# Proposed Eighty Mile Beach Marine Park

indicative management plan

2011

Department of
Environment and Conservation

MPRA
MARINE PARKS & RESERVES AUTHORITY

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**Marine Parks and Reserves Authority**

# Public submissions on the indicative management plan

This indicative management plan was released by the Minister for Environment to provide an opportunity for the community to comment on the proposal.

You are now invited to provide feedback on the indicative management plan and have your say on how the proposed marine park should be managed over the next 10 years. You can provide feedback by:

- completing the online 'Have your say' submission form available from the DEC website at www.dec.wa.gov.au/eightymilebeach or
- downloading the 'Have your say' submission form from the DEC website, and then emailing your completed submission to eightymilebeach@dec.wa.gov.au or
- writing a letter and sending it to:

  eightymilebeach@dec.wa.gov.au

  or

  Plan Coordinator – Eighty Mile Beach
  Marine Policy and Planning Branch
  Department of Environment and Conservation
  Locked Bag 104
  Bentley Delivery Centre Western Australia 6983

**The public submission period is open until Friday 20 January 2012.**

To ensure your submission is as effective as possible:

- be clear and concise
- refer to the page numbers or specific sections in the plan
- say whether you a agree or disagree with any or all of the objectives, strategies and zones (be specific)
- clearly state your reasons, particularly if you disagree
- give sources of information (where possible)
- indicate which strategies that you agree with
- suggest alternatives for those aspects of the plan with which you disagree.

All submissions will be read and considered on their own merit. The indicative management plan will be reviewed in light of the submissions according to the criteria outlined below. A summary of the submissions will be published along with the final management plan.

The indicative management plan ***may*** be amended if a submission:

a) provides additional resource information of direct relevance to the 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

e) indicates omissions, inaccuracies or a lack of clarity.

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 among several widely divergent viewpoints received on the topic and the strategy of the plan is still considered the best option

f) contributes options which are not possible (generally due to some aspect of existing legislation or government policy).

# Executive summary

On 17 June 2011, the State Government released the Kimberley Science and Conservation Strategy. The centrepiece of the Strategy is the Kimberley Wilderness Parks initiative which will become Western Australia's largest interconnected system of marine and terrestrial reserves covering more than 3.5 million hectares. A key component of this initiative is the commitment to establish four marine parks at Camden Sound, North Kimberley, Roebuck Bay and Eighty Mile Beach.

The proposed Eighty Mile Beach Marine Park will make a significant contribution to Western Australia's representative system of multiple-use marine parks and reserves. This indicative management plan outlines the management arrangements for the proposed Eighty Mile Beach Marine Park, which will conserve the area's marine biodiversity and provide a range of opportunities for commercial and recreational use, including nature-based tourism.

The indicative management plan for the proposed marine park also provides for the protection and conservation of the value of the area to Aboriginal culture and heritage and includes a commitment to jointly manage the proposed park with traditional owners. Native title has been determined for much of the lands and waters adjacent to the proposed Eighty Mile Beach Marine Park for the Karajarri, Nyangumarta and Ngarla people. Strong working relationships and joint management arrangements will need to be developed over time with the traditional owners.

Eighty Mile Beach is an extensive stretch of remote and remarkable coastal country located between Port Hedland and Broome, and stretching approximately 220 kilometres in length from Cape Missiessy to Cape Keraudren. The proposed Eighty Mile Beach Marine Park includes Eighty Mile Beach, Cape Keraudren and the diverse marine environments west of Cape Keraudren to Mulla Mulla Down Creek.

A key ecological feature of the proposed marine park are the vast intertidal sand and mudflats that extend up to four kilometres wide in many parts of Eighty Mile Beach at low tide and provide a rich source of food for many species. The presence of flatback turtles and the international importance of Eighty Mile Beach for waterbirds, including migratory and other shorebirds, are also key features.

Flatback turtles are endemic to northern Australia. The waters of the proposed park are important to support foraging flatback turtles, and nesting occurs on Eighty Mile Beach in November-December. Eighty Mile Beach is also regarded as one of the most significant areas in Australia for migratory shorebirds within the East Asian-Australasian flyway and is listed as a wetland of significance under the Ramsar Convention. Birds in the flyway migrate from breeding grounds in north-east Asia and Alaska to Australia and New Zealand. Ninety-seven different species of shorebirds have been recorded, including 42 species listed under international conventions for the protection of migratory species. Many of these feed almost exclusively in the vast intertidal flats of the proposed marine park. The plan proposes management actions focusing on key biodiversity values, including marine turtles, shorebirds, and intertidal sand and mudflat communities.

The key socio-economic values of the proposed marine park include nature-based recreation and tourism, as well as recreational and commercial fishing, which occur within the distinctive seascapes of the proposed park and in the adjoining landscape. There are several nodes of particular importance for visitors to access and enjoy the area, including at the Eighty Mile Beach Caravan Park, Cape Keraudren Coastal Reserve and Pardoo Station. These and adjoining areas are likely to provide key focus points for park visitors, including nature-based and Aboriginal culture-based tourism.

The indicative management plan further outlines the key ecological and socio-economic values of the proposed park, the seven management programs to be applied, and the management objectives, targets and performance measures that will be used to track progress against the stated objectives over the life of the management plan. It is thus an outcome-based approach that provides a robust framework to support adaptive park management.

The key outcomes proposed in this indicative management plan are outlined below:

- The gazettal of a Class A marine park over coastal waters of Eighty Mile Beach, from Mulla Mulla Down Creek to Cape Missiessy at the northern end of Eighty Mile Beach, out to the limit of Western Australia coastal waters.
- The establishment of a zoning scheme and associated management arrangements using a multiple-use approach to meet a range of community aspirations for biodiversity conservation, recreation and commercial uses, nature appreciation, scientific study and public enjoyment.
- The area of the proposed new marine park is approximately 208,792 hectares (ha), comprising approximately 53,219ha (25%) of sanctuary zone, 1,389ha (1%) of special purpose zone, 3,891ha (2%) of recreation zone, and 150,293ha (72%) of general use zone.
- The sanctuary zones and special purpose (mangrove protection) zone provide higher levels of conservation focus for representative examples of a range of marine biodiversity found in the park. This includes representation of an important area of shorebird habitat and use such as the food-rich intertidal flats in the proposed Anna Plains Sanctuary Zone, which also have significant flatback turtle use and nesting; a diverse mix of habitats (and associated marine wildlife) including coral reef, filter feeding communities, seagrass and macroalgae in the proposed Cape Keraudren Sanctuary Zone; a diverse mix of habitats (and associated marine wildlife) including seagrass, mangrove, salt marsh and other habitats in the proposed Pardoo Sanctuary Zone; and a distinct mangrove–salt marsh system at the western end of the proposed marine park in the proposed Mulla Mulla Special Purpose (Mangrove Protection) Zone.
- A collaborative management approach between government agencies, particularly between the Department of Environment and Conservation (DEC) and the Department of Fisheries (DoF).
- The establishment of management programs to focus implementation and help achieve the objectives for the proposed marine park, including education, public participation, patrol and enforcement, intervention and visitor infrastructure, research, and monitoring; along with prioritised strategies and actions.
- Acknowledgement of Aboriginal native title rights and consideration for the development and registration of Indigenous Land Use Agreements (ILUAs) or other mechanisms where appropriate to allow for joint management with traditional owners.

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# Part A

## 1. Introduction

### 1.1 Marine parks and reserves: special marine places

The State Government is progressively establishing a representative system of multiple-use marine parks and reserves in Western Australia. These help to conserve marine biodiversity and provide special places for people to enjoy, appreciate and learn about the spectacular marine life of Western Australia.

Under the *Conservation and Land Management Act 1984* (CALM Act), marine parks and reserves are vested in the Marine Parks and Reserves Authority (MPRA). The MPRA has a statutory function under the CALM Act to prepare marine parks and reserve management plans through the Department of Environment and Conservation (DEC) and to assess the implementation of management plans. The MPRA also provide independent advice to the Minister for Environment in relation to marine parks and reserves and may prepare policies to guide management.

### 1.2 Proposed Eighty Mile Beach Marine Park

On 17 June 2011, the State Government reiterated its commitment to the Kimberley Wilderness Parks initiative while releasing the Kimberley Science and Conservation Strategy. This will be the state's largest interconnected system of marine and terrestrial reserves covering more than 3.5 million hectares. A key component of this initiative is the commitment to establish four marine parks at Camden Sound, North Kimberley, Roebuck Bay and Eighty Mile Beach. The proposed Eighty Mile Beach Marine Park is intended to meet this government commitment, improve protection for marine and coastal biodiversity of the Eighty Mile Beach region and contribute to the State's representative system of multiple-use marine parks and reserves.

The indicative management plan for the proposed marine park also provides for the protection and conservation of the value of the area to Aboriginal culture and heritage and includes a commitment to jointly manage the proposed park with traditional owners.

DEC initiated an assessment of the ecological and socio-economic values of the Pilbara and lower west Kimberley marine bioregions in July 2007. An Interagency Working Group (IWG) was established with representatives from DEC, Department of Fisheries (DoF), then Department of Industry and Resources, then Department for Planning and Infrastructure, Western Australia Museum, the then Office of Native Title, Department of Indigenous Affairs (DIA) and Tourism Western Australia. The IWG worked together to achieve a whole-of-government approach to reserve planning and to provide strategic advice. A data-gathering and assessment phase was initiated that included mapping ecological and social values in the region.

The indicative management plan for the proposed Eighty Mile Beach Marine Park provides a description of the ecological and socio-economic values of the proposed marine park and its management objectives, strategies, performance measures and targets. The aim of the indicative management plan is to facilitate the conservation of the marine biodiversity of the proposed marine park to ensure that the existing and future pressures on the ecological values are managed within an ecologically sustainable framework, and to provide opportunities for social benefits and enjoyment, including recreational and commercial uses.

The management strategies identified in this indicative management plan are intended to be complemented by the management strategies identified in the management plan for the Eighty Mile Beach Ramsar Site (a Wetland of International Importance under the Convention on Wetlands [Ramsar Convention]). A draft of the Ramsar site management plan is currently in preparation. The Ramsar site includes all of the intertidal areas of Eighty Mile Beach plus the Mandora Saltmarsh wetlands located inland of Eighty Mile Beach.

## 1.3 Description of the proposed Eighty Mile Beach Marine Park

The proposed Eighty Mile Beach Marine Park is located off the north-west coast of Western Australia, between Port Hedland and Broome, approximately 1,700km north of Perth. It covers an area of approximately 209,000ha and extends for nearly 260km along the coast from its south-western end approximately 12km west of Pardoo Creek at longitude 119°28'18" east, past Cape Keraudren and along Eighty Mile Beach, to its north-eastern end at Cape Missiessy at latitude 19°02'36" south. The proposed marine park extends seaward from the high water mark[1] out to the limit of coastal waters of Western Australia. The marine park will comprise of the waters, the airspace above those waters, the seabed below those waters, and the subsoil to a depth of 200 metres below that seabed within the area defined above. Figure 1 outlines the location of the marine park and Figure 2 details the adjacent land tenure.

The intertidal area of the proposed marine park is subject to native title determination and the marine park will be reserved in compliance with the Commonwealth Native Title Act 1993. The landward boundary of the proposed marine park is also subject to clarification of adjacent tenure boundaries and will be aligned accordingly. A detailed description of the boundaries of the proposed Eighty Mile Beach Marine Park will be prepared prior to gazettal.

Intertidal areas are significant for many of the ecological values of the proposed marine park. For example, Eighty Mile Beach is recognised under the Ramsar Convention and supports a large number of migratory shorebirds that feed, roost and nest along the beach. In addition, many marine-related activities such as fishing, swimming, reef walking and wildlife viewing occur within the intertidal areas. Accordingly, intertidal areas and related management programs for those areas are included in this indicative management plan to ensure that these values are appropriately protected and managed.

Eighty Mile Beach Marine Park is proposed to be vested as Class A marine park, given the high ecological values as well as the fact that the primary socio-economic values are reliant on the maintenance of these ecological values (for example, nature-based tourism, commercial fishing and recreational fishing).

Appendix I provides further detail with regard to tenure in, and adjacent to, the proposed marine park and definitions of marine reserve types under the CALM Act.

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

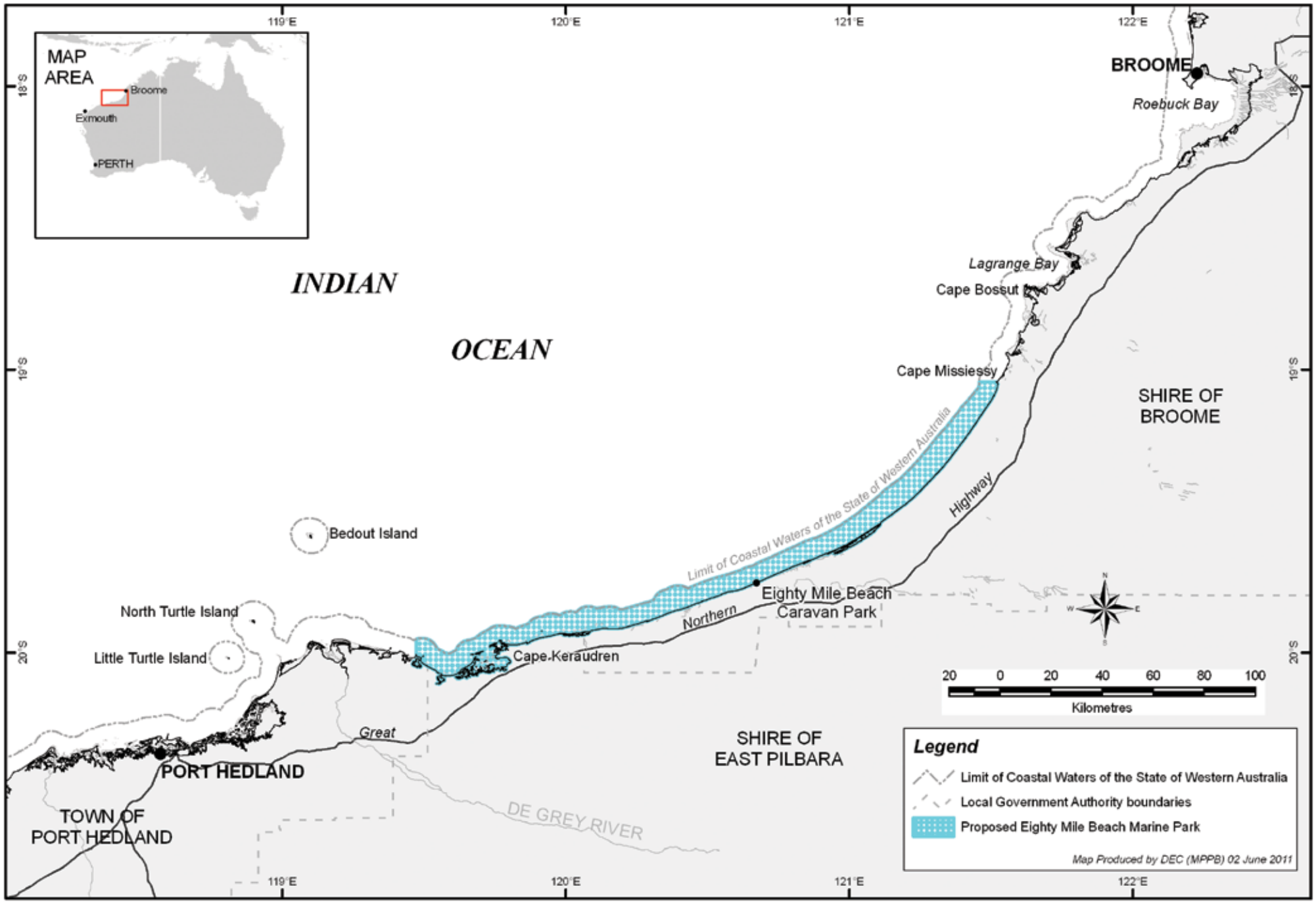


FIGURE 1: Locality of the proposed Eighty Mile Beach Marine Park

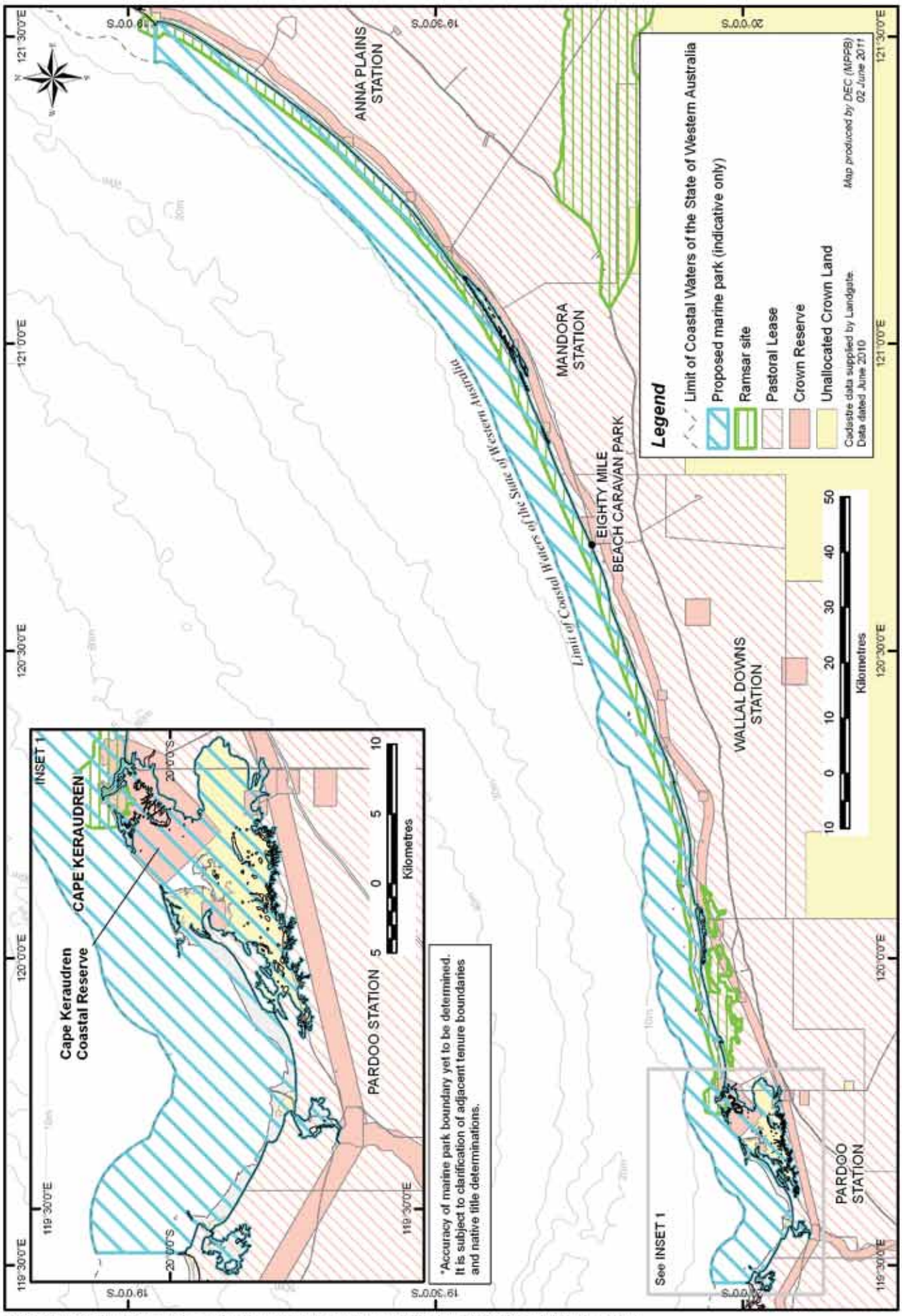


FIGURE 2: Tenure within and adjacent to the proposed Eighty Mile Beach Marine Park

# 2. Vision and strategic objectives

## 2.1 Vision

The vision statement provides a broad direction for management of the proposed Eighty Mile Beach Marine Park and represents the community's future aspirations for the proposed marine park.

**Vision for the proposed Eighty Mile Beach Marine Park**

A protected place for marine turtles, shorebirds and other marine biodiversity to breed and thrive, and to protect unique natural features for present and future generations of people to visit and enjoy.

## 2.2 Strategic objectives

A set of over-arching strategic objectives has been adopted for Western Australia's marine parks and reserves:

- *Conservation* – Maintain and enhance marine biodiversity and ecological integrity.
- *Aboriginal culture* – Provide for the protection and conservation of the value of the area to the culture and heritage of Aboriginal persons.
- *Science and education* – Encourage and promote scientific research and education.
- *Public participation* – Encourage and promote community involvement in, and support for, marine parks and reserves.
- *Recreation* – Provide equitable and sustainable opportunities for recreational use and enjoyment, where appropriate.
- *Commercial* – Provide equitable and sustainable opportunities for commercial use and benefits, where appropriate.

# 3. Bioregional setting and values

Eighty Mile Beach is one of the world's most important feeding grounds for migratory shorebirds and waders and is listed under the Ramsar Convention. It also supports a significant nesting population of flatback turtles that are endemic to northern Australia, and is rich in other marine life, including sawfish, dugongs, dolphins and millions of invertebrates that inhabit the sand and mud flats, seagrass meadows, coral reefs and mangroves.

This coastline has impressive panoramic vistas, and is popular for beach fishing, camping, four-wheel driving, beachcombing, wildlife viewing and enjoying remote seascapes. This multiple-use park will provide protection for a unique and spectacular part of the lower west Kimberley coastline, while providing for sustainable use and enjoyment of the area and the maintenance of Aboriginal culture and heritage.

Eighty Mile Beach itself is a 220km stretch of sandy beach and dune system that is broken up by a few small mudflat bays with mangrove communities. Seaward of the beach are extensive fine-sediment tidal mudflats that can span several kilometres toward the ocean. An abrupt change in the coastal geomorphology occurs in the south-west along Eighty Mile Beach and past Cape Keraudren to the western boundary. This area of the proposed marine park is characterised by rocky shores, with narrow sandy beaches, and small tidal creeks such as Pardoo Creek and Mulla Mulla Down Creek.

The guide to Integrated Marine and Coastal Regionalisation of Australia (IMCRA) developed by the state and federal governments, provides a biological regionalisation of all Australian marine waters (Department of Environment and Heritage, 2006). The proposed Eighty Mile Beach Marine Park contains all of the state waters of the Eighty Mile Beach meso-scale bioregion and overlaps with the north-east corner of the Pilbara Nearshore meso-scale bioregion in the south-west corner of the proposed marine park (Figure 3). Currently, Western Australia has 13 CALM Act marine reserves consisting of 10 marine parks, two marine management areas and one marine nature reserve across eight of the state's 19 marine bioregions. The establishment of the Eighty Mile Beach Marine Park, along with other proposed marine parks in the Kimberley region announced under the Kimberley Science and Conservation Strategy, will provide a significant contribution to the state's representative marine parks and reserves system.

A summary of the climate, oceanography, geology, ecology and social values of the proposed marine park is provided in Appendix II.

The ecological and socio-economic values of the proposed Eighty Mile Beach Marine Park are listed below. More detailed information for each value is provided in sections 5 and 6.

