										
	9. Ensure that the DoF licensing process takes into account MPRA/CALM audit requirements (DoF). **(M)**										

VALUE	MANAGEMENT STRATEGIES	YEAR									
Social		**1**	**2**	**3†**	**4**	**5**	**6†**	**7**	**8**	**9**	**10‡**
Aquaculture (SV 7.2.5)	1. Implement spatial controls to provide for: • monitoring and assessment of key ecological processes and the level of impact of aquaculture in the proposed reserves (representative and of sufficient size); • equitable access to appropriate zones within the proposed reserves for aquaculture; and • protection against possible impacts of aquaculture on the ecological values (CALM). **(H-KMS)**										
	2. Ensure that proposals for nature-based tourism and industry operations do not affect the key ecological requirements (e.g. high water quality) for existing aquaculture operations (CALM, EPA, ACWA, WATC). **(H)**										
	3. In collaboration with the Aquaculture Council of WA and DoF, assess the need for Codes of Practice and Environmental Management Systems (EMS) for aquaculture in the proposed reserves to ensure social and ecological sustainability (CALM, DoF, ACWA). **(H)**										
	4. Ensure operators provide an annual status report on the environmental impacts of aquaculture activity in the reserve in accordance with DoF's licence conditions and the MPRA's auditing requirements (ACWA, CALM). **(M)**										
	5. Provide formal advice to DoF and EPA (as appropriate) in relation to the environmental assessment of proposed aquaculture activity in the reserves (CALM). **(M)**										
	6. Ensure that the DoF licensing process takes MPRA/Departmental audit requirements into account (DoF). **(M)**										
	7. Ensure that licensees meet navigational requirements (DoF, DPI). **(L)**										
	8. Identify potential areas suitable for aquaculture within the proposed reserves (DoF, CALM). **(L)**										
Pearling (SV 7.2.6)	1. Implement spatial controls to provide for: • monitoring and assessment of key ecological processes and the level of impact of pearling in the proposed reserves (representative and of sufficient size); • equitable access for pearling to appropriate zones within the proposed reserves; and • protection against possible impacts of pearling on the ecological values (CALM). **(H-KMS)**										
	2. In collaboration with the Pearl Producers Association (PPA) and DoF, develop environmental Codes of Practice for pearling in the proposed reserves to ensure social and ecological sustainability (DoF, PPA, CALM). **(H)**										
	3. Ensure that proposals for nature-based tourism and industry operations do not affect the key ecological requirements for pearling operations (e.g. high water quality) (CALM, EPA, DoF, ACWA, PPA, WATC). **(H)**										
	4. Ensure that, through DoF and Commonwealth Department of Environment and Heritage processes, licensees meet Sustainable Development requirements and reporting (DoF, Department of Environment and Heritage, EPA, CALM).										

VALUE	MANAGEMENT STRATEGIES	YEAR									
Social		**1**	**2**	**3†**	**4**	**5**	**6†**	**7**	**8**	**9**	**10‡**
	5. Ensure operators provide an annual status report on the environmental impacts of pearling activities in the proposed reserves in accordance with DoF's licence conditions and the MPRA's auditing requirements (PPA, CALM). **(M)**										
	6. Provide formal advice to DoF and EPA (as appropriate) in relation to environmental assessment of proposed pearling activity in the proposed reserves (CALM). **(M)**										
	7. Ensure that the DoF licensing process takes MPRA/CALM audit requirements into account (DoF, CALM). **(M)**										
	8. Ensure through DPI processes that licensees meet navigational requirements (DPI). **(M)**										
Ports and shipping (SV 7.2.7)	1. Implement spatial controls to provide for • monitoring and assessment of key ecological processes and the level of impact of port activities and shipping (representative and of sufficient size); • protection against possible impacts of port activities and shipping on the ecological values; and • equitable access to appropriate zones within the proposed reserves for ports and shipping (CALM). **(H-KMS)**										
	2. Ensure an integrated approach to port and reserve management (including assessment and reporting requirements) through the establishment of a liaison committee for the Dampier Port and for any future ports (DPA, EPA, CALM). **(H)**										
	3. Ensure that ports prepare and implement appropriate Environment Management Systems (EMS) to protect the values of the adjacent reserves. **(H)**										
	4. Provide formal advice to the EPA and DoIR in relation to the environmental assessment of proposed ports and shipping channels in, and adjacent to, the proposed reserves (CALM). **(M)**										
Industry (SV 7.2.8)	1. Implement spatial controls to provide for: • monitoring and assessment of key ecological processes and the level of impact of industry in the proposed reserves (representative and of sufficient size); • protection against possible impacts of industry on the ecological values; and • equitable access to appropriate zones within the proposed reserves for industry (CALM). **(H-KMS)**										
	2. Ensure that a recognised Environment Management System (EMS) is prepared and implemented for industry projects to protect the values of the proposed reserves (EPA, DoIR, CALM). **(H)**										
	3. Provide formal advice to the EPA and DoIR in relation to the environmental assessment of proposed industry in, and adjacent to, the proposed reserves (CALM). **(M)**										
	4. Ensure a coordinated approach to industry assessment and reporting requirements in the proposed reserves (EPA, DoIR, CALM). **(M)**										