### Summary of ecological values

- ***Water and sediment quality:*** Water and sediment quality is high and is essential to the maintenance of healthy marine ecosystems.
- ***Geomorphology:*** Eighty Mile Beach is a unique and exceptional geomorphic feature, which contrasts with a distinctly different seabed and coastal topography in the south-west corner of the proposed marine park.
- ***Intertidal sand and mudflat communities:*** Intertidal sand and mudflat communities are primary producers with an abundance of invertebrate life, providing a valuable food source for waterbirds and other predators in the proposed marine park.
- ***Subtidal filter feeding communities (hard and soft substrate):*** A diverse range of subtidal filter feeding communities, including hard and soft substrate communities with a high diversity of invertebrate species.
- ***Macroalgal and seagrass communities:*** Macroalgal and seagrass communities, which are important primary producers and provide habitat and refuge areas for fish and invertebrates.
- ***Coral reef communities (intertidal and subtidal):*** Intertidal and subtidal reef systems with a high diversity of hard corals.
- ***Mangrove communities and saltmarshes:*** Mangrove communities and adjacent saltmarshes, provide nutrients to the surrounding waters and habitat for fish and invertebrates.

- ***Waterbirds, including migratory species:*** Waterbirds, including a number of nationally and internationally important migratory shorebirds and waders, are found in the proposed marine park.
- ***Marine turtles:*** Marine turtles are of special conservation status. Flatback turtles are endemic to northern Australia and nest within the proposed marine park.
- ***Marine mammals:*** Dugongs and several cetacean species inhabit the shallow warm waters of the Pilbara and Kimberley regions or migrate through the area.
- ***Invertebrates:*** A high diversity of marine invertebrate fauna, which is an important food source for a variety of animals, including birds, fish and turtles, as well as providing for recreational and commercial fishing opportunities.
- ***Finfish:*** A diversity of finfish species that also provide for recreational and commercial fishing opportunities.
- ***Sharks and rays:*** A diversity of sharks and rays, including protected species.

### Summary of socio-economic values

- ***Aboriginal cultural significance:*** Aboriginal people maintain connection to their traditional coastal and sea country through identity and place, family networks, spiritual practice and resource gathering. Native title rights and interests are progressively being recognised.
- ***European heritage:*** The Pilbara and lower west Kimberley region has a history of European contact dating from 1618.
- ***Remote seascapes:*** Remote areas with natural vistas of beaches, intertidal platforms, rocky shores, mudflats and mangroves with abundant wildlife.
- ***Nature-based tourism:*** An undisturbed natural environment offers a variety of attractions and opportunities for visitors to the area, with popular activities including camping and caravanning, four-wheel-driving, fishing and wildlife appreciation.
- ***Commercial fishing:*** A number of commercial fisheries occur within the proposed marine park.
- ***Recreational fishing:*** A diverse range of quality recreational fishing opportunities for fishers targeting finfish, crabs and other invertebrates.
- ***Resources and associated industries:*** The region's economy is dominated by the mineral and petroleum industries. An increase in industrial operations and associated activities is expected with the continuing growth of the resources sector in the broader region.
- ***Research opportunities:*** The relatively pristine nature and variety of habitats and communities, combined with the wide range of human activities, provide unique opportunities for ecological and socio-economic research.

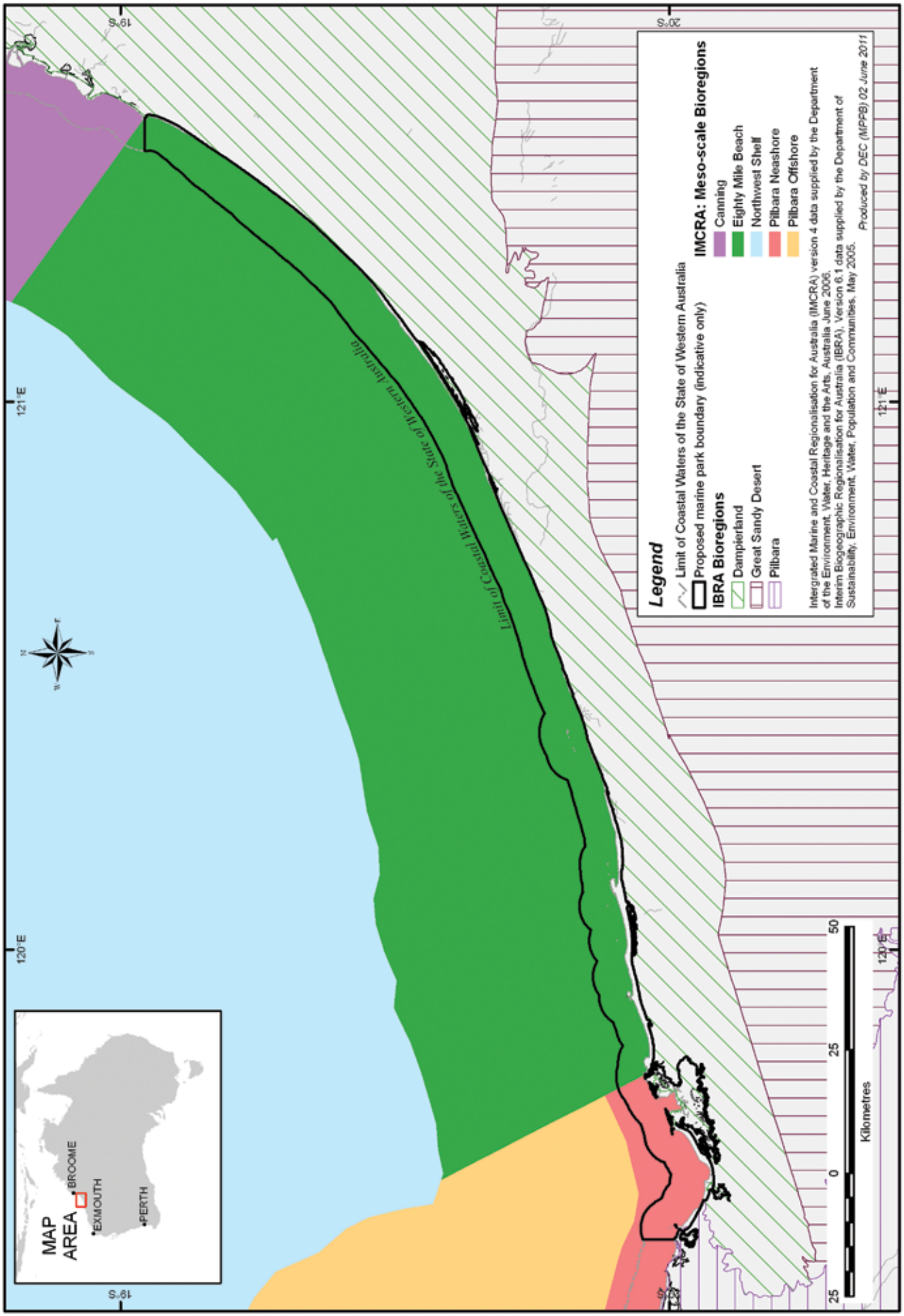


FIGURE 3: Intergrated Marine and Coastal Regionalisation for Australia (IMCRA) mesoscale bioregions and Interim Biogeographic Regionalisation for Australia (IBRA) within and adjacent to the proposed Eighty Mile Beach Marine Park

# Part B

## 4. Management programs

The identification of ecological and socio-economic values, objectives, management actions, performance measures and management targets outlined in sections 5 and 6 of this indicative management plan is a best practice outcome-based approach from which the effectiveness of management can be assessed. This detail also provides improved guidance for marine managers in developing and implementing operational works programs that will best achieve the strategic objectives of the management plan, as well as a more objective and effective approach to implementing management actions, tracking progress of actions, clarifying management effectiveness, and providing for adaptive management responses across the management programs.

Appendix IV provides more detail on the outcome-based management approach used for marine park management, including an outline of the performance assessment and reporting aspects of this indicative management plan.

The vision, strategic objectives, management targets and management objectives are to be delivered by implementing overarching strategies and actions within seven management programs, as well as specific strategies and actions listed against each ecological and social value detailed in sections 5 and 6. Hence, management is delivered through the following programs:

- management frameworks
- education and interpretation
- public participation
- patrol and enforcement
- management intervention and visitor infrastructure
- research
- monitoring.

This indicative management plan should not be viewed in isolation but as an integral part of a suite of complementary management mechanisms that occur within, and adjacent to, the proposed marine park. These include management of adjacent terrestrial areas, such as the Eighty Mile Beach Ramsar site, fisheries management, wildlife protection, industry regulation, pollution control, environmental impact assessment and maritime transport and safety measures, as well as community cooperation and participation.

### 4.1 Management frameworks

The development of management frameworks is essential to ensure effective long-term management of the proposed Eighty Mile Beach Marine Park. These frameworks consist of the legal, financial, human resource and administrative activities required to establish and maintain a marine park. They also include the establishment of zoning and mooring schemes, preparation of planning schemes and other activities not covered by the other management programs.

For administrative purposes, DEC is divided into regions. The proposed marine park is located predominantly within the Kimberley region of DEC and operational responsibility for implementation of the indicative management plan and its management programs rests with this office. The Kimberley Region has management infrastructure and staff at its district office at Broome. DEC's Marine Policy

and Planning Branch has a strategic supporting role in assisting regional and district offices in the management of marine parks and reserves and development of education programs throughout the state. A number of other specialist DEC branches provide support, direction and assistance in relation to such areas as wildlife management, licensing of tourism operations and research and monitoring.

### Summary of overarching objectives, strategies and targets for management frameworks program

| | |
|---|---|
| **Management objectives** | To ensure the proposed marine park has appropriate legal, administrative, financial and human resource frameworks in place so that management can be applied within a collaborative setting. |
| **Overarching management strategies** | 1. Implement appropriate legal provisions to give effect to the proposed marine park boundaries, zoning scheme and relevant management strategies, including notices under the CALM Act, *Wildlife Conservation Act 1950* (WC Act) and *Fish Resources Management Act 1994* (FRM Act) (DEC, DoF) (**H-KMS**).<br>2. Consider and develop as required, Indigenous Land Use Agreements (ILUA) and/or joint management arrangements with native title holders and claimants to enable the intertidal area to be included within the marine park or to enable the intertidal area to be managed as if it were marine park (DEC, DIA, Traditional Owners) (**H-KMS**).<br>3. Develop joint collaborative operational plans for implementation of the strategies in the management plan for the proposed marine park (DEC, DoF, DoT) (**H-KMS**).<br>4. Where feasible progress reservation of pastoral lands to be excised under the 2015 Pastoral Lease Renewals project and Crown land adjacent to the proposed marine park (unmanaged Crown reserve and unallocated Crown land (UCL) coastal strip between high water mark and adjacent pastoral leases) within the conservation reserve system under the CALM Act for the conservation of flora and fauna (DEC) (**H**).<br>5. Ensure the provision of information to support audit by the MPRA (DEC, DoF) (**H**).<br>6. Ensure that management frameworks for the proposed Eighty Mile Beach Marine Park complement management strategies developed for the draft Eighty Mile Beach Ramsar Site Management Plan (DEC) (**H**). |
| **Targets** | Implementation of management strategies within agreed timeframes[1] |

[1] *Agreed timeframes for implementation of management strategies will be included in the final management plan.*

### 4.1.1 Development of a zoning scheme

The implementation of an appropriate zoning scheme is an important strategy for both the conservation of marine biodiversity and the management of human use in marine parks. The partial or total restriction of extractive activities in representative habitats is a key strategy in the long-term maintenance of biodiversity values in marine parks. Specifically, the establishment of zones in which extractive activity is not permitted plays a key role in the protection of representative areas of important habitats such as coral reef, macroalgae and seagrass communities. As well as providing a measure of management 'insurance', these zones provide areas where natural processes can be studied relatively free of significant human influence. These zones also provide the opportunity to improve the understanding of key ecological processes of marine parks and to obtain critical baseline data to compare with areas where extractive activities are permitted and/or where environmental impacts may be occurring. The zoning scheme assists

in separating conflicting uses and provides for specific activities such as for commercial and recreational activities, scientific study and nature appreciation.

Zoning is a flexible management tool that can accommodate evolving use of the marine park for the duration of the management plan. The nature and extent of zoning should be considered within the context of the other management programs (sections 4.2– 4.7).

Section 13B of the CALM Act requires marine parks to be zoned as one or a combination of specific management zones (sanctuary, recreation, special purpose or general use zones), which are formally established as classified areas under Section 62 of the CALM Act. Changes to the zoning of a marine park during the life of the management plan can occur only after meeting the statutory public consultation requirements and acquiring relevant ministerial approvals.

**Sanctuary zones** provide for the maintenance of environmental values and are managed for nature conservation by excluding human activities that may 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 and communities from human disturbance so that marine life can be seen, appreciated and studied in an undisturbed or largely undisturbed state. Passive recreational activities, which do not compromise the maintenance of environmental values, may be permitted but extractive activities are not. Commercial tourism operations (such as nature-based, non-extractive tours) are permitted where they do not conflict with other uses and will be regulated under the CALM Act and/or FRM Act. Sanctuary zones also provide areas for education and scientific study.

**Recreation zones** provide for conservation and compatible recreational activities, including wildlife viewing and recreational fishing. Commercial fishing, pearling, aquaculture and petroleum development are not permitted in these zones.

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

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

The development of the zoning scheme was guided by a number of key principles. These included:

- the zoning scheme should include a system of comprehensive, adequate and representative no-take or sanctuary areas for marine biodiversity conservation and for ecological ‘insurance’ via increased resilience against natural and human disturbances. They should include the major marine communities
- the zoning scheme should provide areas relatively free of significant human impact for research and monitoring, nature appreciation and education
- the precautionary principle should be applied, which means that a lack of scientific certainty about the location, size or number of no-take areas does not prevent the establishment of no-take areas
- the importance of maintaining both ecological and socio-economic values
- that, where possible, the placement of zones to achieve the management objectives should be done so as to minimise impacts on the existing socio-economic values
- that community support is critical to achieving the strategic objectives
- the zoning scheme should be simple for the public to understand and comply with any restrictions.

### 4.1.2 Zones in the proposed Eighty Mile Beach Marine Park

The zoning scheme for the proposed Eighty Mile Beach Marine Park is shown in figures 4 and 5, and the activities permitted in each zone are outlined in Table 1. The proposed marine park covers approximately

208,792ha. The zoning of the proposed marine park comprises three sanctuary zones (approximately 53,219ha or 25% of the proposed marine park), one recreation zone (approximately 3,891ha or 2% of the proposed marine park) and two special purpose zones (approximately 1,389ha or 1% of the proposed marine park). All other areas in the proposed marine park not included in sanctuary, recreation or special purpose zones will be zoned as general use (approximately 150,293ha or 72% of the proposed marine park).

### Anna Plains Sanctuary Zone

The Anna Plains Sanctuary Zone (approximately 33,315ha or 16% of the proposed marine park) includes representative areas of the intertidal sand and mudflat communities of Eighty Mile Beach as well as subtidal waters that encompass areas of sand, mud and sparse filter feeding communities. The sanctuary zone supports a rich diversity of invertebrate and fish fauna, which provide a valuable food source for larger fish, sharks, rays, shorebirds and migratory waders, many of which are of international significance. The sanctuary zone also encompasses an important flatback turtle rookery. A historical plane wreck, the Dutch Dornia, is also located within the sanctuary zone. The sanctuary zone will provide a high level of protection to intertidal sand and mudflat communities, which support a diverse assemblage of fish, sharks, rays, invertebrates and waterbirds of Eighty Mile Beach. The boundaries of this zone have been placed to encompass the most important area for shorebird and migratory waders, which is a primary criterion for the beach being designated as a Ramsar wetland of international significance. The boundaries were also placed to avoid the primary area for recreational fishing and commercial harvesting of pearl/oysters, specimen shells and hermit crabs.

### Cape Keraudren Sanctuary Zone

The Cape Keraudren Sanctuary Zone (approximately 4,899ha or 2% of the proposed marine park) provides protection to a reef area that is considered special because of the high diversity of coral and filter feeding communities, as well as mixed macroalgal and seagrass communities. The coral reef communities are not found in adjacent areas of Cape Keraudren or Eighty Mile Beach, as these are predominately sand and mudflat environments. In the offshore areas of this zone near the extent of state waters, bare sand and seagrass areas exist and are some of the deepest waters in the proposed park. This sanctuary zone will provide opportunities for conservation, education and research. The boundaries of the Cape Keraudren Sanctuary Zone have been placed to encompass the coral, macroalgal and seagrass communities of this reef while avoiding the primary areas for recreational and commercial fishing and reef walking.

### Pardoo Sanctuary Zone

The Pardoo Sanctuary Zone (approximately 15,004ha or 7% of the proposed marine park) includes representative examples of seagrass, macroalgal, filter feeding and coral reef communities, as well as intertidal rocky-shore, sand, mudflat, mangrove and saltmarsh. The seagrass communities are an important source of food for dugongs, which are regularly seen in relatively large aggregations in the shallow embayment west of Mount Blaze. Macroalgal, filter feeding and coral reef communities are important feeding habitat for marine turtles and large turtle aggregations have been reported in the waters of the sanctuary zone. The area supports a high diversity of invertebrates, finfish and sharks and rays, which use the nursery habitat afforded by mangrove and seagrass communities. The sanctuary zone is also likely to assist in replenishment of invertebrate and fish fauna for reefs and creeks closer to Cape Keraudren that are subject to high levels of fishing and collection effort. The boundaries of the Pardoo Sanctuary Zone have been placed to provide representation of the conservation values in this area while avoiding the primary area for recreational fishing and mudcrabbing further to the east.

### Wallal Recreation Zone

The Wallal Recreation Zone (approximately 3,891ha or 2% of the proposed marine park) includes representative areas of intertidal sand and mudflat communities and overlaps a very important section of the Eighty Mile Beach flatback turtle rookery. The area is also an important holiday destination with

a large proportion of visitors staying from several weeks to several months at the Eighty Mile Beach Caravan Park. The primary purpose of this zone is to allow appropriate opportunity for recreational activities while providing adequate protection for nesting turtles, turtle hatchlings, waterbirds and their habitats. Popular recreational activities within this proposed zone include nature appreciation, recreational fishing and collecting (subject to fisheries regulations) and four-wheel driving. Some of these activities have the ability to directly impact upon marine turtles and waterbirds (for example, disturbance from vehicle traffic) and will require additional management strategies that will allow these activities to continue (for example, seasonal vehicle closures for nesting turtles, and appropriate wildlife interaction protocols) without impacting upon the ecological values of the zone. Commercial collection of specimen shells and hermit crabs are not permitted within the Wallal Recreation Zone. However, operators will still be able to collect specimen shells and hermit crabs further along Eighty Mile Beach in the adjacent general use zone, using the primary vehicle access point at Eighty Mile Beach Caravan Park. Commercial charter operators for recreational fishing and non-extractive activities are permitted to operate if their activities are consistent with the primary purpose of the zone. The boundaries of this zone have been placed to encompass the primary area for recreational activities on Eighty Mile Beach. The 20km-zone extends along the intertidal areas for approximately 10km north and south of the primary beach access point at Eighty Mile Beach Caravan Park.

### Pardoo Special Purpose (Shore-based Activities) Zone

The Pardoo Special Purpose (Shore-based Activities) Zone (approximately 815ha or 0.5% of the proposed marine park) is adjacent to the Pardoo Sanctuary Zone and extends along the beach and intertidal zone from approximately 2kms east of Pardoo Creek to the northern side of Bake Bean Creek. It also encompasses the mangrove-lined embayments of Bake Bean Creek. The primary purpose of this zone is to provide an opportunity for shore-based recreational activities where these activities are compatible with the maintenance of the values of the marine park. Activities permitted in this zone include nature appreciation and shore-based recreational fishing and collecting (subject to normal fishing restrictions). Commercial tour operations for recreational fishing and shore-based commercial activities that are consistent with the primary purpose of the zone are also permitted. Boat-based recreational and commercial fishing are not permitted. The boundaries of this zone have been placed to encompass the primary area for shore-based activities adjacent to Pardoo Station.

### Mulla Mulla Special Purpose (Mangrove Protection) Zone

The Mulla Mulla Special Purpose (Mangrove Protection) Zone (approximately 574ha or 0.5% of the proposed marine park) includes representative areas of mangrove communities and saltmarsh of the Pilbara coast. It encompasses waters at the mouth of Mulla Mulla Down Creek, extending into the mangrove-lined creek system and adjacent saltmarshes that are infrequently inundated at very high tides. Mangrove communities provide important habitat and refugia for a variety of fish, sharks, rays, invertebrates and birds. These in turn support socio-economic values, such as recreational fishing and wildlife viewing. The primary purpose of this zone is to provide improved protection for mangroves, saltmarsh and species that may inhabit these areas, while still allowing for compatible recreational uses. Activities permitted in this zone include nature appreciation, boat-based recreational fishing and boat-based charter fishers and operators. No other commercial activities are permitted. Recreational activities that impact upon mangrove communities, such as four-wheel driving, boat launching and access to mangrove areas by foot, are not permitted as they are not considered compatible with the purpose of the zone.

### General Use Zone

All areas in the proposed marine park not included in sanctuary, recreation or special purpose zones will be zoned as general use (approximately 150,293ha or 72% of the proposed marine park). The general use zone will provide for recreational and commercial activities, providing that they are compatible with the overall maintenance of the values of the marine park.

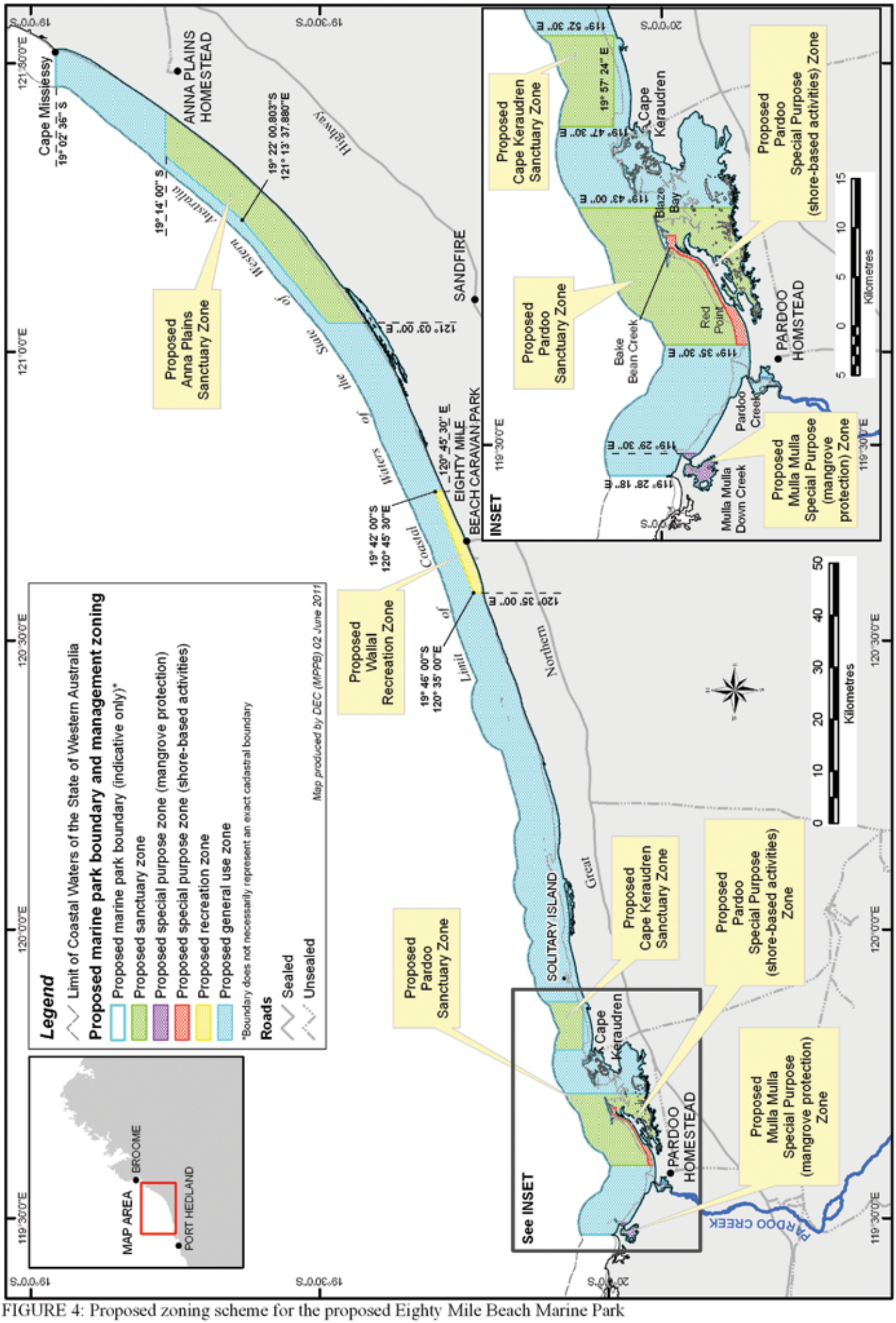


FIGURE 4: Proposed zoning scheme for the proposed Eighty Mile Beach Marine Park

FIGURE 5: Proposed zoning scheme for the proposed Eighty Mile Beach Marine Park - Cape Keraudren to Mulla Mulla Down Creek

**Table 1: Activities permitted in each zone of the proposed Eighty Mile Beach Marine Park**

| Activity | Sanctuary Zone | Recreation Zone | Special Purpose (Mangrove Protection) Zone | Special Purpose (Shore-based Activities) Zone | General Use Zone |
|---|---|---|---|---|---|
| **COMMERCIAL** | | | | | |
| Pearling [a] | No | No | No | No | Yes |
| Commercial fishing [a] | No | No | No | No | Yes |
| Commercial specimen shell, marine aquarium and land hermit crab collecting [a] | No | No | No | Yes [i] | Yes |
| Aquaculture [a] | No | No | No | No | Yes |
| Mineral & petroleum exploration [bc] | Assess [j] | Assess [j] | Assess [j] | Assess [j] | Assess |
| Mineral & petroleum development [bc] | No | No | No | No | Assess |
| Proposals for marine infrastructure [bcd] | Assess | Assess | Assess | Assess | Assess |
| Pipelines (including dredging for pipelines) [bc] | No | No | No | No | Assess |
| Dredging and dredge spoil dumping [bc] | No | No | No | No | Assess |
| Charter operators - fishing [ac] | No | Yes | Yes | Yes | Yes |
| Charter operators - non-extractive (e.g. wildlife viewing) [cef] | Yes | Yes | Yes | Yes | Yes |
| **CUSTOMARY ACTIVITIES** | | | | | |
| Customary activities (e.g. hunting, fishing, camping) [ag] | Yes | Yes | Yes | Yes | Yes |
| **RECREATIONAL** | | | | | |
| Boating (motor & non-motorised) [ad] | Yes | Yes | Yes | Yes | Yes |
| Surface water sports [ad] | Yes | Yes | Yes | Yes | Yes |
| Shore-based recreational fishing [a] | No | Yes | No | Yes | Yes |
| Boat-based recreational fishing [ad] | No | Yes | Yes | No | Yes |

| Activity | Sanctuary Zone | Recreation Zone | Special Purpose (Mangrove Protection) Zone | Special Purpose (Shore-based Activities) Zone | General Use Zone |
|---|---|---|---|---|---|
| Recreational specimen shell collecting (dead or alive) [a] | No | Yes | No | Yes [i] | Yes |
| Recreational coral and 'live' rock collecting [a] | No | No | No | No | No |
| Snorkelling and diving | Yes | Yes | Yes | Yes | Yes |
| Wildlife viewing [ef] | Yes | Yes | Yes | Yes | Yes |
| Vehicle access (car or motorbike) [f] | No (except designated areas) | Yes | No (except designated areas) | Yes | Yes |
| Boat launching | No (except designated areas) | Yes | No (except designated areas) | Yes | Yes |
| Access to mangrove areas by foot | No (except designated areas) | Yes | No (except designated areas) | Yes | Yes |
| **OTHER** | | | | | |
| Navigation aids | Yes | Yes | Yes | Yes | Yes |
| Research [ac] | Yes | Yes | Yes | Yes | Yes |
| Anchoring (other than emergency anchoring) [dh] | Yes | Yes | Yes | Yes | Yes |

KEY:

a. Subject to the *Fish Resources Management Act 1994 and Pearling Act 1990.*

b. Subject to the *Environmental Protection Act 1986.*

c. Licence required from Department of Environment and Conservation and/or Department of Mines and Petroleum and/or Environmental Protection Authority.

d. Subject to the *Western Australian Marine Act 1982.*

e. Subject to the *Conservation and Land Management Act 1984* and *Wildlife Conservation Act 1950.*

f. Seasonal access restrictions may apply in some areas during key turtle nesting and waterbird migration and feeding times.

g. Subject to the rights and provisions of native title holders provided by *Native Title Act 1993.*

h. Specific sites where anchoring is either permitted or restricted may be developed through a mooring and anchoring plan.

i. Only shore-based collection is permitted in this zone.

j. Exploratory drilling for petroleum is not permitted in this zone.

Assess Proposal will be assessed by relevant agencies in accordance with standard procedures.

## 4.2 Education and interpretation

The education and interpretation program will increase public awareness and understanding of conservation and management issues in the proposed Eighty Mile Beach Marine Park, and the marine environment in general. This increased understanding will help to develop a sense of community stewardship, which will subsequently lead to better protection of ecological values and the responsible management of social values. Education opportunities including interpretive materials will be an important part of managing the proposed marine park.

The education and interpretation program, developed to support the management of the marine park, needs to be flexible and applied in ways that maximise the effectiveness of the program for various sectors and target audiences.

### Summary of overarching objectives, strategies and targets for education and interpretation program

| | |
|---|---|
| **Management objective** | To enhance community understanding of, and support for, the proposed marine park through education and interpretation programs. |
| **Overarching management strategies** | 1. Develop an integrated education and interpretation program that aims to ensure users of the proposed marine park understand:<br>a. the importance of the ecological and social values of the proposed marine park<br>b. appropriate behaviours to reduce human impacts and ensure public safety<br>c. the management zones and regulations and the reasons for these controls (DEC, DoF) **(H-KMS)**.<br>2. Implement the education and interpretation program to park users (DEC, DoF) **(H-KMS)**.<br>3. Encourage and assist the local tourism industry and operators to provide educational information and materials to their staff and customers to foster community stewardship of the proposed marine park (DEC) **(H-KMS)**.<br>4. Install zone markers and signage for the proposed marine park for educational purposes where appropriate (DEC) **(H)**.<br>5. Ensure education and interpretation programs complement, and integrate with, similar programs for the Eighty Mile Beach Ramsar Site (DEC) **(H)**. |
| **Targets** | 1. Implementation of management strategies within agreed timeframes.<br>2. Fifty per cent of visitors are aware of the existence of the proposed marine park, its values and the management restrictions that apply within three years of the release of the management plan.<br>3. Ninety per cent of visitors aware of the existence of the proposed marine park, its values and the management restrictions that apply within five years of the release of the management plan. |

## 4.3 Public participation

Public participation can help to sustain community support that is critical for effective implementation of the management plan. An important early step in the operations of the proposed marine park will be the consideration of the establishment of a Management Advisory Committee (MAC) or similar mechanism, to build a partnership between the local community, adjacent landholders/managers and government. The primary function of this type of mechanism will be the provision of advice and assistance to DEC and the MPRA but will also provide an ideal forum for information sharing and an avenue for dissemination of information to the public and adjacent landholders/managers. For example, local stakeholders would be able to raise issues with DEC, the MPRA or the Minister in matters relating to the proposed marine park's

management, administration, zoning, conflicts in usage and any other management-related issues that arises during the life of the management plan. In addition, effective communication and participation in management activities with a range of other community groups will help achieve management objectives and strategies.

### Summary of overarching objectives, strategies and targets for public participation program

| | |
|---|---|
| **Management objective** | To encourage and facilitate ongoing community participation in the management of the marine park. |
| **Overarching management strategies** | 1. Consider and establish as appropriate, a MAC or similar engagement mechanism (DEC) **(H-KMS)**.<br>2. Develop a public participation program for the proposed marine park, which encourages community involvement in management through a range of opportunities including in education and monitoring programs (DEC) **(H-KMS)**.<br>3. Implement the public participation program for the proposed marine park (DEC) **(H-KMS)**.<br>4. Investigate and appoint, as appropriate, honorary marine park officers (DEC) **(H)**.<br>5. Maintain a database of public participation (DEC) **(M)**. |
| **Targets** | Implementation of management strategies within agreed timeframes. |

## 4.4 Patrol and enforcement

This indicative management plan details a range of strategies relating to the management of particular human activities within the proposed marine park. While users typically comply with management regulations when they understand why such controls have been implemented, there is always a need to monitor the level of compliance and take action to stop inappropriate or illegal behaviour. To achieve this, an appropriate level of 'field' presence by DEC and DoF will be necessary in the marine park. However, because of the remoteness and size of the marine park, it is necessary that users of the area (for example, commercial fishermen, charter and tourism operators, Indigenous groups and the general community) play both a self-regulatory and peer surveillance role.

In 2005, a Memorandum of Understanding (MOU) was signed between the Minister for the Environment and the Minister for Fisheries to establish principles of cooperation and integration between DEC and DoF in the management of the state's marine protected areas. A collaborative operational plan will be developed between DEC and DoF to ensure efficient and effective delivery of a range of programs where there is overlapping, shared agency responsibility or mutual interest, which includes patrol and enforcement activities. Specific actions include joint patrols, cross-authorisation of agency staff, improved liaison and reporting arrangements.

**Summary of overarching objectives, strategies and targets for patrol and enforcement program**

| | |
|---|---|
| **Management objective** | To maximise public compliance of regulations related to the ongoing management of the proposed marine park. |
| **Overarching management strategies** | 1. Develop a collaborative patrol and enforcement program to:<br>a. ensure compliance with zoning restrictions, permitted uses and other regulations<br>b. maximise efficiency and effectiveness of patrol and enforcement activities (DEC, DoF, DoT) **(H-KMS)**.<br>2. Implement the patrol and enforcement program (DEC, DoF, DoT) **(H-KMS)**.<br>3. Install zone markers and signage for the proposed marine park for legal compliance purposes where appropriate (DEC, DoF) **(H-KMS)**.<br>4. Facilitate cross-authorisation of enforcement officers as appropriate (DEC, DoF, DoT) **(H-KMS)**.<br>5. Investigate and appoint, as appropriate, honorary enforcement officers under the CALM Act (DEC) **(H)**.<br>6. Undertake annual inspections and maintenance of DEC managed infrastructure within the proposed marine park, particularly zone markers and signage (DEC) **(M)**.<br>7. Maintain a database of compliance statistics and issues, which is available for management assessment (DEC, DoF) **(M)**. |
| **Targets** | Implementation of management strategies within agreed timeframes. |

## 4.5 Management intervention and visitor infrastructure

Intervention comprises direct management actions required to achieve conservation outcomes. These can be either proactive (preventative) or reactive (restorative) management actions and include provision of visitor facilities to reduce site disturbance and environmental impacts, rehabilitation of degraded areas and risk management.

### Visitor Risk

Visitor risk management is an important focus for DEC. The remote nature of the proposed marine park, combined with the large intertidal areas, strong tides and winds and the risk of tropical cyclones, pose a risk to visitors who may be inexperienced in, or unprepared for, such conditions. As visitation to the proposed marine park is likely to increase during the life of the management plan, an ongoing visitor risk management program will be undertaken to identify potential hazards and measures implemented to minimise these. Risks to visitors are managed under the framework of DEC's Policy Statement No. 53 *Visitor Risk Management Policy.* The installation and maintenance of navigation aids and other boating safety measures in all state waters is the responsibility of the Department of Transport (DoT).

### Development Proposals

When developments, including exploration activities are proposed within the proposed marine park they are subject to the environmental impact assessment requirements of the *Environmental Protection Act 1986* (EP Act) and consideration by DEC and the MPRA in the context of the management plan gazetted under the CALM Act. During the life of this management plan there may be proposals for the installation and construction of infrastructure associated with the petroleum and mineral industries, pearling, tourism operations or public recreation. 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 will review the proposal in terms of its potential impacts on the proposed marine park's ecological and socio-economic values, and determine whether it is consistent with the targets of the proposed marine park.

In relation to petroleum development, there are agreed assessment procedures and protocols that are set out in an MOU between the Environmental Protection Agency (EPA) and Department of Mines and Petroleum (DMP). The MPRA has endorsed the approach outlined in the MOU. The MPRA will be informed of all proposals submitted in the proposed marine park, although EPA/DMP 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 DEC would still provide input and advice to EPA on proposals when requested.

### Mooring and Anchoring

Amendments to the CALM Regulations are currently being progressed to allow more efficient management of moorings and anchoring in marine conservation reserves. DEC will develop a mooring and anchoring plan that will include identification of areas where moorings and anchoring are acceptable from an ecological and socio-economic perspective and the capacities of these areas. Consideration will also be given to the establishment of cyclone moorings if required. No moorings or anchoring restrictions currently exist within the proposed marine park.

### Summary of overarching objectives, strategies and targets for management intervention and visitor infrastructure program

| | |
|---|---|
| **Management objectives** | 1. To provide facilities to enhance visitor enjoyment of, and minimise impacts to, the values of the proposed marine park.<br><br>2. To identify and address, where appropriate, existing or potential human impacts on the ecological and social values of the proposed marine park.<br><br>3. To take reasonable steps to minimise visitor risk, where appropriate, within the proposed marine park.<br><br>4. To ensure that the impacts of development proposals on the ecological and social values are evaluated through an appropriate level of environmental assessment. |
| **Overarching management strategies** | 1. Provide visitor facilities, where appropriate, based on human usage monitoring data, visitor risk assessments and in liaison with major users to enhance visitor enjoyment of, and reduce impacts to, the values of the proposed marine park (DEC) **(H-KMS)**.<br><br>2. Periodically identify areas of existing or potential adverse human impacts in the proposed marine park and, where required, implement appropriate management measures to address these impacts (DEC) **(H-KMS)**.<br><br>3. Complete periodic visitor risk assessments and, where appropriate, implement measures to minimise visitor risks within the proposed marine park (DEC) **(H-KMS)**.<br><br>4. Ensure advice on the ecological values, objectives and targets of the proposed marine park is provided to relevant authorities dealing with marine infrastructure proposals (DEC, MPRA, EPA) **(H)**.<br><br>5. Ensure the approvals and setting of licence conditions for new developments and operations are consistent with the management objectives and targets for the ecological and social values of the proposed marine park and that appropriate monitoring conditions are applied to ensure these outcomes are achieved (DEC, MPRA, EPA) **(H)**.<br><br>6. Maintain a quantitative and qualitative spatial database of human use within the proposed marine park (DEC) **(H)**.<br><br>7. Ensure that the ecological and social values of the proposed marine park are included in predictive models and response plans for oil spills to assist in managing any significant pollution event that occurs within or adjacent to the proposed marine park (DEC, DoT) **(M)**.<br><br>8. Prepare a mooring and anchoring management plan for the proposed marine park (DEC) **(M)**.<br><br>9. Implement a program of routine inspection, maintenance and reporting on infrastructure condition (e.g. zone markers, signage) in the marine park (DEC) **(M)**. |
| **Targets** | Implementation of management strategies within agreed timeframes. |

## 4.6 Research

Developing an understanding of the ecological and socio-economic values of the marine park is critical to effective management. A comprehensive marine research program facilitates this understanding and provides background information necessary for an effective approach to the protection of ecological values and the responsible management of socio-economic values. Much of this information does not exist at this stage for the proposed Eighty Mile Beach Marine Park. Accordingly, research programs will be designed to fill key gaps in current knowledge relevant to management, including establishing the natural state of key ecological values and the processes supporting them.

Research within the reserves will require a licence to be issued by DEC. This enables DEC to:

- maintain an understanding of research effort
- direct research effort, where necessary, so it is relevant to management
- collaborate with researchers where possible
- share research outcomes with others.

Permits may also be required through DoF if research is undertaken on fish as defined in the FRM Act.

A range of organisations have a role in promoting and undertaking research for the proposed marine park and broader Pilbara and lower-west Kimberley regions. Where required, specific research strategies are detailed for the ecological and socio-economic values in sections 5 and 6. Research is identified as an important socio-economic value of the proposed marine park and is discussed further in Section 6.8.

### Summary of overarching objectives, strategies and targets for research program

| | |
|---|---|
| **Management objectives** | To implement a collaborative and cost-effective research program to improve knowledge and understanding of the key ecological and social values in the proposed marine park to inform management decisions. |
| **Overarching management strategies** | 1. Prepare a coordinated and prioritised marine research program with a focus on addressing knowledge gaps for ecological and social values identified as key performance indicators that reflect the highest conservation and management priorities (DEC) **(H-KMS)**.<br><br>2. Undertake and/or facilitate ecological and social research within, or relevant to, the proposed marine park in accordance with the marine research program (DEC) **(H-KMS)**.<br><br>3. Facilitate knowledge transfer and uptake of research program outcomes to marine park management, planning and policy (DEC) **(H-KMS)**.<br><br>4. Communicate the prioritised research program to appropriate research organisations and funding bodies (DEC) **(H-KMS)**.<br><br>5. Undertake and/or facilitate research to determine the effectiveness of the proposed marine park's zoning scheme for biodiversity conservation and in relation to the principles of comprehensiveness, adequacy and representativeness, with a particular emphasis on sanctuary zones (DEC) **(H-KMS)**.<br><br>6. Develop broadscale habitat and wildlife distribution maps in, and adjacent to, the proposed marine park to better inform management (DEC) **(H-KMS)**.<br><br>7. Assess the nature, level and potential impacts of human activities on ecological and social values within the proposed marine park to inform the monitoring program (DEC) **(H-KMS)**. |

| | |
|---|---|
| **Overarching management strategies (cont'd)** | 8. Develop and maintain a database of the historical and current research that has occurred within, or is relevant to, the proposed marine park and its values (DEC) **(H)**.<br><br>9. Ensure the results of research conducted within the proposed marine park by external organisations are forwarded to DEC and the MPRA as part of research licence conditions (DEC) **(H)**.<br><br>10. Implement a non-destructive sampling policy within sanctuary zones of the proposed marine park (DEC) **(M)**. |
| **Targets** | Implementation of management strategies within agreed timeframes. |

## 4.7 Monitoring

Monitoring the condition of the marine environment is essential to measure the effectiveness of management of marine parks. Monitoring enables the early detection of detrimental impacts and provides the trigger for corrective management action before ecological and socio-economic values of the marine park become significantly degraded. Where changes have occurred and remediation measures have been implemented, a monitoring program should also determine the rate of recovery of an affected area or value.

A prioritised monitoring program is being progressively implemented by DEC as part of a state-wide initiative to improve the delivery of research and monitoring requirements within marine parks and reserves. Programs will focus on monitoring of key ecological and socio-economic values against their management targets. These are identified as the key performance indicators (KPIs) in the management plan. Where required, short-term management targets may need to be developed or further refined to reflect meaningful interim steps in achieving the longer-term management targets and reserve objectives.

DEC's Marine Science Program will help determine appropriate performance measures, or surrogates, to monitor the values of the reserves to measure whether the objectives of the management plan are being achieved. The delivery of the monitoring program will be in collaboration with DEC's regional and district staff, who are responsible for day-to-day management of the proposed marine park, DoF for fisheries-related aspects, and through external providers, such as the Commonwealth Scientific and Industrial Research Organisation, Australian Institute of Marine Science and universities, where appropriate. The detection of human-induced changes requires an understanding of what is 'natural' as a benchmark and this information will be progressively established through strategic research programs.

### Summary of overarching objectives, strategies and targets for monitoring program

| | |
|---|---|
| **Management objectives** | To implement a collaborative and cost effective marine monitoring program to provide the basis for adaptive management and to inform assessment of management effectiveness within the proposed marine park. |
| **Overarching management strategies** | 1. Develop a coordinated and prioritised ecological and social monitoring program for the proposed marine park, including community-based monitoring, with a particular emphasis on DEC and MPRA audit requirements (monitoring of key performance indicators) (DEC) **(H-KMS)**.<br><br>2. Implement the ecological and social monitoring program (DEC) **(H-KMS)**.<br><br>3. Communicate the prioritised monitoring program to appropriate research organisations (DEC) **(H-KMS)**.<br><br>4. Implement a long-term monitoring program, including baseline studies if necessary, to assess the effectiveness of the zoning scheme, with a particular emphasis on sanctuary zones (DEC) **(H-KMS)**.<br><br>5. Facilitate knowledge transfer and uptake of monitoring program outcomes to marine park management, planning and policy (DEC) **(H-KMS)**.<br><br>6. Develop and maintain a database of historical and current monitoring in the proposed reserves (DEC) **(H)**.<br><br>7. Facilitate ecological and social monitoring in the proposed marine park conducted by research, academic and educational institutions, by providing financial and logistical assistance, where appropriate (DEC) **(H)**.<br><br>8. Ensure the results of monitoring conducted within the proposed marine park by external organisations are forwarded to DEC and the MPRA as part of research licence conditions (DEC) **(H)**.<br><br>9. Consider the potential implications of climate change when developing a marine monitoring program (DEC) **(M)**. |
| **Targets** | Implementation of management strategies within agreed timeframes. |

# 5. Management of ecological values

Ecological values are the physical, geological, chemical and biological characteristics of an area. Ecological values are significant in terms of their biodiversity (representative, rare or unique) and ecosystem integrity role. Ecological values also have a social significance because many social values are functionally dependent on the maintenance of ecological values. Set out below is information on specific ecological values, their management objectives, strategies and targets. These specific strategies should complement the overarching strategies in Section 4 that apply to many of the park's values, particularly in the case of education and interpretation, research, and monitoring.

## 5.1 Water and sediment quality

*Water and sediment quality is high and is essential to the maintenance of healthy marine ecosystems.*

Oceanographic processes, including currents, winds, wave action and tidal flow, influence the water and sediment quality in the region by impacting on transport, dispersal and mixing of sediments, biota and pollutants. The relative lack of human population and development within the proposed marine park, combined with strong oceanic mixing and circulation, means that water and sediments of the proposed marine park are of high quality. Local offshore water movement is dominated by the southerly flowing Leeuwin Current, which brings warm, low salinity water from the Pacific via the Indonesian throughflow (Condie, *et al.*, 2006; Hutchins, 2004). The coastal waters of the Pilbara and lower west Kimberley regions are relatively turbid, due to episodic run-off from rivers and strong tidal flow. However, coastal waters of Eighty Mile Beach remain relatively clear despite the large tidal range, due to the small amount of river run-off into coastal waters compared with adjacent bioregions. Maintaining high levels of water and sediment quality is important in maintaining healthy marine ecosystems.

Freshwater seeps also occur along Eighty Mile Beach and may play an important role for a variety of species and communities, particularly those found in the intertidal areas. Further study is required to determine the nature, importance and extent of this value in the proposed marine park (Hale and Butcher, 2009; Piersma *et al.,* 2005).