VALUE	MANAGEMENT STRATEGIES	YEAR									
Social		**1**	**2**	**3†**	**4**	**5**	**6†**	**7**	**8**	**9**	**10‡**
Recreational activities (SV 7.2.9)	1. Implement spatial controls to provide for: • monitoring and assessment of key ecological processes and the level of impact of recreational activities (representative and of sufficient size); • provide protection to key recreation sites; • equitable access to the proposed reserves for recreational users; and • protection against possible impacts of recreational activities on the ecological values (CALM). **(H-KMS)**										
	2. Educate reserve users about the impacts of recreational activities on the ecological values of the proposed reserves (CALM). **(H)**										
	3. In collaboration with user groups, develop Codes of Practice to minimise environmental impacts of recreational activities, as appropriate (CALM). **(M)**										
	4. Determine the nature, spatial patterns, compatibility and potential environmental impacts of all existing recreational activities in the reserves (CALM). **(M)**										
	5. If necessary, separate incompatible recreational uses within the proposed reserves (CALM). **(M)**										
	6. Liaise with the DPI to designate speed restrictions where necessary for wildlife protection and/or for safety requirements (CALM, DPI). **(M)**										
	7. Establish interpretative dive trails in suitable areas within the proposed reserves (CALM). **(L)**										
Recreational fishing (SV 7.2.10)	1. Implement spatial controls to provide for: • monitoring and assessment of key ecological processes and the level of impact of recreational fishing in the proposed reserves (representative and of sufficient size); • equitable access to appropriate zones within the proposed reserves for recreational fishing; • protection of nursery habitats (e.g. mangroves) and spawning sites for key recreational fishing species; • opportunities to contribute to the achievement of DoF' objectives for the broader management of recreational fishing; • assistance in maintaining fish stocks in the area; and • protection against possible impacts of recreational fishing on the ecological values (CALM). **(H-KMS)**										
	2. DoF to revise recreational fishing management arrangements (e.g. bag and size limits) for targeted species within the proposed marine park to ensure stocks of targeted species are maintained at appropriate levels in the Archipelago (DoF). **(H-KMS)**										
	3. DoF to review management controls (e.g. bag, size and possession limits) on recreational fishing in the proposed reserves and amend these if they are inappropriate (DoF). **(H-KMS)**										
	4. Ensure recreational fishers are aware of the spatial controls and of restrictions that may apply to their activities in the proposed reserves (DoF, CALM). **(H)**										