The National Water Quality Management Strategy provides a framework for water and sediment quality management, based on policies and principles that apply nationwide. The national strategy is being given effect in Western Australia through implementation of the State Water Quality Management Strategy (SWQMS) Document No. 5, which was endorsed by government in 2004 (Government of Western Australia, 2004). Consistent with the SWQMS Document No. 6, the then Department of Environment undertook broad consultation with the community and stakeholders to establish environmental values and objectives for state marine waters off the Pilbara coast, including waters of the proposed marine park. The environmental values and spatially-defined objectives arising from the community consultation (Department of Environment, 2006) have been endorsed as 'interim', pending development of a formal policy under the EP Act. The 'interim' environmental values and objectives align with the zoning scheme and KPIs contained in this indicative management plan, and will be used to guide management and protection of the marine environment from the effects of waste inputs and pollution.

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 spatial scales, as a consequence of environmental parameters (for example, water circulation) and human usage patterns (for example, number of vessels and number of passengers). The State Government adopted a policy for the discharge of sewage from vessels in 2004 (Department of Transport, 2009). The strategy outlines a number of guidelines but allows some flexibility in applying the zones in marine parks and reserves. The basis of this policy is that three zones will apply in Western Australia coastal waters:

- Zone 1 – No discharge
- Zone 2 – Discharge only using approved treatment systems

- Zone 3 – Open for discharge of untreated vessel sewage.

The following sewage discharge scheme will be applied using two discharge categories, however, during the life of the management plan, these categories may be amended if considered necessary:

- all waters in proposed sanctuary and recreation zones within the proposed marine park and within 500m of these zones are designated 'Zone 1' (no discharge)
- all waters within 500m of islands or land within the proposed marine park are designated 'Zone 1' (no discharge)
- all remaining waters of the proposed marine park are designated 'Zone 2' (discharge permitted only using approved treatment systems).

Shipping is an important activity in the Pilbara and lower-west Kimberley regions and offshore waters adjacent to the proposed marine park, however, it is not a major activity within the proposed marine park. The risk of oil spills in offshore waters could pose a risk to values of the proposed marine park. Other potential pressures on water and sediment quality include litter and sedimentation from industry activities (for example, dredging). Future development in the region, especially the construction and expansion of ports, may have impacts on local water quality.

At the current level of recreational and commercial activities in the proposed marine park, no major pressures on the high water quality of the proposed marine park have been identified. Management to maintain the water and sediment quality of the proposed marine park will include gaining a better understanding of the processes which contribute to the high water quality and development of predictive models in the event of oil spills from offshore shipping accidents.

### Summary of management arrangements for water and sediment quality.

| | |
|---|---|
| **Current status** | The water and sediment quality of the proposed marine park is likely to be high. |
| **Existing and potential uses and/or pressures** | • Sewage discharge, oil spills and pollutants from vessels, marine infrastructure and mainland facilities/activities.<br>• Increased turbidity from industry activity (e.g. dredging, pipe-laying, construction of marine facilities).<br>• Changes in hydrological regime or subterranean ground water flow from extraction associated with onshore developments/activities. |
| **Current major pressures** | No current major pressures. |
| **Management objective** | To ensure the water and sediment quality of the proposed marine park is not significantly impacted by human activities within, and adjacent to, the proposed marine park. |
| **Specific Strategies/ Actions** | Ensure the marine research program (Section 4.6) seeks to:<br>a. develop an appropriate understanding of the background water quality, variability, circulation and mixing in the proposed marine park (DEC) **(H-KMS)**<br>b. develop an appropriate understanding of the subterranean groundwater regime and freshwater seeps, and their ecological function within the proposed marine park (DEC) **(H)**<br>c. develop an appropriate understanding of the sediment quality and variability within the proposed marine park (DEC) **(M)**. |

| | | | |
|---|---|---|---|
| **Performance measures** | 1. Nutrients: *Chlorophyll a* and inorganic nitrogen concentration in water and sediments<br>2. Toxicants: concentration<br>3. Pathogens: faecal coliform concentration<br>4. Litter: mass (kg) of litter at selected monitoring sites | **Desired trends** | 1. Constant or negative<br>2. Constant or negative<br>3. Constant or negative<br>4. Negative |
| **Short-term target** | To be developed as required. | | |
| **Long-term target** | Maintain or improve water and sediment quality of the proposed marine park from a relevant baseline level, except for designated areas where a different level of acceptable change is approved by the appropriate government regulatory authority. | | |

## 5.2 Geomorphology (KPI)

*Eighty Mile Beach is a unique and exceptional geomorphic feature, which contrasts with a distinctly different seabed and coastal topography in the south-west corner of the proposed marine park.*

Eighty Mile Beach consists of an almost continuous curving beach and associated low sand dunes. The beach is approximately 220km long, with an average width of more than 100m, and adjoins extensive tidal mudflats sometimes several kilometres wide. A few small bays support mangrove communities, breaking up the sections of white sandy beach. The intertidal sand and mudflats are of particular importance as they provide habitat for diverse and ecologically significant intertidal sand and mudflat communities (Section 5.3). The carbonate rich sediments that make up the mudflats are of marine origin and are carried to the area by the Leeuwin Current (Piersma *et al.*, 2005).

The beach and foredunes comprise calcareous sand and are important for shorebirds and nesting turtles. The dune vegetation includes beach spinifex (*Spinifex longifolius*), green birdflower *(Crotalaria cunninghamii),* dune wattle *(Acacia bivenosa)* and the local endemic grey soft spinifex *(Triodia epactia)* (Hale and Butcher, 2009).

Cape Keraudren, Blaze Bay and Pardoo Creek in the south-west corner of the proposed marine park, are characterised by rocky shores with narrow sandy beaches, small tidal creeks and mangrove lined muddy bays. Saltmarsh flats occur further inland behind the mangroves (Stevens *et al.*, 2008, Department of Conservation and Land Management, 1994).

The geomorphology of the proposed marine park is generally undisturbed. There are some localised disturbances to geomorphology within the proposed Eighty Mile Beach Marine Park in the vicinity of Cape Keraudren where camping, four-wheel-driving and boat launching occurs on coastal landforms and adjacent to mangrove areas. Potential pressures on the geomorphology of the proposed marine park include physical disturbance from recreational use of coastal landforms, infrastructure and industry development, resulting in erosion to sand dunes and beach sediment compaction in high vehicle traffic areas (Hale and Butcher, 2009).

Management of this value includes ensuring development proposals in the proposed marine park, including new pipelines or shipping channels, are subject to assessment in accordance with the EP Act and working with adjacent land managers to build upon current strategies to manage access and use across susceptible geomorphic features.

### Summary of management arrangements for geomorphology (KPI)

| | |
|---|---|
| **Current status** | The geomorphology of the proposed marine park is generally undisturbed from human impacts. |
| **Existing and potential uses and/or pressures** | • Degradation from recreational use of coastal landforms (e.g. vehicles, boat launching, camping).<br>• Changes to geomorphology from nearshore and onshore developments/activities (e.g. installation of markers, jetties). |
| **Current major pressures** | No current major pressures. |
| **Management objective** | To ensure that the seabed structural complexity, geomorpohological processes and coastal landforms of the proposed marine park are not significantly altered by human activities in the proposed marine park. |

| | | | |
|---|---|---|---|
| **Specific Strategies/ Actions** | 1. Identify degraded areas in and adjacent to the marine park, assess rehabilitation options and implement strategies to address these, where appropriate (DEC) **(H)**.<br>2. Liaise with coastal land managers to ensure effective management of access and use of coastal landforms adjacent to the proposed marine park to ensure that geomorphology values are not significantly impacted by human activities (DEC) **(H)**. | | |
| **Performance measure** | 1. Area of hard seabed disturbance (ha)<br>2. Area of coastal disturbance (ha) | Desired trends | 1. Constant or negative<br>2. Constant or negative |
| **Short-term target** | To be developed as required. | | |
| **Long-term target** | No change in seabed structural complexity, geomorphological processes and coastal landforms of the proposed marine park as a result of human activity within the marine park, except for designated areas where a different level of acceptable change is approved by the appropriate government regulatory authority. | | |

## 5.3 Intertidal sand and mudflat communities (KPI)

*Intertidal sand and mudflat communities are primary producers with an abundance of invertebrate life, providing a valuable food source for waterbirds and other predators in the proposed marine park.*

The intertidal sand and mudflat communities of the proposed Eighty Mile Beach Marine Park support a high diversity of infauna (particularly molluscs) that live within or on the intertidal sand and mud flats and are extremely important for biodiversity conservation. Although typically bare of vegetation, these areas are covered with a surface film of microorganisms 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 living on the surface of the sand or mud and burrowing into the substrate, where their burrowing activities regularly turn over and oxygenate 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.

The large tidal range of Eighty Mile Beach results in an intertidal zone that can be up to 4km wide and comprises 60,000ha of sand and mud. In a 1999 survey of benthic invertebrate fauna conducted along 80km of the intertidal zone at the northern end of the beach, 112 different taxa were identified to various taxonomic levels. Forty of these taxa were not found in similar surveys of Roebuck Bay to the north of Eighty Mile Beach, highlighting the distinctiveness of intertidal communities between areas along the Pilbara and lowerwest Kimberley coasts (Piersma *et al.,* 2005).

The importance of these communities to the ecological and socio-economic values of the proposed marine park should not be underestimated. Some reports have suggested that Eighty Mile Beach could be among the richest known intertidal mudflats in the world (Piersma *et al.,* 2005).

Intertidal sand and mudflat flora and fauna are protected throughout Western Australia 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 DEC and the EPA in accordance with *Guidelines for the Assessment of Environmental Factors. Benthic Primary Producer Habitat Protection* (Environmental Protection Authority, 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"* (Environmental Protection Authority, 1998a).

The intertidal sand and mudflat communities of the proposed marine park are generally undisturbed. However, there are some localised disturbances to intertidal sand and mudflat communities where recreational fishing and shell collecting, commercial hermit crab collecting and trampling from humans and vehicles occur. There are no known current major pressures identified within the proposed marine park, however, there are a number of existing and potential pressures that may impact on intertidal sand and mudflat communities.

Management will focus on increasing our understanding of the value and its relationships to other values of the proposed marine park to improve management, and on understanding the impacts of human activities. Education will also be an important management program so that users of the marine park understand the ecological significance of intertidal sand and mudflat communities.

### Summary of management arrangements for intertidal sand and mudflat communities (KPI)

| | | | |
|---|---|---|---|
| **Current status** | The intertidal sand and mudflat communities are generally undisturbed from human impacts. | | |
| **Existing and potential uses and/or pressures** | • Sediment compaction from vehicles, humans and livestock.<br>• Removal and degradation of habitat from infrastructure development.<br>• Changes to hydrological regime or subterranean ground water flow from onshore developments/activities.<br>• Sewage discharge, oil spills and pollutants from vessels, vehicles, marine infrastructure and mainland facilities/activities.<br>• Direct (e.g. removal) and indirect (e.g. changes to community structure) impacts from recreational and commercial fishing. | | |
| **Current major pressures** | No current major pressures. | | |
| **Management objective** | To ensure that intertidal sand and mudflat communities are not significantly altered by human activities in the marine park. | | |
| **Specific Strategies/ Actions** | 1. See zoning strategy (Section 4.1.2) (DEC) **(H-KMS)**.<br>2. Ensure the marine research program (Section 4.6) seeks to characterise the floral and faunal diversity, abundance and natural variability of intertidal sand and mudflat communities to support long-term management (DEC) **(H-KMS)**.<br>3. Ensure the education and interpretation program (Section 4.2) aims to increase awareness of the intertidal sand and mudflat communities to visitors and users of the marine park, their ecological significance and the adverse impacts that some activities can have upon them (DEC) **(H-KMS)**.<br>4. Assess the nature and level of impact (or potential impacts) of human activities on intertidal sand and mudflat communities within the proposed marine park (DEC) **(H)**. | | |
| **Performance measures** | 1. Species diversity<br>2. Abundance of indicator species | **Desired trends** | 1. Constant<br>2. Constant or positive |
| **Short-term target (KPI)** | To be developed as required. | | |
| **Long-term target (KPI)** | No loss of intertidal sand and mudflat community diversity and biomass in the proposed marine park as a result of human activity within the marine park, except for designated areas where a different level of acceptable change is approved by the appropriate government regulatory authority. | | |

## 5.4 Subtidal filter feeding communities (hard and soft substrate)

*A diverse range of subtidal filter feeding communities, including hard and soft substrate communities with a high diversity of invertebrate species.*

Filter feeding communities within the subtidal zone of Pilbara and lower-west Kimberley coastal waters provide important habitat structure and food for many species. They are found on both hard and soft substrates, and include a high diversity of sponges, soft corals (such as gorgonians and sea whips), tunicates and cnidarians. Soft sediment filter feeding communities also have a high diversity of burrowing invertebrate fauna, including polychaete worms, molluscs and crustaceans, as well as surface dwelling organisms such as sea stars, sea urchins and crabs. These invertebrates are covered in more detail in Section 5.11.

There is little known of the filter feeding communities located in the subtidal zone of Eighty Mile Beach, however, habitat surveys at the southern end of the proposed marine park near Cape Keraudren found well developed filter feeding communties on hard substrates, including reef inundated with sand (Zuideveld *et al.,* 2010). These communities were often associated with macroalgae and seagrass communities in the same area. Coastal waters to the west of the proposed marine park between Onslow and Cape Keraudren were sampled by Hooper *et al.,* (2002) and found 344 species of sponges in 129 genera, of which 127 (37%) were endemic. Hooper also made an assessment of Australia-wide sponge populations and found that the North-West Shelf of Western Australia is one of five regions in Australia with more than 250 species.

Subtidal filter feeding communities are protected throughout the state under the WC Act and the FRM Act. In addition, development proposals that may impact on filter feeding communities are subject to an environmental impact assessment by the DEC/EPA in accordance with *Guidance for the Assessment of Environmental Factors. Benthic Primary Producer Habitat Protection* (Environmental Protection Authority, 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"* (Environmental Protection Authority, 1998a).

Filter feeding communities in the proposed marine park are considered to be generally undisturbed. Filter feeding communities within the proposed marine park may be susceptible to existing or potential pressures from dredging and dredge spoil dumping, industrial development activities, introduced marine pests and nutrient input from vessels and mainland facilities.

Further study of the subtidal areas adjacent to Eighty Mile Beach is required to determine the spatial extent, diversity and cover of soft sediment filter feeding communities in the proposed marine park. It is likely that these areas provide important foraging and internesting habitat for flatback turtles.

### Summary of management arrangements for subtidal filter feeding communities (hard and soft substrate)

| | |
|---|---|
| **Current status** | Subtidal filter feeding communities in the proposed marine park are generally undisturbed. |
| **Existing and potential uses and/or pressures** | • Habitat degradation and physical disturbance from trawling, pipe-laying, dredging and dredge spoil dumping.<br>• Sewage discharge, oil spills and pollutants from vessels, vehicles, marine infrastructure and mainland facilities/activities.<br>• Introduction of marine pests from ballast water and hull fouling. |
| **Current major pressures** | No current major pressures. |

| | | | |
|---|---|---|---|
| **Management objectives** | To ensure that subtidal filter feeding communities are not significantly impacted by human activities in the marine park. | | |
| **Specific Strategies/ Actions** | Ensure the marine research program (Section 4.6) seeks to characterise the diversity, abundance and natural variability of hard and soft substrate subtidal filter feeding communities within the proposed marine park and their contribution to the ecosystem to facilitate long-term management (DEC) **(H)**. | | |
| **Performance measures** | 1. Species diversity<br>2. Abundance of indicator species | **Desired trends** | 1. Constant<br>2. Constant or positive |
| **Short-term target** | To be developed as required. | | |
| **Long-term targets** | No loss of subtidal filter feeding community diversity and biomass in the proposed marine park as a result of human activity within the marine park, except for designated areas where a different level of acceptable change is approved by the appropriate government regulatory authority. | | |

## 5.5 Macroalgal and seagrass communities

*Macroalgal and seagrass communities, which are important primary producers and provide habitat and refuge areas for fish and invertebrates.*

Seagrass and macroalgae are important components of shallow tropical marine environments, providing energy and nutrients for detrital grazing food webs, and food for other species. Dense seagrass and macroalgal meadows enhance the habitat value of benthic habitats by increasing structural diversity and by stabilising soft substrates. They also vary seasonally in response to water temperature, day length, reproductive cycles, physical disturbance and regrowth (Fulton *et al.*, 2006; Kirkman, 1997).

Seagrasses are widespread along the Pilbara and lower-west Kimberley coast, particularly *Halophila ovalis* (Wells *et al.,* 1995; Walker and Prince, 1987). Brown algae are the most abundant group of macroalgae in the region, with *Sargassum* spp., *Dictyopteris* spp. and *Padina* spp. being the dominant species. The most common green algae are the articulate coralline *Halimeda* spp., while prominent red algal species include crustose corallines, non-corallines and algal turf (Pendoley and Fitzpatrick, 1999; Wells *et al.*, 1995).

The intertidal and sub-tidal zones of Eighty Mile Beach are largely unvegetated, supporting no seagrass and few macroalgae. However, seagrass and macroalgal communities of note are found in the proposed marine park west of Cape Keraudren. The seagrass meadows in this area are believed to contribute to the regular presence of dugongs (see Section 5.10).

Macroalgae and seagrasses are protected throughout Western Australia 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 DEC and EPA in accordance with the *Guideline for the Assessment of Environmental Factors. Benthic Primary Producer Habitat Protection* (Environmental Protection Authority, 1998a) and *Guidance for the Assessment of Environmental Factors, Seagrass Habitat Protection* (Environmental Protection Authority, 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 marine park have been identified and these communities are currently in good condition. Management will focus on improving our understanding of the abundance and spatial extent of macroalgae and seagrass in the proposed marine park.

**Summary of management arrangements for macroalgal and seagrass communities**

| | |
|---|---|
| **Current status** | The macroalgal and seagrass communities in the proposed marine park are likely to be undisturbed. |
| **Existing and potential uses and/or pressures** | • Physical disturbance from vessel activity (e.g. anchoring, propeller scour), infrastructure development (i.e. pipe-laying, dredging, dredge spoil dumping) and trawling.<br>• Increased turbidity and sedimentation from industry activities or infrastructure development.<br>• Sewage discharge, oil spills and pollutants from vessels, vehicles, marine infrastructure and mainland facilities/activities. |
| **Current major pressures** | No current major pressure. |
| **Management objective** | To ensure that macroalgal and seagrass communities are not significantly impacted by human activities in the marine park. |

| | | | |
|---|---|---|---|
| **Specific Strategies/ Actions** | 1. See zoning strategy (Section 4.1.2) (DEC) **(H-KMS)**.<br>2. Ensure the marine research program (Section 4.6) seeks to develop a more comprehensive understanding of the diversity, biomass and spatial extent of macroalgae and seagrass in the proposed marine park (DEC) **(H)**. | | |
| **Performance measures** | 1. Species diversity<br>2. Biomass | **Desired trends** | 1. Constant<br>2. Constant |
| **Short-term target** | To be developed as required. | | |
| **Long-term target** | No loss of macroalgal or seagrass community diversity and biomass in the proposed marine park as a result of human activity within the marine park, except for designated areas where a different level of acceptable change is approved by the appropriate government regulatory authority. | | |

## 5.6 Coral reef communities (subtidal/intertidal)

*Intertidal and subtidal reef systems with a high diversity of hard corals.*

The Pilbara and Kimberley regions are home to a diverse and distinct range of hard corals. However, there are relatively few, well-developed coral communities in the Eighty Mile Beach and Canning meso-scale bioregions (Department of Environment and Conservation, 2009). This represents a significant delineation between the Pilbara and north Kimberley coral communities (Gilmour *et al.,* 2006). The Pilbara coastline has more than 200 stony coral species from 57 genera, of which approximately half belong to the families Acroporidae and Faviidae (Gilmour *et al.,* 2006).

A small number of coral communities are found in the proposed Eighty Mile Beach Marine Park at the southern end near Cape Keraudren and in sparse areas on the outer edge of the intertidal mudflats (Department of Conservation and Land Management, 1994; Davidson *et al.*, 2008).

Corals reefs are important primary producers and provide food, substrate and shelter for a wide variety of marine life, including sponges, sea stars, sea urchins, crustaceans, molluscs, gastropods, worms and fish. Some inhabitants of coral reef communities, such as fish, molluscs, ornamental aquarium fish and juvenile corals, are targeted by recreational and commercial fishers. Coral reefs also protect coastlines from wave erosion and are important for nature-based tourism, research and education.

DoF is responsible for the management of the recreational and commercial take of coral in Western Australia. Currently, corals can only be legally collected in the proposed marine park by commercial fishers who hold a Marine Aquarium Managed Fishery licence with an endorsement to take corals. Recreational fishers are not permitted to take live or dead coral anywhere in Western Australia.

Development proposals that may impact on corals are subject to an environmental impact assessment by the EPA, with advice from DoF and DEC, and in accordance with *Guidelines for the Assessment of Environmental Factors. Benthic Primary Producer Habitat Protection* (Environmental Protection Authority, 1998a). This statement, which has its basis in the EP Act, indicates that 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"* (Environmental Protection Authority, 1998a).

Coral reef communities of the proposed marine park are generally in good condition. However, there are some localised disturbances to coral reef communities in the vicinity of Cape Keraudren where fishing, reef walking and collecting (both commercially for coral and recreationally for species that occur within coral reefs) may occur. Other existing or potential localised pressures on coral reef communities include fishing causing the removal of top order predators and physical disturbance from anchor damage.

Management for this value will focus on gaining an increased understanding of corals in the proposed marine park, including their diversity, spatial extent and natural variability.

### Summary of management arrangements for coral reef communities (subtidal/intertidal)

| | | | |
|---|---|---|---|
| **Current status** | Coral reef communities in the proposed marine park are generally undisturbed, although some localised disturbances associated with fishing, reef walking and collecting do exist. | | |
| **Existing and potential uses and/or pressures** | • Fishing causing the removal of top order predators and localised and serial depletion of coral from commercial collection.<br>• Physical disturbance from reef walking and recreational collecting of non-coralline species, commercial coral collecting, anchoring and infrastructure development.<br>• Sewage discharge, oil spills and pollutants from vessels, vehicles, marine infrastructure and mainland facilities/activities.<br>• Increased turbidity and sedimentation from industry activities or infrastructure development.<br>• Introduction of marine pests from ballast water and hull fouling. | | |
| **Current major pressures** | No current major pressure. | | |
| **Management objective** | To ensure that coral reef communities are not significantly impacted by human activities in the marine park. | | |
| **Specific Strategies/ Actions** | 1. See zoning strategy (Section 4.1.2) (DEC) **(H-KMS)**.<br>2. Ensure the marine research program (Section 4.6) seeks to characterise the diversity, biomass and natural variability of coral reefs within the proposed marine park (DEC) **(M)**. | | |
| **Performance measures** | 1. Species diversity<br>2. Biomass (extent in hectares) | **Desired trends** | 1. Constant<br>2. Constant or positive |
| **Short-term target** | To be developed as required. | | |
| **Long-term target** | No loss of coral reef diversity and biomass in the proposed reserves as a result of human activity within the marine park, except for designated areas where a different level of acceptable change is approved by the appropriate government regulatory authority. | | |

## 5.7 Mangrove communities and saltmarshes

*Mangrove communities and adjacent saltmarshes, provide nutrients to the surrounding waters and habitat for fish and invertebrates.*

Mangrove communities are important primary producers and are of ecological and economic importance. Organisms that inhabit mangrove communities include snails, oysters, barnacles, worms, crabs, prawn, fish, sharks, rays and birds. Mangroves help to stabilise coasts and control erosion by trapping and binding sediment, as well as providing habitat and refugia for a variety of fish, elasmobranchs, invertebrates and birds (Carr and Livesey, 1996). Mangroves are also important for heritage, research and education.

Saltmarshes and saltpans in the proposed marine park generally occur on wide pans in intertidal areas that are infrequently inundated by very high tides. Little is known of the ecological services provided by these habitats in tropical Australia, however, it is likely that some fish and invertebrates use these areas when inundated (Connolly and Lee, 2007). Further investigation is needed to better understand the importance of these areas and to determine what detrimental impacts these areas currently may be subject to.

Significant mangrove communities and saltmarshes exist in the south-west corner of the proposed Eighty Mile Beach Marine Park in creeks and bays between Cape Keraudren and Mulla Mulla Down Creek. Mangroves are virtually non-existent along Eighty Mile Beach, except for a few small tidal creeks near Mandora that contain two stands of *Avicennia marina* comprising approximately 100ha of 4–6m-high woodland (Lane, 2003; Semeniuk, 1997) and in the north at Cape Missiessy.

The mangrove habitats in the south-west corner of the proposed marine park are considered part of the Pilbara Coast coastal sector, as described by Semeniuk (1993). Seven species of mangroves have been identified at the nearby De Grey River Delta. The dominant species are the red mangrove *(Rhizophora stylosa)* and the white mangrove *(Avicennia marina),* while the club mangrove *(Aegialitis annulata),* river mangrove *(Aegiceras corniculatum),* ribbed-fruit orange mangrove (Bruguiera exaristata), yellow-leaf spurred mangrove *(Ceriops tagal)* and milky mangrove *(Excoecaria agollocha)* can also be found throughout the proposed marine park (Semeniuk, 1997). The Pilbara mangrove communities have national and international significance as they are the largest single unit of relatively undisturbed tropical arid zone mangrove in the world (Semeniuk, 1997).

Mangroves are protected throughout Western Australia under the WC Act and native vegetation clearing provisions of the EP Act. In addition, development proposals that may impact on mangrove communities are subject to an environmental impact assessment by DEC and EPA in accordance with *Guidance Statement for Protection of Tropical Arid Zone Mangroves along the Pilbara Coastline* (Environmental Protection Authority, 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 and Eighty Mile Beach coastline, habitats and dependent habitats is *"… to maintain ecological function and sustainability"* (Environmental Protection Authority, 2001).

The mangrove communities and saltmarshes of the proposed marine park are in a generally undisturbed condition and there are no identified current major pressures on these communities. There are a number of identified localised pressures within the proposed marine park, including fishing, four-wheel-driving and boat launching, which have resulted in localised impacts to mangroves and saltmarshes, however, these are not considered to be widespread. Within the proposed Eighty Mile Beach Marine Park these localised disturbances occur in the vicinity of Cape Keraudren, Blaze Bay and Mulla Mulla Down Creek. Other potential pressures include clearing for industry facilities and infrastructure, litter, nutrient input from industry, vessels or mainland discharge and alteration of community structure from fishing.

Management of this value will focus on implementing an appropriate zoning scheme to provide additional protection to some mangrove areas, identifying areas of high impact and managing those impacts as required. Improving our understanding of the ecological role of saltmarsh areas is also a priority.

**Summary of management arrangements for mangrove communities and saltmarshes**

| | | | |
|---|---|---|---|
| **Current status** | The mangrove communities in the proposed marine park are generally undisturbed, although some localised disturbances associated with fishing, four-wheel-driving and boat launching exist. | | |
| **Existing and potential uses and/or pressures** | • Direct (e.g. removal of individuals) and indirect (e.g. changes to community structure) impacts from recreational fishing.<br>• Habitat degradation and physical disturbance from vehicles, trampling by livestock, recreational fishing and authorised and unauthorised clearing for infrastructure and facilities (e.g. pipelines, boat launch areas).<br>• Sewage discharge, oil spills and pollutants from vessels, vehicles, marine infrastructure and mainland facilities/activities. | | |
| **Current major pressures** | No current major pressure. | | |
| **Management objective** | To ensure that mangrove communities and saltmarshes are not significantly impacted by human activities in the marine park. | | |
| **Specific Strategies/ Actions** | 1. See zoning strategy (Section 4.1.2) (DEC) **(H-KMS)**.<br>2. Ensure the marine research program (Section 4.6) seeks to develop a more comprehensive understanding of the ecological role of saltmarshes in the proposed marine park and their spatial extent (DEC) **(H)**.<br>3. Assess the nature and level of impact (or potential impacts) of human activities on mangroves within the proposed marine park (DEC) **(H)**.<br>4. Ensure the marine monitoring program (Section 4.7) monitors mangrove diversity and biomass in the proposed marine park (DEC) **(H)**. | | |
| **Performance measures** | 1. Species diversity<br>2. Biomass | **Desired trends** | 1. Constant<br>2. Constant or positive |
| **Short-term target** | To be developed as required. | | |
| **Long-term target** | No loss of mangrove diversity and biomass in the proposed marine park as a result of human activity within the marine park, except for designated areas where a different level of acceptable change is approved by the appropriate government regulatory authority. | | |

## 5.8 Waterbirds, including migratory species (KPI)

*Waterbirds, including a number of nationally and internationally important migratory shorebirds and waders, are found in the proposed marine park.*

Eighty Mile Beach supports a high diversity and abundance of waterbirds. Ninety-seven species of waterbirds have been recorded, including 42 species listed under international migratory agreements (Hale and Butcher, 2009). Eighty Mile Beach offers undisturbed nesting and refuge sites, with the intertidal sand, mudflat and mangrove communities providing food such as worms, bivalves and other invertebrates. As well as being of great ecological significance, the seabird and shorebird communities are a popular attraction for visitors to the area. Migratory shorebirds have been observed along the entire length of the beach. Many of these species feed almost exclusively within the intertidal flats while others use the beach for roosting but feed on adjacent inland areas.

The waterbirds of Eighty Mile Beach are of national importance and of international significance, with the Eighty Mile Beach and inland Mandora marsh wetland being recognised as a Wetland of International

Significance under the Ramsar Convention. Eighty Mile Beach is considered one of the most significant sites in Australia for migratory shorebirds and is one of the most important non-breeding areas within the East Asian-Australasian flyway (Watkins *et al.,* 1997; Piersma *et al.,* 2005; Rogers *et al.*, 2009). Birds in the flyway migrate from breeding grounds in north-east Asia and Alaska to non-breeding grounds in Australia and New Zealand, covering the journey twice in a single year. The beach section provides important staging and feeding areas, particularly on southward migration routes, between August and November (Piersma *et al.,* 2005).

For many of the most abundant species, counts indicate the highest numbers occur in the northern third of the beach, particularly the stretch south of the Anna Plains beach access road (Rogers *et al.*, 2009). However, different species concentrate on different areas of the beach. Due to the great length of the beach, total ground counts of the site in the non-breeding season are limited to three records of shorebird numbers: October 1998 (465,890), November 2001 (472,418), and December 2008 (311,638) (Rogers *et al.*, 2009). These counts represent the highest number of shorebirds for any site in Australia and among the highest counts for the flyway. Based on the December 2008 complete count, the most abundant species within the beach section are great knot (128,600), bar-tailed godwit (51,100), red-necked stint (28,200), red knot (23,100) and greater sand plover (22,700) (Rogers *et al.*, 2009).

All birds are fully protected under the WC Act and some of the seabirds and shorebirds of the proposed marine park are also protected under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). Many of the seabirds and shorebirds within the proposed marine park are covered by international treaties with Japan, China and South Korea so Australia has an international obligation to protect these species. Sixty-four species recorded on Eighty Mile Beach are listed as threatened or migratory under the EPBC Act, with 42 of these also listed under international migratory bird agreements (Hale and Butcher, 2009).

There are no current major pressures on waterbirds in the proposed marine park, although there are some pressures that have the potential to affect bird populations. Physical disturbance from recreational vehicles, aircraft and people can cause birds to fly away from nests, leaving them exposed to predators. Taking flight can also cost shorebirds energy and reduce feeding opportunity, which may impact on their ability to put on enough weight to migrate successfully. Other potential anthropogenic pressures come from uncontrolled pets and livestock, infrastructure development, degradation of critical habitat, predation, litter and pollution.

Management of waterbirds in the proposed marine park will focus on managing human activities that may impact upon waterbirds through vehicle restrictions and education programs and ensuring an adequate monitoring program is established.

### Summary of management arrangements for waterbirds, including migratory species (KPI)

| | |
|---|---|
| **Current status** | Waterbird diversity and abundance in the proposed marine park and pressures acting on populations while they are in the area are considered to be stable. |
| **Existing and potential uses and/or pressures** | • Disturbance to feeding, roosting and nesting activity from people, vehicles, vessels, low flying aircraft, livestock and pets.<br>• Loss or degradation of critical habitat (e.g. coastal vegetation, intertidal sand and mudflats).<br>• Entanglement and ingestion of litter.<br>• Sewage discharge, oil spills and pollutants from vessels, vehicles, marine infrastructure and mainland facilities/activities.<br>• Predation by foxes, cats and birds of prey. |
| **Current major pressures** | No current major pressures. |

| | | | |
|---|---|---|---|
| **Management objectives** | To ensure that waterbirds are not significantly impacted by vehicle traffic and human activities in the marine park. | | |
| **Specific Strategies/ Actions** | 1. See zoning strategy (Section 4.1.2) (DEC) **(H-KMS)**.<br>2. Assess the nature and level of impact (or potential impacts) of human activities on waterbirds within the proposed marine park (DEC) **(H-KMS)**.<br>3. Ensure the marine monitoring program (Section 4.7) is designed to appropriately monitor waterbird populations in the proposed marine park (DEC) **(H-KMS)**.<br>4. Ensure the education and interpretation program (Section 4.2) aims to increase awareness of the nationally and internationally significant waterbird populations to visitors and users of the marine park, the adverse impacts that some human activities can have upon them and steps users can take to minimise the impacts (DEC) **(H-KMS)**.<br>5. In liaison with native title holders, adjacent land managers and users of the proposed Eighty Mile Beach Marine Park, investigate the need for and implement as appropriate, a permanent vehicle closure of the northern part of Eighty Mile Beach from Cape Missiessy to Mandora Creek to protect waterbirds (DEC, DoT, local government authority (LGA), adjacent landholders, traditional owners) **(H)**.<br>6. In liaison with native title holders, adjacent landholders and users of the proposed Eighty Mile Beach Marine Park, investigate the need for and implement as appropriate, vehicle management programs that prevent inappropriate levels of disturbance of waterbirds in, and adjacent to, the proposed marine park from vehicle traffic (DEC, DoT, LGA, adjacent landholders, traditional owners) **(H)**. | | |
| **Performance measures** | 1. Species diversity<br>2. Abundance | **Desired trends** | 1. Constant<br>2. Constant or positive |
| **Short-term target** | To be developed as required. | | |
| **Long-term target** | Maintain or improve waterbird abundance and diversity in the proposed marine park from an appropriately established baseline. | | |

## 5.9 Marine turtles (KPI)

*Marine turtles are of special conservation status. Flatback turtles are endemic to northern Australia and nest within the proposed marine park*

Green *(Chelonia mydas)*, hawksbill *(Eretmochelys imbricata)* and flatback *(Natator depressus)* turtles all nest on beaches and islands within the Pilbara and lower west Kimberley regions, while loggerhead *(Caretta caretta)* and leatherback *(Dermochelys coriacea)* turtles are known to frequent the region. Flatback turtles are the only species known to nest on Eighty Mile Beach, with peak nesting from November to December and peak hatching from February to March.

Flatback turtles have particular importance as the only nesting populations in the world exist in northern Australia. Recent studies indicate that the flatback population at Eighty Mile Beach may be a different genetic stock to those populations further west at Barrow Island and Mundabullangana and further north along the Kimberley coast (Pittard, 2010). Flatback turtles prefer to nest on large open beaches, avoiding reef areas near and adjacent to their nesting beaches. They also favour soft-bottom habitat for foraging and internesting (Pendoley, 2005; Limpus, 2004). Flatback turtles are unique in that they remain relatively close to their natal beaches, and do not have a pelagic, open-water life stage. These all highlight the significance of Eighty Mile Beach and its adjacent intertidal and subtidal soft-bottom habitats to nesting, internesting and foraging flatback turtles.

Visitor observation of turtle nesting behaviour is a popular activity in some parts of the region, making marine turtles potentially economically significant to the nature-based tourism industry. These activities must be carefully managed to ensure impacts to turtles are minimised.

All marine turtles are protected under Western Australia (WC Act) and commonwealth (EPBC Act) legislation and also recognised under international conservation agreements. DEC has previously prepared an information guide for marine turtles of the Pilbara coast, which includes a Turtle Watcher's Code of Conduct.

No current major pressures have been identified for marine turtles within the proposed marine park, however, nesting turtles and turtle hatchlings are susceptible to pressures within the proposed marine park from habitat degradation and disturbance from four-wheel-driving and human interaction, and disturbance or predation by feral (for example, dogs, foxes and cats) and native species (for example, varanids and birds). Other existing or potential pressures on turtles within the proposed marine park include boat strikes, commercial trawl fishing, litter and entanglement, unsustainable traditional hunting and egg collection, changes in light horizons from facilities or recreational usage, pollution and oil spills. Their conservation in the proposed marine park is also a priority due to the current and potential industrial development in other parts of the region.

Management of this value will focus on managing human activities that may impact upon nesting turtles and hatchlings. Strategies will include working with adjacent land managers to build upon current strategies to manage seasonal access and use of vehicles on beaches, education programs to improve interaction rules and improving our knowledge and understanding of marine turtles to improve management outcomes.

### Summary of management arrangements for marine turtles (KPI)

| | |
|---|---|
| **Current status** | While the status of turtle populations in the proposed marine park requires further investigation, the results of a flipper tagging program at nearby Mundabullangana (Cowrie Beach) suggests the flatback nesting population to be stable (Pendoley *et al.*, in press). |

<table>
<tr><td>Existing and potential uses and/or pressures</td><td colspan="3">• Disturbance to turtles, nesting females and hatchlings from vehicles, human interaction, industrial activities (e.g. blasting, dredging, pipe-laying, seismic exploration), lights and flares from onshore and offshore facilities (industrial and residential) and vessels (including boat strikes).<br>• Predation of eggs and hatchlings by feral and native species.<br>• Degradation to nesting habitat from recreational use and onshore developments/ activities of coastal landforms.<br>• Entanglement and ingestion of litter.<br>• Sewage discharge, oil spills and pollutants from vessels, vehicles, marine infrastructure and mainland facilities/activities.<br>• Unsustainable traditional hunting and egg collection across the species range.<br>• Illegal, unreported and unregulated fishing and collection.</td></tr>
<tr><td>Current major pressures</td><td colspan="3">No current major pressures.</td></tr>
<tr><td>Management objective</td><td colspan="3">To ensure that marine turtles in the proposed marine park are not significantly impacted by human activities occurring within, and immediately adjacent to, the marine park.</td></tr>
<tr><td>Specific Strategies/ Actions</td><td colspan="3">1. Ensure the marine research program (Section 4.6) continues to increase understanding of the location and significance of critical areas and nesting beaches in and adjacent to the proposed marine park (DEC) (H-KMS).<br>2. Ensure the marine monitoring program (Section 4.7) is designed to appropriately assess long-term changes in abundance and usage (DEC) (H-KMS).<br>3. In liaison with native title holders, managers of the Eighty Mile Beach Caravan Park, Cape Keraudren Reserve, adjacent pastoralists and users of the proposed marine park, investigate and implement as appropriate, a seasonal vehicle closure of the entire turtle rookery at Eighty Mile Beach and Cape Keraudren during flatback turtle nesting and hatching season (November to March) (DEC) (H-KMS).<br>4. As part of the education and interpretation program (Section 4.2), work with the managers of the Eighty Mile Beach Caravan Park, Cape Keraudren Reserve, and adjacent pastoralists to ensure users of the proposed marine park are aware of, and comply with, the DEC Turtle Watcher's Code of Conduct (DEC) (H-KMS).<br>5. Develop and implement, as appropriate, feral predator abatement programs to protect nests and hatchlings from predation (DEC) (H).<br>6. Assess the nature, level and significance of impacts from human activities on marine turtles within the proposed marine park (DEC) (H).<br>7. Work with Aboriginal groups and communities to manage the sustainable take of turtles and eggs for cultural purposes, avoiding take from highly protected zones where possible (DEC) (M).</td></tr>
<tr><td>Performance measures</td><td>1. Number of nesting turtles<br>2. Number of nests disturbed by predators or human activities<br>3. Reproductive success</td><td>Desired trends</td><td>1. Constant or positive<br>2. Negative<br>3. Constant or positive</td></tr>
<tr><td>Short-term target</td><td colspan="3">To be developed as required.</td></tr>
<tr><td>Long-term targets</td><td colspan="3">Maintain or improve flatback turtle abundance and breeding success impacted by human activities within, and immediately adjacent to, the proposed marine park.</td></tr>
</table>

## 5.10 Marine Mammals

*Dugongs and several cetacean species inhabit the shallow warm waters of the Pilbara and Kimberley regions or migrate through the area.*

Dugongs occur throughout the subtropical and tropical Indo-West Pacific, with the majority of the population distributed across northern Australia. More than 2,000 individuals inhabit the Pilbara region from Locker Point, south of Onslow, to the De Grey River mouth (Prince *et al.*, 2001). Dugongs commonly aggregate in protected shallow bays and mangrove channels. They feed primarily on *Halophila* seagrass and migrate depending on food source availability. Dugongs are regularly sighted in the shallow water embayments at the southern end of the proposed Eighty Mile Beach Marine Park in relatively large aggregations (*pers com*., S. Bunce) and migration of animals between coastal waters of the Pilbara and Kimberley regions through Eighty Mile Beach Marine Park is likely to occur (*pers com.*, D. Holley).

Current knowledge on the distribution, migratory habits and regional and local importance of the proposed marine park for cetaceans is limited. The large tidal range of the proposed Eighty Mile Beach Marine Park would make passage by some of the larger cetacean species unlikely through the northern parts of the proposed marine park (Jenner, *et al.*, 2001). However, there have been a number of unconfirmed sightings and reports of humpbacks whales, including mother–calf pairs, close to the beach and cliffs at Cape Keraudren and in waters west of Mount Blaze.

A number of smaller cetacean species, including the common bottlenose dolphin *(Tursiops truncatus)*, Indo-Pacific bottlenose dolphin *(Tursiops aduncus),* Australian snubfin dolphin *(Orcaella heinsohni)* and the Indo-Pacific humpback dolphin *(Sousa chinensis)* are likely to occur in the proposed marine park (*pers com.*, S. Allen). These species have been sighted and/or recorded further along the adjacent coastline to the west and east of the proposed marine park, but further investigation is required to confirm the spatial and temporal extent of the species in the proposed marine park and the significance of the areas and habitats they use.

All marine mammals found in, and adjacent to, Western Australian waters are protected under both Western Australia (WC Act) and commonwealth (EPBC Act) legislation.

There are no current major pressures on dugongs and cetaceans within the proposed marine park. Existing or potential pressures on dugongs and cetaceans include loss of seagrass habitat, which can be removed by trawling or affected by sedimentation from industrial activities (e.g. shipping, dredging, pipe-laying, construction of facilities), entanglement and ingestion of litter, trawl fishing, pollution and oil spills and human interaction. Traditional hunting of dugongs still occurs in some parts of the Pilbara and Kimberly regions but is believed to be uncommon within the proposed marine park.

Management of this value will focus on improving our understanding of cetaceans that are found in the park, their distribution, abundance and use of the area.

### Summary of management arrangements for marine mammals.

| | |
|---|---|
| **Current status** | The population status of marine mammals in the proposed marine park is unknown. |
| **Existing and potential uses and/or pressures** | • Disturbance from human interaction (e.g. vessels, nature-based tourism), boat strike, trawl fishing, industrial activities (e.g. blasting, dredging, pipe-laying, seismic exploration).<br>• Degradation to feeding (seagrass) and/or critical habitat.<br>• Entanglement and ingestion of litter.<br>• Sewage discharge, oil spills and pollutants from vessels, vehicles, marine infrastructure and mainland facilities/activities.<br>• Potential for unsustainable hunting. |

| | | | |
|---|---|---|---|
| **Current major pressures** | No current major pressure. | | |
| **Management objective** | To ensure that marine mammals that inhabit or migrate through the propose park are not significantly impacted by human activities in the marine park. | | |
| **Specific Strategies/ Actions** | 1. See zoning strategy (Section 4.1.2) (DEC) **(H-KMS)**.<br>2. Ensure the marine research program (Section 4.6) seeks to gain an understanding of the diversity and abundance of marine mammals and location of critical areas for marine mammals in, and adjacent to, the proposed marine park (DEC) **(H)**. | | |
| **Performance measures** | 1. Dugong abundance<br>2. Cetacean abundance and diversity | **Desired trends** | 1. Constant or positive<br>2. Constant or positive |
| **Short-term target** | To be developed as required. | | |
| **Long-term target** | No loss of marine mammal abundance or diversity in the proposed marine park as a result of human activities within the marine park. | | |

## 5.11 Invertebrates

*A high diversity of marine invertebrate fauna, which is an important food source for a variety of animals including birds, fish and turtles, as well as providing for recreational and commercial fishing opportunities.*

Marine invertebrates are those marine animals without a backbone and include corals, sponges, rock lobster, crabs, squid, cuttlefish, other molluscs, jellyfish, anemones, tunicates, echinoderms, marine worms and many burrowing crustaceans and molluscs. The proposed Eighty Mile Beach Marine Park has a high diversity and abundance of marine invertebrates, which can be attributed to the range of habitats throughout the region. Most are tropical species, which are common throughout the Indo-West Pacific region as well as many endemic species.

Invertebrates are found in most habitats and ecological communities of the proposed marine park, including subtidal filter feeding communities, mangroves, macroalgae and seagrass, and intertidal sand and mudflats. They are a food source for fish, birds and turtles, while several invertebrate species, including prawns, crabs, squid, octopus, oysters, rock lobsters, sea cucumbers and hermit crabs, are targeted by recreational and commercial fishers in the region.

Under the FRM Act, DoF is responsible for the management of the recreational and commercial take of invertebrate species. Pearling in Western Australia is managed under the *Pearling Act 1990*. See sections 6.5 and 6.6 for further details on fishing and pearling.

Invertebrate populations of the proposed marine park generally are undisturbed and there are no current major pressures on them. However, there are localised areas where recreational and commercial fishing may be impacting on local populations of invertebrates within the proposed Eighty Mile Beach Marine Park. These areas are in the vicinity of the Eighty Mile Beach Caravan Park and Cape Keraudren, where recreational fishing for octopus, clams, oysters, squid and shells occurs, as does commercial collection of shells and hermit crabs. Other existing or potential pressures on invertebrates include alteration of community structure from fishing and introduced species, sedimentation from industry activities and construction of facilities and oil spills.

The management of targeted invertebrate species needs to consider the viability of the populations of these species in the context of maintaining the values of the proposed marine park. Species for which extraction is considered appropriate will be managed by DoF, in accordance with sustainable development

principles. A key management strategy is the education of park users about the detrimental impacts of human activities on invertebrates in the proposed marine park.