VALUE	MANAGEMENT STRATEGIES	YEAR									
Social		**1**	**2**	**3†**	**4**	**5**	**6†**	**7**	**8**	**9**	**10‡**
	5. Formulate performance measures and targets for key recreational species that will maintain the quality of recreational fishing in the proposed reserves (DoF). **(M)**										
	6. Evaluate the sustainability of recreational fisheries in the proposed reserves (DoF, CALM). **(M)**										
	7. Monitor recreational fishing catch/effort within the proposed reserves (DoF). **(M)**										
	8. Encourage compliance to recreational fishing restrictions through enforcement activities (e.g. checks at boat ramps) (DoF). **(H)**										
	9. Educate reserve users on the cumulative impacts of recreational fishing on fish stocks (DoF, CALM). **(M)**										
Seascapes (SV 7.2.11)	1. Identify and determine the key characteristics and spatial extent of the major seascapes of the proposed reserves (CALM, local government authorities). **(H)**										
	2. Provide formal advice to the WATC, EPA and local government authorities in relation to ensuring development proposals outside the reserves do not unnecessarily impact on the seascapes of the proposed reserves (CALM, MPRA). **(M)**										
	3. Ensure potential developers are informed of relevant management objectives and targets of the proposed reserves in relation to seascape values (CALM, local government authorities). **(M)**										
Scientific research (SV 7.2.12)	1. Implement spatial controls to provide for: • monitoring and assessment of key ecological processes and level of human impact (areas that are representative and of sufficient size); and • equitable access to the proposed reserves for scientific research (CALM). **(H-KMS)**										
	2. Assess the nature, level and potential impacts of ecological and social research within the proposed reserves and implement an appropriate monitoring program (CALM). **(H)**										
	3. Implement a policy of non-destructive sampling in sanctuary and special purpose zones, where possible (CALM). **(M)**										
	4. Ensure proponents of research and monitoring programs in the proposed reserves obtain and comply with appropriate CALM permits (CALM). **(H)**										
	5. Ensure the proposed reserves values for scientific research is not diminished as a result of human activities in the proposed reserves (CALM). **(M)**										

VALUE	MANAGEMENT STRATEGIES	YEAR									
Social		**1**	**2**	**3†**	**4**	**5**	**6†**	**7**	**8**	**9**	**10‡**
Education (SV 7.2.13)	1. Implement spatial controls to provide for equitable access to the proposed reserves for education (CALM). **(H-KMS)**										
	2. Ensure the proposed reserves values for education are not diminished as a result of human activities within the proposed reserves (CALM). **(M)**										

VALUE	MANAGEMENT STRATEGIES	YEAR									
Generic		**1**	**2**	**3†**	**4**	**5**	**6†**	**7**	**8**	**9**	**10‡**
Administration	1. Gazette appropriate notices under the CALM Act and FRM Act to implement the zoning scheme of the proposed reserves (CALM, DoF). **(H - KMS)**										
	2. Implement appropriate signage indicating zone boundaries and inform users about the types of zones, reasons for and restrictions on activities in the proposed reserves (CALM, DoF). **(H - KMS)**										
	3. MPRA and CCWA to develop an appropriate vesting basis for the management arrangements of the intertidal areas of the reserves (MPRA, CCWA, CALM). **(H-KMS)**										
	4. In liaison with stakeholders, develop quantitative targets for geomorphology, water quality, sediment quality and marine habitats in commercial (aquaculture) areas and unzoned areas of the marine management area (CALM). **(H-KMS)**										
	5. Facilitate research on the effectiveness of zoning as an aid to achieving the objectives of the proposed reserves (CALM). **(H)**										
Education and interpretation	1. Develop and implement, in collaboration with DoF and other relevant agencies, education and interpretation programs to ensure users of the reserves are aware of and understand the values of the reserves, management zones and regulations and the reasons for these controls (CALM, DoF). **(H - KMS)**										
	2. Develop and distribute to the local community and visitors appropriate education materials about the reserves' values and management (CALM, DoF). **(H)**										
	3. Provide talks and briefings about the reserves' values, uses and management to local and visiting groups (CALM). **(M)**										