### Summary of management arrangements for invertebrates

| | | | |
|---|---|---|---|
| **Current status** | Invertebrates within the proposed marine park generally are undisturbed. | | |
| **Existing and potential uses and/or pressures** | • Recreational and commercial fishing including:<br>a. live shell collecting (e.g. specimen shells and hermit crabs)<br>b. targeted fishing (e.g. prawns, crabs, squid, octopus, lobster, oysters)<br>c. bait collection<br>d. bycatch<br>e. localised depletion of some targeted invertabrates at high-use sites (e.g. Cape Keraudren).<br>• degradation of critical habitat as a result of human activities (e.g. reef walking, dredging, pipe-laying and construction activities).<br>• sewage discharge, oil spills and pollutants from vessels, vehicles, marine infrastructure and mainland facilities/activities.<br>• introduction of marine pests from ballast water and hull fouling.<br>• localised depletion of some targeted invertebrates at high use sites (e.g. Cape Keraudren). | | |
| **Current major pressures** | No current major pressures. | | |
| **Management objectives** | 1. To maintain non-targeted invertebrate species in a generally undisturbed condition.<br>2. To manage targeted invertebrate species for ecological sustainability.<br>3. To maintain targeted invertebrate species that are susceptible to localised depletion at an appropriate level. | | |
| **Specific Strategies/ Actions** | 1. See zoning strategy (Section 4.1.2) (DEC) **(H-KMS)**.<br>2. Assess the nature and level of impact of human activities on invertebrates that are susceptible to localised depletion within the proposed marine park, and implement management strategies to address these impacts as appropriate (DoF, DEC) **(H-KMS)**.<br>3. Ensure the education and interpretation program (Section 4.2) educates marine park users about invertebrate populations within the proposed marine park, and relevant fisheries' regulations that apply (DEC, DoF) **(H)**.<br>4. Identify targeted invertebrate species that require protection from recreational and commercial fishing in the proposed marine park (DEC, DoF) **(H)**. | | |
| **Performance measures** | 1. Species diversity<br>2. Biomass (non-targeted species only) | **Desired trends** | 1. Constant<br>2. Constant or positive |
| **Short-term target** | To be developed as required. | | |
| **Long-term target** | 1. No loss of invertebrate diversity as a result of human activity within the proposed marine park.<br>2. No loss of non-targeted invertebrate species abundance and diversity as a result of human activities within the proposed marine park.<br>3. Abundance and size composition of targeted invertebrate species in sanctuary zones and non-targeted invertebrate species in other zones to be at natural levels Ω. | | |

*Ω In this context, 'natural' refers to the abundance that would occur in areas that are undisturbed and/or unexploited by human activities. This management target may not apply to invertebrate species that have widely distributed life cycles (e.g. pelagic and/or migratory species).*

## 5.12 Finfish (KPI)

*A diversity of finfish species that also provides for recreational and commercial fishing opportunities.*

The coastal waters of the Pilbara and lower west Kimberley regions support a diverse range of predominantly tropical finfish species. A 2000–2002 finfish survey across the north-west coast recorded 352 species of finfish from 194 genera in 82 families (Travers *et al.*, 2003). The most common families were Carangidae (trevally/queenfish), Serranidae (cods), Bothidae (flounders), Lutjanidae (snappers) and Tetraodontidae (puffers).

Many finfish species are specifically targeted by commercial and recreational fishers. Under the FRM Act, 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. Currently, no finfish species found in the proposed marine park are listed as totally protected species under Western Australian fisheries legislation. See sections 6.5 and 6.6 for commercial and recreational fishing socio-economic values.

Finfish populations within the proposed marine park generally are undisturbed, however, there may be some localised impacts on selected site-attached species.

The management of targeted finfish species needs to consider the viability of the populations of these species in the context of maintaining the values of the proposed marine park. Species for which extraction is considered appropriate will be managed by DoF, in accordance with sustainable development principles. A key management strategy is the education of park users about the detrimental impacts of human activities on finfish stocks in the proposed marine park.

**Table 12. Summary of management arrangements for finfish (KPI).**

| | | | |
|---|---|---|---|
| **Current status** | Finfish populations are generally undisturbed. | | |
| **Existing and potential uses and/or pressures** | • Recreational and commercial fishing, including incidental mortality and localised depletion of some targeted invertabrates at high-use sites<br>• Loss and degradation of critical habitat (e.g. nursery areas, aggregation areas) from infrastructure and facilities (e.g. boat ramps, pipelines)and trawling.<br>• Sewage discharge, oil spills and pollutants from vessels, vehicles, marine infrastructure and mainland facilities/activities. | | |
| **Current major pressures** | No current major pressures. | | |
| **Management objectives** | 1. To maintain non-targeted finfish species in a generally undisturbed condition.<br>2. To manage targeted finfish species for ecological sustainability.<br>3. To maintain targeted finfish species that are susceptible to localised depletion at an appropriate level. | | |
| **Specific Strategies/ Actions** | 1. See zoning strategy (Section 4.1.2) (DEC) **(H-KMS)**.<br>2. Assess the nature and level of impact of human activities on finfish that are susceptible to localised depletion within the proposed marine park, and implement management strategies to address these impacts as appropriate (DoF, DEC) **(H-KMS)**.<br>3. Ensure the education and interpretation program (Section 4.2) educates marine park users about finfish within the proposed marine park, and relevant fisheries' regulations that apply (DEC, DoF) **(H)**. | | |
| **Performance measures** | 1. Species diversity<br>2. Biomass (non-targeted species only) | **Desired trends** | 1. Constant<br>2. Constant or positive |
| **Short-term target** | To be developed as required. | | |

| | |
|---|---|
| **Long-term targets** | 1. No loss of finfish diversity as a result of human activity within the proposed marine park.<br>2. No loss of non-targeted finfish species biomass as a result of human activities in the proposed marine park.<br>3. Abundance and size composition of finfish species in sanctuary zones and non-targeted finfish species in other zones to be at natural levels Ω . |

*Ω In this context, 'natural' refers to the abundance that would occur in areas that are undisturbed and/or unexploited by human activities. This management target may not apply to finfish that have widely distributed life cycles (e.g. pelagic and/or migratory species).*

## 5.13 Sharks and Rays

*A diversity of sharks and rays, including protected species.*

The shark and ray populations of the inshore waters of the proposed marine park are dominated by whaler sharks, including pigeye shark (*Carcharhinus amboinensis*), nervous shark *(C. cautus)*, graceful shark *(C. amblyrhynchoides)*, blacktip shark *(C. tilstoni)*, lemon shark *(Negaprion acutidens)*, spinner shark *(C. brevipinna)* and hardnose shark *(C. macloti)*. All four species of sawfish found in Australia also occur in the area *(Pristis clavata, P. microdon, P. zijsron and Anoxypristis cuspidate),* as well as stingrays (Family: Dasyatidae), hammerheads *(Eusphyra blochii)* and shovelnose rays (Family: Rhinobatidae). Small juvenile animals have comprised a significant portion of the shark and ray catch along Eighty Mile Beach (noting that these animals may have been specifically targeted by fishers), highlighting the potential value of the nearshore subtidal and intertidal waters as nursery areas for many of these species (Stevens *et al.*, 2008; Salini *et al.*, 2007).

Sharks and rays were previously taken by commercial gillnetters operating along Eighty Mile Beach (although these exemptions to fish have been removed) and by commercial shark longliners operating offshore (McAuley *et al.*, 2005). The commercial northern shark fisheries are still operating at reduced levels of fishing effort to the north-east of the proposed marine park. However, due to the mobility of some of these species, continued shark fishing in adjacent areas may still be influencing the abundance of shark and ray species in the proposed marine park. Potential effects may be driven by the removal of sharks that may transit the proposed marine park and/or reductions in the breeding biomass of species that use inshore habitats at other stages of their life cycles. Some limited take of sharks and rays may still occur in the proposed marine park as part of the Northern Demersal Scalefish Managed Fishery (two shark per trip limit), but the level of take of sharks and rays in the proposed marine park from commercial fishers is likely to be significantly reduced from previous levels. Some sharks and rays can be taken by recreational fishers.

The DoF continues to monitor the status of commercial shark stocks in the Pilbara and Kimberley regions through ongoing fishery-independent research surveys, biological research and stock assessments for key commercial species. This is in response to risk assessments undertaken by DoF showing that stock levels for some sharks in the region are unacceptable or have a high level of uncertainty (Department of Fisheries, 2010).

Nine shark and ray species found in the proposed marine park are protected under Western Australia and/or Commonwealth legislation, highlighting the significance of the area for these species. Sawfish are totally protected species under the FRM Act with dwarf, freshwater and green sawfish also listed as threatened species under the EPBC Act. All four species have been recorded at Cape Keraudren and along Eighty Mile Beach (Stevens *et al.*, 2008; Heupel and McAuley, 2007; Pember, 2006; McAuley *et al.*, 2005). Sawfish are particularly vulnerable to all types of net fishing due to the susceptibility of their rostra to become easily entangled.

Grey nurse sharks previously have been caught in indeterminate numbers by commercial gillnetters operating in intertidal waters of Eighty Mile Beach (R. McAuley, unpublished data). Based on anecdotal descriptions and because of the proximity of the proposed park boundaries to known distributions of northern river sharks *(Glyphis garricki)* and speartooth sharks *(Glyphis glyphis)*, it is possible that these species may also occur within the area. However, their occurrence has yet to be confirmed off Eighty Mile Beach. Adult dusky sharks *(Carcharhinus obscurus)* have also been recorded from waters off the Pilbara and Kimberley coasts and are, therefore, likely to occur within the proposed park boundaries. However, the dusky shark's highly mobile nature makes it difficult to determine the significance to the species of the limited area defined by the proposed park boundaries.

As with invertebrates and finfish, DoF is responsible for the management of the recreational and commercial take of sharks and rays. DoF will manage species for which extraction is considered appropriate, in accordance with sustainable development principles and in the context of maintaining the values of the proposed marine park (see sections 6.5 and 6.6 for commercial and recreational fishing socio-economic values). For other species, greater understanding of the habitats used in the proposed marine park and their significance requires further investigation. Another key management strategy is the education of reserve users about the potential detrimental impacts of human activities on sharks and rays in the proposed marine park.

With the removal of commercial gillnetting from Eighty Mile Beach, it is likely that anthropogenic pressures on shark and ray populations within the proposed marine park have been reduced. However, a low level of interaction with other commercial and recreational fishers is still likely.

### Summary of management arrangements for sharks and rays

| | | | |
|---|---|---|---|
| **Current status** | Shark and ray populations in the proposed marine park are likely to be stable or increasing, however, no empirical data is available to confirm this. | | |
| **Existing and potential uses and/or pressures** | • Recreational and commercial fishing, including incidental mortality.<br>• Loss and degradation of critical habitat (e.g. nursery areas, aggregation areas) from infrastructure and facilities (e.g. boat ramps, pipelines), trawling, etc.<br>• Sewage discharge, oil spills and pollutants from vessels, vehicles, marine infrastructure and mainland facilities/activities. | | |
| **Management objectives** | 1. To ensure non-targeted shark and ray species are not significantly impacted by human activities in the proposed marine park.<br>2. To manage targeted shark and ray species for ecological sustainability. | | |
| **Current major pressures** | No current major pressures. | | |
| **Specific Strategies/ Actions** | 1. See zoning strategy (Section 4.1.2) (DEC) **(H-KMS)**.<br>2. Ensure the marine research program (Section 4.6) seeks to characterise shark and ray diversity and abundance and location and significance of critical areas within the proposed marine park (DEC, DoF) **(H)**.<br>3. Assess the nature and level of impact of human activities on sharks and rays within the proposed marine park (DEC, DoF) **(M)**.<br>4. Ensure the education and interpretation program (Section 4.2) educates marine park users about the marine park's sharks and rays, relevant fisheries' regulations and appropriate behaviours (DEC, DoF) **(M)**. | | |
| **Performance measures** | 1. Species diversity<br>2. Abundance (non-targeted species only) | **Desired trends** | 1. Constant<br>2. Constant or positive |
| **Short-term target** | To be developed as required. | | |

| | |
|---|---|
| **Long-term targets** | 1. No loss of shark and ray diversity as a result of human activity in the proposed marine park.<br>2. No loss of non-targeted shark and ray species abundance as a result of human activities in the proposed marine park.<br>3. Abundance and size composition of shark and ray species in sanctuary zones and non-targeted shark and ray species in other zones to be at natural levels[Ω]. |

*Ω In this context, 'natural' refers to the abundance that would occur in areas that are undisturbed and/or unexploited by human activities. This management target may not apply to sharks and rays that have widely distributed life cycles (e.g. pelagic and/or migratory species).*

# 6. Management of socio-economic values

Marine parks are created to provide for the 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 while providing opportunities for nature-based recreation, tourism and commercial uses, where appropriate. Within this setting, a range of human values and uses are recognised and will continue consistent with management targets set for habitats and species of conservation interest in the proposed marine park.

It is recognised that conservation estate, such as a marine park, has the capacity to satisfy an important portion of public demand for outdoor recreation and nature-based tourism, and in so doing contributes significantly to the social, psychological, physical and economic wellbeing of the community (Department of Environment and Conservation, 2006). Management of use and visitation in the proposed marine park is guided principally by the zoning scheme and permitted uses (Section 4.1.2), and the management objectives, strategies and targets in sections 4–6, as well as by the provisions of the CALM Act and WC Act in association with other government legislation relating to marine management (Appendix III). DEC's policy No. 18 *Recreation, Tourism and Visitor Services* provides specific guidance for recreation, tourism and visitor services within CALM Act reserves (Department of Environment and Conservation, 2006).

## 6.1 Aboriginal cultural significance

*Aboriginal people maintain connection to their traditional coastal and sea country through identity and place, family networks, spiritual practice and resource gathering. Native title rights and interests are progressively being recognised.*

Archaeological evidence shows that the Pilbara and lower-west Kimberley regions have been inhabited by Aboriginals for about 30,000 years (Department of Indigenous Affairs, 2007). Culturally significant features found in the area include mythological and ceremonial sites, Aboriginal art and middens. Shell middens and evidence of fish traps are testimony to the strong association Aboriginal people in this area had for the sea (Carr and Livesey, 1996). The Dreaming is a key concept in connecting Aboriginal people and their environment. Stories, songlines and sites are embedded within the area and remain a powerful spiritual force for Aboriginal people. Indeed, the land, sea and Aboriginal culture are interconnected.

Three Aboriginal groups have native title claims or determinations in the vicinity of the proposed marine park. These are the Karajarri people at the northern end of the proposed marine park, the Nyangumarta people over the most of the length of Eighty Mile Beach, and Ngarla people in the vicinity of Cape Keraudren. The Karajarri and Nyangumarta people have an overlapping native title claim in the northern section of the proposed marine park and are currently engaged to resolve the claim. Native title claims and determinations, as well as sites held in the DIA Aboriginal Heritage Sites Database, are represented in Figure 6.

Although the majority of local Aboriginal people live in towns such as Port Hedland and Broome, individuals and families have strong ties to particular sites, which are regularly visited. Aboriginal people seek to retain social, spiritual and cultural bonds with their traditional land and sea country. Within the coastal areas of the Pilbara and lower-west Kimberley regions, deltas, coastal creeks and intertidal flats are regarded as being particularly important for resource usage. Current Aboriginal use of the coastal country of Eighty Mile Beach includes camping, nature appreciation, fishing, and harvesting activities. Limited hunting of turtle (predominantly collection of turtle eggs) also occurs.

The Karajarri people have drafted a Coastal Management Plan as part of the process of developing an Indigenous Protected Area (IPA) on their country. Where possible, the proposed Eighty Mile Beach Marine Park should complement the management objectives of the Karajarri IPA. The Nyangumarta people have native title determined over a large portion of the intertidal parts of the proposed Eighty Mile Beach Marine Park and adjoining land. Nyangumarta people regard 'looking after' plants and animals in their coastal and sea country as a priority. The protection and respect of cultural sites, stories and songlines is also viewed as being very important. Aspirations for their coastline and sea country are best summed up by the phrase "Ngalpa warran, ngalpa marrngu", which translates to 'Healthy country, healthy people'. The Nyangumarta are also hopeful of increasing people's understanding about their culture and the connection they have with the land and sea.

Management issues in the proposed marine park include potential human impacts on significant Aboriginal heritage sites (for example, access and disturbance to sensitive sites, litter) and the involvement of Aboriginal people in the management of the proposed marine park. 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, as well as the traditional knowledge pertaining to them. These responsibilities and obligations are of continuing importance to Aboriginal people, particularly with respect to teaching cultural heritage to younger generations.

DEC recognises the need to increase involvement of Aboriginal people in managing conservation lands and water, biodiversity and cultural landscapes. Continued access to areas for cultural purposes and building effective partnerships will be important components of marine resource management.

### Summary of management arrangements for Aboriginal cultural significance

| | |
|---|---|
| **Requirements** | • Recognition of Aboriginal spiritual and cultural value and traditional usage.<br>• Recognition of native title rights and interests for coastal and sea country.<br>• Access for traditional hunting, use of significant sites and cultural activities.<br>• Protection of Aboriginal heritage sites.<br>• Collaborative involvement of traditional owners in management of the proposed marine park. |
| **Management objectives** | 1. To work in partnership with traditional owners to develop joint management arrangements of the proposed marine park that recognises native title rights and interests for coastal and sea country.<br>2. To recognise and gain an increased understanding of Aboriginal spiritual and cultural values, connections and traditional usage with the marine and coastal environment of the proposed marine park.<br>3. To ensure that human activity within the proposed marine park does not significantly affect sites of significance to Aboriginal people.<br>4. To allow ongoing access for traditional hunting, use of significant sites and cultural activities. |

| | |
|---|---|
| **Specific Strategies/ Actions** | 1. Develop Indigenous Land Use Agreements and/or joint management arrangements with relevant native title holders and claimants (DEC, traditional owners, DPC **(H-KMS)**.<br>2. Encourage Aboriginal participation in the long-term management of the proposed marine park through establishment of cooperative management mechanisms, such as a management advisory committee or park council, employment, and interpretation programs (DEC, traditional owners, DPC) **(H)**.<br>3. In partnership with the native title holders and claimants, develop a shared understanding of the significance of the area to Aboriginal people and identify the significance of Aboriginal heritage sites in the proposed marine park (DEC, DIA) **(H)**.<br>4. Collaboratively develop education programs, where culturally appropriate, to raise awareness and knowledge of visitors to the proposed marine park of Aboriginal connections with the marine and coastal environment (DEC) **(M)**. |
| **Reporting** | To be developed as required. |
| **Target/s** | 1. Increased level of participation of traditional owners in the management of the proposed marine park.<br>2. No deterioration of Aboriginal heritage sites as a result of human activities in the proposed marine park.<br>3. Maintenance of Aboriginal heritage values, as determined by DIA. |

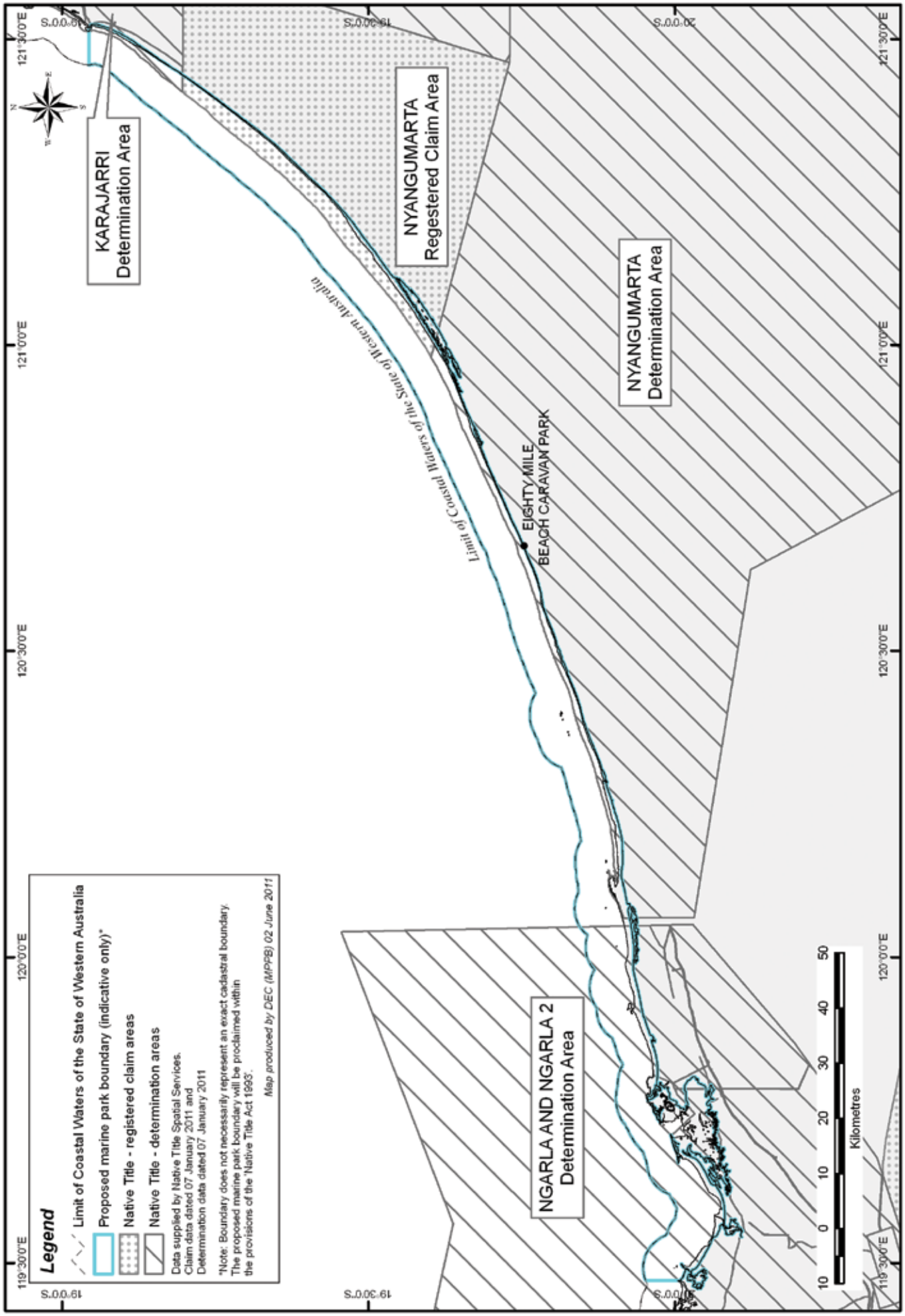


FIGURE 6: Native title claims and determinations within and adjacent to the proposed Eighty Mile Beach Marine Park

## 6.2 European heritage

*The Pilbara and lower-west Kimberley region has a history of European contact dating from 1618.*

Following European settlement of the region in the 1860s, pastoralism was the first major industry in the area with sheep stations being established on the nearby De Grey River. This was followed by the establishment of small ports and service centres along the Pilbara and lower-west Kimberley coast (Scadding, 2008), and the establishment and development of the pearl shell industry in Broome by the turn of the century (Department of Education and Training, 2008). Commercial fishing also had an important early influence on the economic geography of the area (Department of Environment, Water, Heritage and the Arts, 2008). Other European heritage interests immediately adjacent to the proposed marine park include remnants of the end of the rabbit proof fence and a wall used as a lookout post in the Second World War, both at Cape Keraudren.

A historical plane wreck, the *Dutch Dornia,* was recently located within the Anna Plains sanctuary zone. As a cultural heritage site, the wreck is protected under the *Heritage of Western Australia Act 1990.* Under this Act, all development proposals regarding places on the State Register of Heritage Places must be referred to the Heritage Council of Western Australia for advice. The Western Australia Maritime Museum assists the Heritage Council of Western Australia in managing these submerged sites.

Two pearl luggers were wrecked on Eighty Mile Beach in the 1890s and while they have been covered by sand over the years, they may sometimes be exposed after cyclones. Pre-1900 shipwrecks are protected under the *Maritime Archaeology Act 1973* and all shipwrecks over 75 years old are protected under the Commonwealth *Historic Shipwrecks Act 1976*. The Western Australia Maritime Museum has statutory responsibility for management of these wrecks.

The main management issues regarding European heritage in the proposed marine park are potential human impacts on important sites (for example, litter, physical disturbance).

### Summary of management arrangements for European heritage

| | |
|---|---|
| **Requirements** | • Identification and protection of heritage sites. |
| **Management objectives** | 1. To gain an increased understanding of European heritage sites in, or adjacent to, the proposed marine park.<br>2. To ensure that human activities do not significantly impact on heritage sites in the proposed marine park (in collaboration with the Western Australia Museum and Heritage Council of Western Australia). |
| **Specific Strategies/ Actions** | 1. Identify sites of historic importance within the proposed reserve to facilitate long-term management (DEC) **(M)**.<br>2. Provide visitor facilities to enhance visitor enjoyment of, and reduce impacts to, European heritage values of the proposed marine park, where appropriate (DEC) **(M)**. |
| **Reporting** | To be developed as required. |
| **Target/s** | No deterioration of heritage sites as a result of human activities in, or adjacent to, the proposed marine park. |

## 6.3 Remote seascapes (KPI)

*Remote areas with natural vistas of beaches, intertidal platforms, rocky shores, mudflats and mangroves with abundant wildlife.*

The proposed marine park has intrinsic remote and isolated seascape values that offer a wilderness experience to visitors. Remote seascapes comprise panoramic vistas of unimpacted environments, including reefs, rocky shores, mudflats, mangroves and beaches with abundant wildlife. Eighty Mile Beach is the longest beach in Western Australia, extending for more than 200km with curving white sands and dunes. The community can enjoy these attributes from the beach, high vantage points along the coast, from the window of a plane or from a vessel. They also provide commercial value to the tourism industry (such as charter, caravan and camping operators) as a drawcard for tourists.

The degradation of remote seascapes in the proposed marine park has the potential to impact on other values of the proposed marine park, including Aboriginal cultural significance, tourism and coastal use, and sites for recreational fishing where a remote experience is sought. Inappropriate structures along the coastline and in surrounding waters have the potential to degrade the remote seascape values of the proposed marine park. This can include signage, lighting, jetties, marinas and other infrastructure, which impede the remote and unimpacted nature of the proposed marine park. Litter, pollution and the development of roads and facilities that promote visitation also have the potential to impact on remote seascape values. Coastal developments and maritime infrastructure projects must be planned with careful consideration of this value.

Management of remote seascapes of the proposed marine park will concentrate on ensuring that areas of high seascape value are identified and protected. Developments and activities that have the potential to impact on this value should be suitably assessed and where possible, these impacts should be avoided or minimised.

### Summary of management arrangements for remote seascapes (KPI)

| | |
|---|---|
| **Requirements** | • High quality environment (e.g. no litter, high water quality, undeveloped marine and coastal areas).<br>• Undisturbed coastal and marine vistas.<br>• Sensitively designed and located coastal and marine infrastructure. |
| **Management objectives** | To ensure areas with high seascape quality valued by the community are not impacted by visual intrusions or human activities in the proposed marine park. |
| **Specific Strategies/ Actions** | 1. Identify the key characteristics and map the spatial extent of important remote seascapes within the proposed marine park to support long-term management (DEC) **(H-KMS)**.<br>2. Ensure site planning and development proposals for recreational and commercial activities are consistent with maintaining the remote seascapes of the proposed marine park (DEC, LGAs, adjacent land managers) **(H)**. |
| **Reporting** | To be developed as required. |
| **Targets** | No visual intrusion on, or disturbance to, areas of important remote seascape value in the proposed marine park. |

## 6.4 Nature-based tourism

*An undisturbed natural environment offers a variety of attractions and opportunities for visitors to the area, with popular activities, including camping, four-wheel-driving, fishing and wildlife appreciation.*

The proposed marine park offers a range of attractions and opportunities for nature-based tourism and marine recreation. The natural rugged beauty and abundant wildlife provide a valuable experience for visitors who enjoy the natural environment. Activities include camping, four-wheel-driving, fishing, boating and wildlife appreciation.

Eighty Mile Beach Caravan Park is an important holiday destination and popular stopover for travellers along this coast. The area immediately in front of the caravan park is well known for beach fishing, four-wheel driving, shell collecting and wildlife viewing, including shorebirds and nesting marine turtles and their hatchlings. Near the southern extent of the proposed Eighty Mile Beach Marine Park, Cape Keraudren provides another caravan and camping destination and high-use recreational area, with fishing and wildlife viewing the predominant activities in the area. The Shire of East Pilbara's Cape Keraudren Reserve abuts the proposed marine park and encompasses the important recreation, historical and archaeological values of this area. Pardoo Station Stay to the west of Cape Keraudren also offers accommodation and camping facilities, allowing access for tourists to the proposed marine park between Pardoo Creek and Mount Blaze.

An ever-increasing number of visitors to Western Australia experience marine parks and reserves using the services of commercial operators. The CALM Act and *Wildlife Conservation Regulations 2002* (Wildlife Conservation Regulations) require commercial businesses operating within marine parks and reserves to be issued with a commercial operations licence by DEC specifying conditions and the payment of a licence charge. Commercial licences are granted where the activity is of a transient nature or usually involve no permanent infrastructure within a marine park or reserve. Most commercial licences are related to tourism. Commercial licensing may be a new requirement for some commercial businesses operating within the proposed marine park for both on-water activities and fly over tours.

DEC's *Tour Operator Handbook – marine* provides specific information for commercial businesses operating in a marine park or reserve (DEC 2009). Commercial operators are required to hold a wildlife interaction licence in order to interact with whales, whale sharks, dolphins or dugongs. Licences are issued by DEC under the Wildlife Conservation Regulations and strict conditions apply to each type of licence. 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. Vehicle access to the high-usage area in front of Eighty Mile Beach Caravan Park is currently regulated by the owners, especially during the turtle nesting season and access to the Cape Keraudren Reserve is managed by the Shire of East Pilbara. Licences must also be issued by the Department of Fisheries under the FRM Act for any aquatic tour activity that has the potential to impact on fish stocks or the aquatic environment.

The proposed marine park provides a range of opportunities for nature-based tourism and recreation that relies upon attractive natural settings and experiences. The management strategies for this value focus on providing for these nature-based tourism opportunities, while ensuring the ecological values of the marine park are not significantly impacted.

### Summary of management arrangements for nature-based tourism

| | |
|---|---|
| **Requirements** | • High water quality.<br>• High aesthetic quality of environment (e.g. no litter, undeveloped marine and coastal areas).<br>• Equitable access to natural values of the proposed marine park.<br>• Provision of areas free of human impacts for nature appreciation. |
| **Management objectives** | 1. To ensure that nature-based tourism activities are managed in a manner that is consistent with maintaining the ecological and socio-economic values of the marine park.<br>2. To maintain the ecological and socio-economic values of the proposed marine park that are important to nature-based tourism, through the appropriate management of human activities that adversely impact upon these values. |
| **Specific Strategies/ Actions** | 1. License all nature-based tourism operators within the proposed marine park with appropriate conditions (DEC) **(H)**.<br>2. In collaboration with Tourism Western Australia where appropriate, develop Codes of Practice for nature-based tourism operations in the proposed marine park that are consistent with the proposed marine park's objectives, targets and performance measures (DEC, Tourism Western Australia) **(H)**.<br>3. Ensure the granting and renewal of commercial tour vessel licences in relation to marine park access and wildlife interaction is consistent with the management plan permitted use table, management targets and wildlife conservation notices (DEC, MPRA) **(H)**. |
| **Reporting** | To be developed as required. |
| **Target/s** | All tourism operators that operate within the proposed marine park have the required licenses and permits. |

## 6.5 Commercial fishing

*A number of commercial fisheries occur within the proposed marine park.*

Commercial fishing is an important industry in the Pilbara and lower-west Kimberley regions, providing significant economic value. A range of species is targeted using different methods, including traps, lines, nets and hand collection.

The principal commercial fisheries in the region comprise the Pilbara Fish Trawl (Interim) Managed Fishery, Pilbara Trap Managed Fishery, Pilbara Line Fishery and Northern Demersal Scalefish Managed Fishery (line and trap fishery). These fisheries have an estimated combined value of $12 million per annum making them the most valuable finfish sector in Western Australia (Department of Fisheries, 2010). While these fisheries generally target the same species (emporers, snappers and cods), only license holders from Pilbara Line Fishery and Northern Demersal Scalefish Managed Fishery are permitted to fish within the proposed marine park using lines.

The Mackerel Fishery is another line fishery that is permitted to operate in the proposed marine park targeting spanish mackerel *(Scomberomorus commerson)* and grey mackerel *(S. semifasciatus)*. This fishery is licensed to operate along the entire West coast to the Western Australia–Northern Territory border, however, effort in the proposed marine park is likely to have been minimal in recent years (Department of Fisheries, 2010).

The boundaries of the Broome and Nickol Bay Prawn Managed Fisheries extend over the proposed marine park. However, trawling is not permitted within the proposed marine park under the provisions of the Broome Prawn Management Plan, and while trawling is permitted under the Nickol Bay Prawn Management Plan, no trawling has been recorded in the area to date. A permanent closure to finfish trawling closure covers all of the waters of the proposed marine park.

One of the most important zones for the collection of pearl oysters *(Pinctada maxima)* from the wild in the Western Australia Pearl Oyster Fishery, occurs in coastal waters within, and adjacent to, the proposed Eighty Mile Beach Marine Park. The Western Australian pearling industry is believed to be one of the largest remaining wild stock pearl fisheries in the world and provides significant value to the state's economy. In recent years, the wild capture fishery has been valued at $2–6 million (Department of Fisheries, 2010). Some harvesting of pearl oysters by hand during drift dives occurs in the northern portion of the proposed Eighty Mile Beach Marine Park, but most of the harvesting is likely to occur in waters adjacent to the proposed marine park further offshore. No pearl leases occur within the proposed marine park.

Other commercial fisheries that may operate within the proposed marine park include:

- The Specimen Shell Managed Fishery – includes all State waters (except for some closed waters) and is based on the collection of individual shells for display, collection, cataloguing, classification and sale.
- The Marine Aquarium Fish Managed Fishery – a highly selective fishery that operates along the length of the Western Australian coast. Fishers are permitted to take a range of species, including fish (including Syngnathids), coral, live rock, algae, seagrass and invertebrates.
- The Beche-de-mer Fishery – a small, hand-harvest fishery that extends from Exmouth Gulf to the Northern Territory border. A specific spatial closure excludes fishers from collecting within five nautical miles of Cape Keraudren (Department of Fisheries, 2010).
- The Pilbara Developing Crab Fishery – DoF has granted fishing exemptions to explore the commercial viability of blue swimmer crabs *(Portunus pelagicus)* in the region. Effort is unlikely to occur within the proposed marine park with the fishery primarily operating between Onslow to Port Hedland.
- Five authorisations to collect land hermit crabs in Western Australia have been granted, with significant effort occurring along Eighty Mile Beach.

Commercial fishing and pearling is managed by DoF under the FRM Act and *Pearling Act 1990* in accordance with ecologically sustainable development principles that are incorporated within an Ecosystem Based Fisheries Management Framework. A range of management strategies is used, including limitations on fishing gear, closed areas, limits to the number of licenses issued and the monitoring of catch and stock levels. Other management strategies include the use of bycatch reduction devices to minimise the impacts of commercial fishing on non-target species.

The *Fishing and Related Industries Compensation (Marine Reserves) Act 1997* provides the mechanism by which the holder of an existing authorisation for commercial fishing, aquaculture and/or fish processing may seek compensation if the commercial value of the authorisation is diminished. Events that can give rise to compensation are the establishment of a marine nature reserve, or the classification of an area of a marine park as sanctuary area, recreation area or special purpose area in which commercial fishing activity has full or partial fishing restrictions beyond that which would normally be applied by DoF. DoF is responsible for administering this Act and the compensation process.

The primary role of management in relation to commercial fishing and pearling in the proposed marine park is, in liaison with DoF, to ensure that activities in the proposed marine park are ecologically and socio-economically sustainable and to maintain the natural values (for example, high water and sediment quality) on which the industries depend.

The management of commercially targeted species needs to consider the viability of the populations of these species in the context of maintaining the values of the proposed marine park. Fisheries management scales are rarely reconciled with the spatial scales of marine parks 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 species should be protected in part or the entire proposed marine park. This decision would be based on a number of factors, including species distribution, abundance, life history and an assessment of the ecological and socio-economic importance of the species in the context of the reserve (for example, 'icon' species). As is currently the case, targeted species will be managed by DoF, in accordance with sustainable development principles.

**Table 18. Summary of management arrangements for commercial fishing.**

| | |
|---|---|
| **Requirements** | • High water quality.<br>• Maintenance of critical habitats for commercially targeted fish species.<br>• Maintenance of commercially targeted fish stocks.<br>• Equitable access to fishing areas within the proposed marine park, where consistent with the objectives of the proposed marine park. |
| **Management objectives** | 1. To maintain the ecological values of the proposed marine park that are important to commercial fishing.<br>2. In collaboration with DoF, ensure that commercial fishing in the proposed marine park is managed in a manner that is consistent with maintaining the ecological and socio-economic values of the proposed marine park. |
| **Specific Strategies/ Actions** | 1. Implement spatial controls within the marine park (Section 4.1.2) as necessary to provide for:<br>a. conservation outcomes, while allowing for commercial fishing access to appropriate zones<br>b. conservation of critical habitats for commercially targeted species (e.g. nursery areas) (DEC, DoF) **(H-KMS)**.<br>2. Monitor commercial fishing catch/effort within the proposed marine park and report the results publicly and to DEC and the MPRA for the annual and periodic reviews of the implementation of the management plan (DoF, DEC, MPRA) **(H-KMS)**.<br>3. Ensure commercial fishers are aware of the spatial controls and any restrictions that may apply to their operations in the proposed marine park (DoF, DEC) **(H-KMS)**.<br>4. Ensure DoF liaises with the MPRA and DEC in regard to any changes to existing fisheries management arrangements for commercial fisheries that operate within the proposed marine park (DoF, DEC) **(M)**. |
| **Reporting** | To be developed as required. |
| **Target/s** | Implementation of the above management strategies within agreed timeframes. |

## 6.6 Recreational fishing

*A diverse range of quality recreational fishing opportunities for fishers targeting finfish, crabs and other invertebrates.*

Recreational fishing is experiencing significant growth in the region, driven by an increase in tourists visiting or passing through in winter and an increased regional workforce from industrial developments in the area (Department of Fisheries, 2010). Effort is largely concentrated around major settlements outside of the proposed marine park, such as Port Hedland and Broome. However, popular recreational fishing areas exist at Cape Keraudren and along parts of Eighty Mile Beach. It is recognised as a key attraction for people visiting the area.

Recreational fishing along Eighty Mile Beach, Cape Keraudren and Pardoo Station is predominately shore-based, targeting barramundi, threadfin salmon, blue nose salmon, mulloway, tailor, whiting and bream. Mud crabs are also targeted by recreational fishers in mangrove creeks.

Recreational fishing in marine parks is managed by DoF through its Recreational Fisheries Program under the FRM Act and in accordance with the relevant marine park management plan. Management tools include bag and size limits, gear restrictions, seasonal restrictions, licensing and fish habitat protection areas. Some species, such as potato cod, hump-headed maori wrasse and all species of sawfish, are fully protected in all state coastal waters, including the proposed marine park. In 2005, DoF released a management strategy for recreational fishing in the Pilbara–Kimberley region. The review outlines a series of recommendations on future management of recreational fishing, in particular the implementation of new bag limits and new legal size limits, as well as addressing other issues, such as research, resource sharing, possession limits and protection of vulnerable species (Department of Fisheries, 2005b).

Concerns of localised depletion of some recreationally targeted species, including finfish and invertebrates around popular fishing areas, have been raised by some stakeholders. In the context of widely distributed marine species, localised depletion may not be a significant risk to fish stocks, however, it does have the potential to impact on the recreational experience of people visiting the region. Further investigation is required to determine if localised depletion is significantly affecting the social values of the area and what strategies can be employed to address the issue.

### Summary of management arrangements for recreational fishing

| | |
|---|---|
| **Requirements** | • High water quality.<br>• Maintenance of critical habitats for recreationally targeted fish species.<br>• Maintenance of recreationally targeted fish stocks.<br>• Equitable access to fishing areas within the proposed marine park. |
| **Management objectives** | 1. To maintain the ecological values of the proposed marine park that are important to recreational fishing.<br>2. In collaboration with DoF, ensure that recreational fishing in the proposed marine park is managed in a manner that is consistent with maintaining the ecological and socio-economic values of the proposed marine park.<br>3. Cooperate with DoF and stakeholders in maintaining quality recreational fishing opportunities in the proposed marine park. |

| | |
|---|---|
| **Specific Strategies/ Actions** | 1. Implement spatial controls within the marine park (Section 4.1.2) as necessary to provide for:<br>a. conservation outcomes, while allowing for recreational fishing access to appropriate zones<br>b. conservation of critical habitats for recreationally targeted species (e.g. nursery areas)<br>c. monitoring and assessment of human activities (DEC, DoF) **(H-KMS)**.<br>2. Investigate the effects of localised depletion on the quality of recreational fishing opportunities and address identified issues as appropriate (DoF, DEC) **(H-KMS)**.<br>3. Monitor recreational fishing catch/effort within the proposed marine park and report the results publicly, to DEC and the MPRA for the annual and periodic reviews of the implementation of the management plan (DoF, DEC, MPRA) **(H-KMS)**.<br>4. Ensure recreational fishers are aware of the spatial controls and any restrictions that may apply to their activities in the proposed marine park (DEC, DoF) **(H-KMS)**. |
| **Reporting** | To be developed as required. |
| **Target/s** | Implementation of the above management strategies within agreed timeframes. |

## 6.7 Resources and associated industries

*The region's economy is dominated by the mineral and petroleum industries. An increase in industrial operations and associated activities is expected with the continuing growth of the resources sector in the broader region.*

The Pilbara and Kimberley regions are world renowned for their mineral, oil and gas resources. The regions have experienced a substantial boom in the resources sector in recent years and this is predicted to continue as demand in Asia increases (Department of Environment, Water, Heritage and the Arts, 2008). Few sites in the vicinity of the proposed marine park are currently of interest to the petroleum industry, however, some coastal areas adjacent to the proposed marine park are of interest to the mining industry, with exploration leases covering much of the coastal region (Figure 7).

Major ports in the region include Port Hedland and Broome. No future ports (major or minor) are proposed within the proposed marine park. The growth of the north-west's economy is reflected in the number of vessel visits and the intensification of shipping activity. In 2005–2006, Port Hedland had the third highest number of vessel visits in Western Australia (Department of Environment, Water, Heritage and the Arts, 2008). While shipping is not a major activity within the proposed marine park due to the shallow water depths in the proposed marine park, there are an increasing number of vessels in the region supporting offshore petroleum activities.

Mineral, petroleum and industrial operations are managed by DMP under the *Mining Act 1976* and the *Petroleum Act 1967,* and the EPA under the EP Act.

Exploration activities, other than exploration drilling in sanctuary zones, are permitted within marine reserves subject to assessment under the EP Act. Exploration for petroleum and mineral resources below sanctuary zones (that is, at 200 metres or greater depth below the seabed) can be achieved by directional drilling from sites adjacent to a sanctuary zone.

Where petroleum titles have been granted, provided the operator has met the specified requirements as set out in the *Petroleum and Geothermal Energy Resources Act 1967*, the operator will have the right to a production title and be eligible to commence production under strict conditions of approval.

Where exploration permits are located within an existing marine reserve, DMP will advise the proponent

that surface exploration activities will require assessment under the EP Act. Also, under section 15A of the Petroleum and Geothermal Energy Resources Act and section 18A of the *Petroleum (Submerged Lands) Act 1982*, entry into a marine reserve requires the Minister for Mines and Petroleum's approval and that Minister must consult with the Minister for Environment.

Additionally, many companies have developed their own environmental and sustainability principles and commitments (Rangelands Natural Resource Management Coordinating Group, 2005). Environmental risks associated with shipping and ports are managed through a range of state, national and international legislation and agreements. DoT and Department of Planning are responsible for the planning and development of coastal infrastructure, while port authorities are autonomous bodies operating under the *Port Authorities Act 1999* (Department of Environment, Water, Heritage and the Arts, 2008). In 2001, the Australian Quarantine and Inspection Service introduced requirements for the handling and treatment of ballast water in ships entering Australian waters to reduce the risk of introduced marine pests (Australian Quarantine and Inspection Service, 2008).

Increases in industrial and shipping operations and port expansions associated with the growth of the resources sector in the region have the potential to impact on values of the proposed marine park. For example, an increase in visitor numbers, shipping activity and associated activities (such as dredging, spoil disposal and pipe-laying) can significantly increase risks of pollution and oil spills, loss or contamination of marine habitat, introduction of marine pests via the discharge of ballast water, and leaching of anti-fouling agents.