VALUE	MANAGEMENT STRATEGIES	YEAR									
Generic		**1**	**2**	**3†**	**4**	**5**	**6†**	**7**	**8**	**9**	**10‡**
	4. Provide support, where possible, to local schools, institutions and organisations using the proposed reserves for educational purposes (CALM). **(M)**										
Surveillance and enforcement	1. Develop and implement a surveillance and enforcement program, in collaboration with DoF, to ensure an adequate level of compliance with zoning restrictions (CALM, DoF). **(H-KMS)**										
	2. Facilitate cross authorisation of Government enforcement officers as appropriate (CALM, DoF, DPI). **(H - KMS)**										
	3. Develop and implement procedures to ensure coordination between Government agencies to maximise efficiency and effectiveness of surveillance and enforcement activities (CALM, DoF, DPI). **(H - KMS)**										
	4. Facilitate the hydrocarbon, pearling, aquaculture and charter industries, as well as visitors to the reserves, to take an active role in a voluntary surveillance and enforcement program (CALM). **(H)**										
	5. Appoint honorary enforcement officers as appropriate (CALM, DoF, DPI). **(M)**										
Research	1. Develop and progressively implement a coordinated and prioritised research program of key values and processes of the proposed reserves (CALM, DoF). **(H - KMS)**										
	2. Develop and maintain a database of human usage in the proposed reserves (CALM, DoF). **(H - KMS)**										
	3. Develop and maintain detailed habitat maps and wildlife distribution maps for the proposed reserves (CALM). **(H-KMS)**										
	4. Identify, prioritise and communicate high priority ecological and social research projects relevant to the management of the proposed reserves to appropriate research organisations via a strategic research plan with the aim of maximising priority research outcomes for the proposed reserves (CALM). **(H - KMS)**										
	5. Develop and maintain a database of historical and current research in the proposed reserves (CALM). **(H)**										
	6. Facilitate ecological and social research in the proposed reserves conducted by research, academic and educational institutions by providing financial and logistical assistance (where possible) (CALM, DoF). **(H)**										
Monitoring	1. Develop and progressively implement a coordinated and prioritised monitoring program of key values and processes of the proposed reserves (CALM, DoF). **(H - KMS)**										
	2. Ensure that proponents of development proposals or activities with the potential to impact on the reserves' values conduct appropriate compliance monitoring programs (CALM). **(H)**										

VALUE	MANAGEMENT STRATEGIES	YEAR									
Generic		**1**	**2**	**3†**	**4**	**5**	**6†**	**7**	**8**	**9**	**10‡**
Public participation	1. Establish and maintain a MAC (CALM). **(H - KMS)**										
	2. Encourage community involvement in education and interpretation programs (CALM). **(M)**										
	3. Encourage community involvement in monitoring programs (CALM). **(M)**										
Direct management intervention	1. Identify areas of existing human impact in the proposed reserves (CALM). **(M)**										
	2. Assess rehabilitation options and where appropriate implement these (CALM). **(M)**										
	3. Monitor human usage (visitor numbers and high use areas) of the proposed reserves and consistent with available resources provide visitor facilities where appropriate (CALM). **(M)**										
	4. Perform regular assessments of visitor risk in the proposed reserves and, where necessary, implement appropriate measures to minimise visitor risk (CALM). **(M)**										
	5. Implement a program of routine inspection, maintenance and reporting on infrastructure condition (e.g. zone markers and signage) in the proposed reserves (CALM). **(M)**										
Development proposals	1. Ensure appropriate advice is provided to relevant authorities with regard to proposed marine infrastructure and the defined ecological targets for the proposed reserves (CALM, DoE, MPRA). **(H)**										
	2. Identify areas in which moorings are acceptable and/or necessary from environmental, safety and equity perspectives (CALM, DoE, DPI). **(M)**										
	3. Assess mooring applications on a case-by-case basis and in relation to mooring criteria established in the mooring policy (CALM, DoE, MPRA). **(M)**										

Key:

Shading indicates agreed timeline for implementation of management strategy.

† MPRA audit
‡ MPRA audit and management plan review
* Key Performance Indicator
EV Ecological value reference in management plan
SV Social value reference in management plan

(H-KMS) High priority key management strategy
(H) High priority
(M) Medium priority
(L) Low priority

2003534-0105-1000