### Summary of management arrangements for resources and associated industries

| | |
|---|---|
| **Requirements** | Equitable access to areas for current and proposed activities within appropriate areas. |
| **Management objectives** | In collaboration with DMP and DoT, ensure that industry and associated activities in, and adjacent to, the proposed marine park are managed in a manner that is consistent with maintaining the ecological and socio-economic values of the proposed marine park. |
| **Specific Strategies/ Actions** | 1. See zoning strategy (Section 4.1.2) (DEC) **(H-KMS)**.<br>2. Provide formal advice to the EPA, DMP, DoT and Commonwealth Department of Sustainability, Environment, Water, Population and Communities (SEWPAC) in relation to the environmental assessment of proposed industrial developments in and adjacent to the proposed marine park (DEC, MPRA) **(H-KMS)**.<br>3. Ensure a coordinated approach to industry assessment and reporting requirements in the proposed marine park taking into account cumulative impact and the values, objectives, targets and performance measures of the proposed marine park (DEC, DMP, DoT) **(H)**. |
| **Reporting** | To be developed as required. |
| **Target/s** | Implementation of the above management strategies within agreed timeframes. |

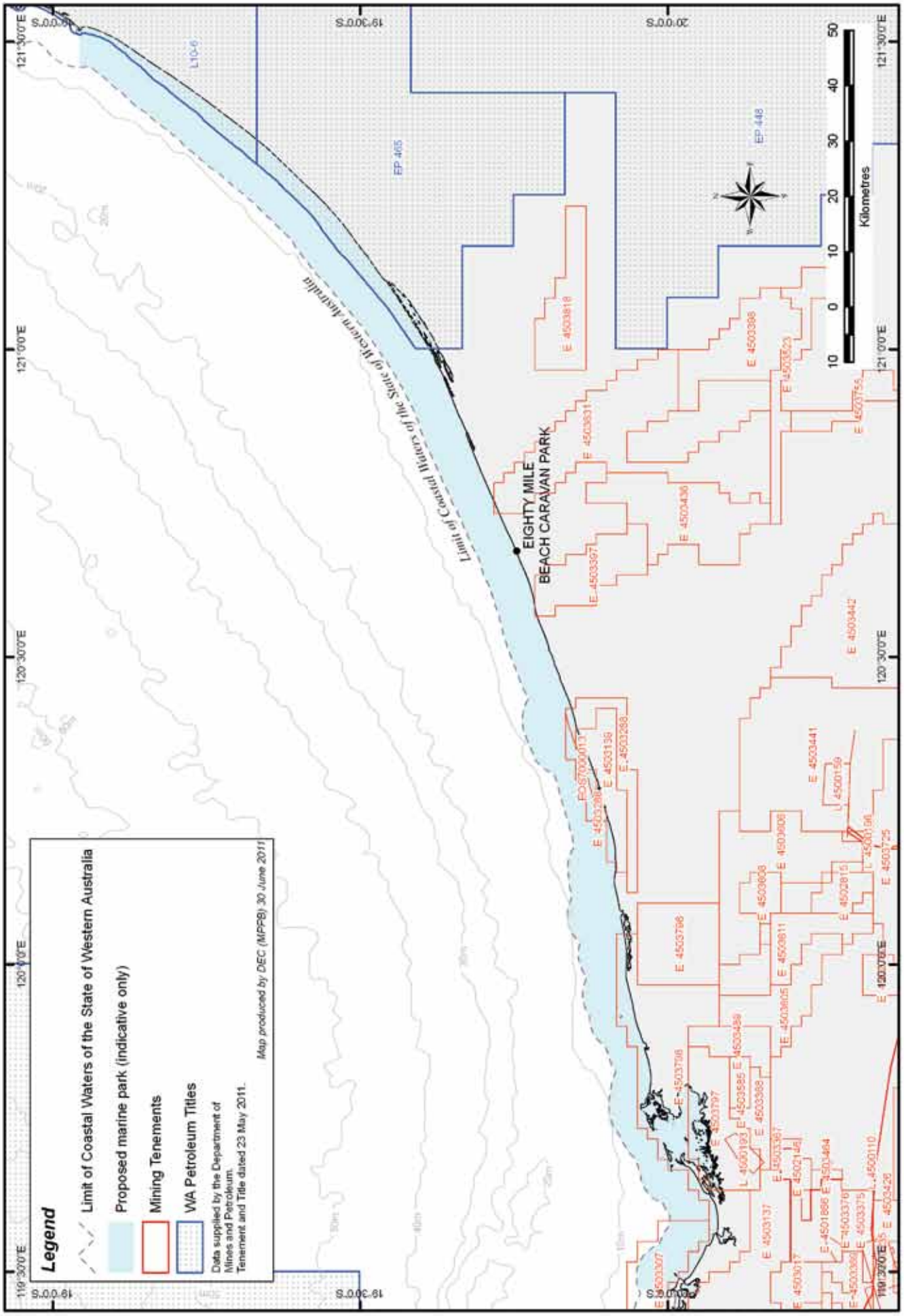


FIGURE 7: Mining and petroleum tenements within and adjacent to the proposed Eighty Mile Beach Marine Park

## 6.8 Research opportunities

*The relatively pristine nature and variety of habitats and communities, combined with the wide range of human activities, provide unique opportunities for ecological and socio-economic research.*

The relatively undisturbed nature of the region, range of habitats and communities, combined with the range of human activities, including commercial fishing and recreational activities, makes the coast a focus for scientific research. Many attributes of the proposed Eighty Mile Beach Marine Park have been relatively well studied and monitored, especially those associated with the Eighty Mile Beach Ramsar site. However, this is not the case for all components. Additional studies of the biodiversity features and environmental processes of the proposed marine park will increase understanding about the region's marine environment. A good understanding of reserve ecology and knowledge about the cumulative long-term impact of recreational and commercial activities on the ecological values of the proposed marine park are fundamental requirements for effective management. It is expected that there will be an increase in the amount of scientific research in the area with the creation of the park. The opportunities that the proposed marine park provides for scientific research are an important value of the area, however, research is also an important management tool for many of the other values.

All research within the proposed marine park requires the appropriate research permit and/or approvals issued under the CALM Act, WC Act, FRM Act, EPBC Act and/or *Western Australia Animal Welfare Act 2003*, as relevant to the research proposal.

Most scientific research programs have relatively benign sampling methods. However, the combined effect of many 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').

### Summary of management arrangements for research opportunities

| | |
|---|---|
| **Requirements** | • Access to representative sites in areas free of human impacts for scientific reference sites and in areas with human activities for impact reference sites.<br>• Equitable access to the proposed marine park for ecological and socio-economic research opportunities. |
| **Management objectives** | 1. To ensure the values of the proposed marine park upon which scientific research depends are not diminished as a result of human activities in the proposed marine park.<br>2. To provide access and opportunities for scientific research in the proposed marine park. |
| **Specific Strategies/ Actions** | 1. See zoning strategy (Section 4.1.2) (DEC) **(H-KMS)**.<br>2. See overarching management strategies in Section 4.6. |
| **Reporting** | To be developed as required. |
| **Target/s** | Implementation of the above management strategies within agreed timeframes. |

# 7. Auditing and reviews

Progress in implementing the management plan and in assessing management effectiveness against the stated objectives will be reviewed periodically through a formal process. Management targets of selected key ecological and socio-economic values of the reserves are used as key performance indicators (KPI) of management effectiveness. The KPIs reflect both the conservation priorities and the management imperatives of the MPRA, DEC and the community. The KPIs for the proposed marine park will be the management targets for the following values:

- geomorphology
- intertidal sand and mudflat communities
- marine turtles
- waterbirds, including migratory species
- finfish
- remote seascapes.

## 7.1 Annual review by the Department of Environment and Conservation

The prioritised strategies outlined in sections 4–6 of the management plan will be implemented primarily through the annual works programs of DEC's Kimberley regions, Marine Science Program and other specialist DEC branches. DEC's Kimberley Region will also prepare an annual review of management plan implementation for the MPRA's consideration. Key parts of the annual review will include the identification of issues affecting implementation; progress in implementing the management plan strategies; and the condition of ecological and social values against performance measures and targets.

## 7.2 Audit by the Marine Parks and Reserves Authority

The MPRA is responsible for assessing the implementation of management plans and is guided by an audit policy. The MPRA will examine the annual reviews prepared by DEC's Kimberley region, together with those for other Western Australian marine parks and reserves, and prepare an annual audit report. The MPRA will also assess implementation of the management plan on a periodic basis (for example, mid-term) and before the statutory 10-year review of the plan. Periodic and 10-year assessments will be based on the preceding annual reviews and input from stakeholders regarding the management of the proposed marine park.

## 7.3 Revision of the management plan

This management plan will guide management of the proposed marine park for a period of 10 years, or until such time as a statutory revision is undertaken and a new management plan prepared. The CALM Act specifies that in the event of such a revision not occurring by the end of the plan's specified lifespan, the plan will remain in force in its original form unless it is revoked by the Minister for Environment or a new plan is approved. Full public consultation will occur at the time of a revision and before a new management plan is submitted to the MPRA and then to the Minister for Environment for approval.

## 7.4 Links with the State of the Environment reporting

The Western Australian *State of the Environment Report*, which has been published in 1992, 1998 and 2007, is designed to communicate credible, timely and accessible information about the current condition of the environment to decision makers and the community. The reports discuss objectives, indicators, overall condition, key findings and suggested responses for marine and terrestrial ecosystems. Relevant marine issues covered by this framework include the degradation of the marine environment, marine contamination, introduced marine species and emerging issues (such as marine debris). The audit process for Western Australia's marine parks and reserves, as described above, is broadly consistent with the State of the Environment reporting framework (EPA 2007).

## 7.5 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). The national *State of the Environment Report*, which has been published in 1996, 2001 and 2006 is prepared by an independent committee to provide an assessment of the Australian environment (Australian State of the Environment Committee, 2006). A range of performance assessment criteria is being developed to assess whether the goals of the NRSMPA are being achieved.

# Part C

# 8. Appendices

## Appendix I: Reserve tenure

Reservation of intertidal areas between the low-water mark and high-water mark is a 'future act' under the Commonwealth *Native Title Act 1993* as intertidal areas are identified as an 'onshore place'. As the proposed marine park consists of extensive intertidal areas containing habitat and species of considerable marine conservation value, it will be important for DEC to work with native title holders to develop management arrangements, potentially through the registration of Indigenous Land Use Agreements (ILUAs). This may enable reservation of the intertidal area as a marine park to be progressed or, alternatively, managed by agreement for its conservation and cultural values in a way that is complementary to the objectives for park management.

Currently, a 40-metre wide coastal strip of UCL between the high-water mark and the boundaries of adjacent pastoral leases extends along the eastern boundary of the proposed marine park. In 2015, this strip is proposed to become wider (up to two kilometres in some areas) after agreement between the Government of Western Australia and adjacent pastoralists (Anna Plains, Mandora, Wallal, Pardoo and De Grey stations) to relinquish portions of these lands, as part of the 2015 Pastoral Lease Renewals project. These areas have been identified as important for managing flatback turtle and migratory shorebirds populations within, and adjacent to, the proposed marine park. These areas will be held as UCL with a view to future reservation under the CALM Act pending stakeholder consultation and resolution of native title.

There are several other reserves that abut the boundaries of the proposed marine park. For example, Reserve 39135 is a recreation reserve vested in the Shire of East Pilbara at Cape Keraudren and extends into intertidal areas. Other reserves that were gazetted around the 1900's primarily for the purposes of watering places for stock, also abut the boundaries of the proposed marine park.

### Marine reserve types and definitions as outlined in the CALM Act

The CALM Act provides for the classification of marine reserves as marine nature reserve, marine park or marine management area. To determine the appropriate category for a proposed reserve, it is necessary to assess the conservation significance and current and future uses of the area. Thedecision is guided by the various reserve types as set out in the CALM Act (outlined below).

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 the:*

*a) conservation and restoration of the natural environment*

*b) protection, care and study of Indigenous flora and fauna*

*c) 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*

*d) production of petroleum and associated activities".*

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 200m*

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

Under the statutory classification of Class A reserves, 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. Any substantial change to the management plan requires a statutory three-month public submission period and approval by the Minister for Environment, Minister for Fisheries and Minister for Mines and Petroleum.

# Appendix II: Bioregional setting

### Climate and oceanography

The proposed Eighty Mile Beach Marine Park is located on the north-west coast of Western Australia between the major centres of Port Hedland and Broome. With an average annual precipitation of approximately 370 millimetres (mm) recorded at the Mandora weather observation station and an average annual evaporation between 3200mm and 3600mm, the proposed marine park is situated on the most arid coast in Australia and is one of only five arid coasts in the world (V & C Semeniuk Research Group, 2000). Most rainfall occurs from December to March, while August to October are the driest months (Bureau of Meteorology, 2010).

Temperatures are hottest in the summer months with a mean monthly temperature range from the mid 20ºCs to high 30ºCs. The minimum mean monthly temperature in winter is 12.5ºC and the maximum is 28.9ºC. Winds are strongest in the summer months and are predominantly north-westerly, while winter winds are generally weak and variable. Cyclones often impact the region and are most common from December to April, bringing increased rainfall and strong winds to the area (Bureau of Meteorology, 2010).

Oceanographic conditions offshore from Eighty Mile Beach are driven by the presence of southward flowing ocean currents that drive warm, low salinity water into the region. The Leeuwin Current, driven by the Indonesian throughflow, has the most influence on the region, however, this is somewhat reduced due to the width of the North West shelf (Condie *et al.*, 2006; Hutchins, 2004). The Leeuwin Current is strongest during the winter months.

The nearshore waters of Eighty Mile Beach generally are turbid, due to the strong tidal flows and episodic river runoff in the region, particularly during cyclone events. The waters further offshore tend to be clearer. Tides on Eighty Mile Beach are semi-diurnal and have a range of about six metres, although

maximum spring tides can exceed 10 metres. Water temperatures in the region range from 30°C to 32°C in summer (October to December) and from 18°C to 21°C in winter (June to August) (Bureau of Meteorology, 2010; Semeniuk, 1996; Semeniuk, 1983).

### Geology and geomorphology

Eighty Mile Beach is a 220km-long stretch of sandy beach and dune system that is broken up by a few small mudflat bays with mangrove communities. Seaward of the beach are extensive fine-sediment tidal mudflats that can span several kilometres toward the ocean. There is no fluvial runoff as no rivers enter the ocean on the coast (Rangelands Natural Resource Management Coordinating Group, 2005). The beach and foredunes comprise coarser calcareous sand, with a narrow floodplain covered with grasses and pindan woodland immediately inland from these (Hale and Butcher, 2009).

An abrupt change in the coastal geomorphology occurs in the south-west along Eighty Mile Beach and past Cape Keraudren to the western boundary. This area of the proposed marine park is characterised by rocky shores, with narrow sandy beaches, small tidal creeks such as Pardoo Creek and Mulla Mulla Down Creek, and mangrove lined muddy bays. Significant saltmarsh flats occur further inland behind the mangroves (Department of Conservation and Land Management, 1994; Stevens *et al.*, 2008).

### Regionalisation

Under the classification scheme provided in IMCRA (Department of Environment and Heritage, 2006), the proposed Eighty Mile Beach Marine Park is located almost exclusively within the Eighty Mile Beach meso-scale bioregion. To the west is the Pilbara Nearshore meso-scale bioregion, which overlaps with the south-west corner of the proposed marine park. To the north is the Canning meso-scale bioregion (Figure 3). These meso-scale bioregions, along with the Pilbara Offshore and North West Shelf meso-scale bioregions make up the Northwest Provincial Bioregion.

The Eighty Mile Beach bioregion stretches from Cape Keraudren to Cape Missiessy and is characterised by a long sand beach and extensive intertidal mudflats. The Pilbara Nearshore bioregion is relatively shallow, covering the nearshore area to 10m depth from Cape Keraudren to North West Cape. The Pilbara Nearshore bioregion has generally turbid waters and is characterised by intertidal mud and sand flats with fringing mangals and coral reefs surrounding some of the offshore islands (Department of Environment and Heritage, 2006).

The adjacent terrestrial subregion to the Eighty Mile Beach marine bioregion is Pindanland, in the Dampierland bioregion (Department of Sustainability, Environment, Water, Population and Communities, 2010). The recognised special values of the Pindanland subregion that are related to the ecological values of Eighty Mile Beach include the extensive mudflats of Eighty Mile Beach, resulting from major paleoriver systems; the enormous numbers of migratory birds found at Eighty Mile Beach; and coastal swamps adjacent to Eighty Mile Beach (Graham, 2001).

### Habitats, flora and fauna

Marine biota of the Pilbara and lower-west Kimberley regions comprise tropical species of the Indo-West Pacific, with high levels of endemism. The presence and distribution of flora and fauna and their associated habitat types within the proposed marine park are primarily associated with the beaches and extensive intertidal mudflats of Eighty Mile Beach, and the rocky shores and mangrove lined bays in the south-western corner.

As well as being a unique and important value in their own right, the intertidal sand and mudflat communities of Eighty Mile Beach provide an extremely important ecological service for other species and ecosystems in and adjacent to the marine park. These communities have a high diversity of infauna (particularly molluscs) living within the substrate and 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 which in turn provide a food source for larger fish and waterbirds.

As a major waterbird roosting, nesting and feeding area, Eighty Mile Beach is of both national importance and of international significance, and has been recognised as such under the Ramsar Convention. Eighty Mile Beach also forms part of the East Asian–Australasian Flyway, and is the primary staging area for shorebirds on their way to and from Asia, Alaska and eastern Siberia. It supports more than one per cent of the flyway population (or one per cent of the Australian population for resident species) for 21 species (Hale and Butcher, 2009). Eighty Mile Beach is also considered the most significant site internationally (in terms of bird numbers) for nine migratory species in the East Asian–Australasian Flyway.

A variety of marine habitats in the Pilbara and lower-west Kimberley supports important populations of marine turtles. Five of the seven species of marine turtle that exist worldwide are known to occur in the region. Of these, only flatback turtles *(Natator depressus)* are known to nest on beaches within the proposed marine park. However, green *(Chelonia mydas)*, hawksbill *(Eretmochelys imbricata),* loggerhead *(Caretta caretta)* and leatherback *(Dermochelys coriacea)* turtles are likely to frequent waters of the proposed Eighty Mile Beach Marine Park. The only known nesting populations of flatback turtles in the world exist in northern Australia, making these areas globally significant.

Macroalgal and seagrass communities occur in the coastal waters around Cape Keraudren to the western boundary of the proposed Eighty Mile Beach Marine Park. In addition to providing energy and nutrients for detrital grazing food webs, macroalgae and seagrass provide food and habitat for a range of higher order species. Eighty Mile Beach is largely devoid of both macroalgae and seagrass in its intertidal and subtidal areas.

Mangroves and adjacent saltmarshes provide important habitat and nutrients to many organisms, including snails, oysters, barnacles, worms, crabs, prawns, fish, sharks, rays and birds. Significant mangrove communities exist in the south-west corner of the proposed Eighty Mile Beach Marine Park in creeks and bays between Cape Keraudren and Mulla Mulla Down Creek. Mangroves are virtually non-existent along Eighty Mile Beach itself, except for a few small tidal creeks near Mandora. Seven mangrove species have been identified along the Pilbara and lower-west Kimberley coastline. These communities have national and international significance from a geoheritage perspective, because they are the largest single unit of relatively undisturbed tropical arid zone mangrove in the world (Semeniuk, 1997).

Coral reef communities can be found in intertidal and subtidal zones in the vicinity of Cape Keraudren. Coral reefs are important primary producers, providing food, substrate and shelter for a wide variety of marine life, including sponges, sea stars, sea urchins, crustaceans, molluscs, gastropods, worms and fish. Recreational and commercial fishers target some inhabitants of coral reef communities, such as fish, molluscs, ornamental aquarium fish and corals.

Subtidal filter feeding communities on hard substrates are known to be located in the south-western corner of the proposed marine park. They have a high diversity of sponges, soft corals, such as gorgonians and sea whips, tunicates and cnidarians. The distribution and abundance of soft sediment subtidal filter feeding communities within the proposed marine park is uncertain and additional habitat knowledge will be gained during the life of the plan. It is known from other places that such communities may provide a significant ecological service to other values in the park, such as internesting and foraging marine turtles.

Dugongs occur throughout the subtropical and tropical Indo-West Pacific, with the majority of the population distributed across northern Australia. More than 2,000 individuals inhabit the Pilbara region from Locker Point, south of Onslow, to the De Grey River mouth (Prince *et al.*, 2001). Dugongs are regularly seen in the south-western corner of the marine park (*pers com.*, S. Bunce) and migration of animals between coastal waters of the Pilbara and Kimberley regions through Eighty Mile Beach Marine Park is likely to occur (*pers com.*, D. Holley). A number of smaller cetaceans inhabit the waters of the proposed marine park (*pers com.*, S. Allen) with larger animals being reported off Cape Keraudren and to the west of Mount Blaze on the southward migration along the Western Australia coast.

A number of shark and ray species occur in the proposed marine park, including many whalers and sawfish. While further investigation is required, the coastal waters of the proposed marine park may provide important habitat for a number of sharks and rays at varying life stages.

### Socio-economic values

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

Many Aboriginal people of the region have a strong spiritual and cultural connection to the coastal country of the Eighty Mile Beach region. One expression of this historical and contemporary connection is through native title, which has been determined for much of the intertidal areas of the proposed marine park to the Karajarri, Nyangumarta and Ngarla people. Many of the deltas, coastal creeks and intertidal flats are particularly important for resource use and form part of dreaming stories and songlines that have ongoing significance.

Remote seascapes and abundant wildlife are major attractions for visitors to the region, supporting a number of tourism ventures. The most popular activities include fishing, boating, wildlife appreciation and four-wheel driving.

Recreational fishing effort is largely centred around accessible areas along the coast with Cape Keraudren and the Eighty Mile Beach Caravan Park being popular recreational fishing areas within the proposed marine park. A variety of species are targeted, the most highly regarded including emperor (Lethrinidae), seaperch (Lutjanidae) and cod (Serranidae) species as well as salmon (Salmonidae), barramundi (Latidae) and mud crabs (Portunidae). Many other finfish and invertebrate species are caught. Primary recreational fishing techniques are line fishing (both shore and boat-based) and hand collection.

Coastal and offshore waters of the Pilbara and lower-west Kimberley provide valuable fishing and pearling grounds for a range of commercially targeted species. Commercial fisheries that may operate within the proposed marine park include the Nickol Bay Prawn Managed Fishery, Northern Demersal Scalefish Managed Fishery, Pilbara Line Fishery, Mackerel Managed Fishery, Beche-de-mer Fishery, Pilbara Developing Crab Fishery, Marine Aquarium Managed Fishery, Specimen Shell Managed Fishery, and Pearl Oyster Fishery.

The Pilbara and Kimberley regions are renowned for their mineral, oil and gas resources and produce valuable export dollars for Australia. There has been a substantial boom in the resources sector in recent years and this is predicted to continue. Major ports are located outside of the proposed marine park at Dampier, Port Hedland and Broome, as well as a privately owned and operated facility at Cape Lambert. The number of vessel visits to the region has increased in recent years and shipping activity supporting offshore petroleum exploration and production has intensified. There is potential for continued increase in large-scale industrial developments in the region.

Human activity in the marine environment of the Pilbara and lower-west Kimberley regions is increasing and as a result, the cultural, recreational, commercial and tourism uses need to be managed to ensure compatibility with, and to minimise impact on, the conservation values within and adjacent to the proposed marine park.

## Appendix III: Legislative and policy context

### State context

The marine parks and reserves system in Western Australia is being progressively established to represent the rich and varied marine biodiversity of the state and to provide a variety of other social benefits that parks can provide. Enhanced management of the state's marine biodiversity provides conservation, social and economic benefits to Western Australia.

DEC has primary responsibility for implementing and managing marine parks and reserves in Western Australia. The CALM Act, administered by DEC, is the State legislation under which marine parks and reserves are created in state waters. The MPRA is the statutory body in which marine parks and reserves

are vested (legally entrusted). As such, it plays a pivotal role in the development of management plans, establishment of marine parks and reserves and in auditing the implementation of the management plan and its effectiveness. The MPRA's audit function is fundamental in ensuring that management of these reserves is achieving stated objectives and targets. The management plan provides the principal framework to enable the MPRA to carry out this function.

The WC Act, which is also administered by DEC, provides legislative protection for flora and fauna across the state's lands and waters. The *Wildlife Conservation Regulations 1970* regulate interaction with fauna and flora through a licensing system. In addition, the Conservation and Land Management Regulations 2002 provide a mechanism to manage human impacts in marine parks and reserves through enforcement and licensing. DoF remains responsible for the management and regulation of recreational and commercial fishing and aquaculture in marine parks and reserves in accordance with the FRM Act.

The *Fishing and Related Industries Compensation (Marine Reserves) Act 1997* provides the mechanism by which the holder of an existing authorisation for commercial fishing, aquaculture and/or fish processing may seek compensation if the commercial value of the authorisation is apparently diminished. Events that can give rise to compensation are the establishment of a marine nature reserve, or the classification of an area of a marine park as sanctuary area, recreation area or special purpose area in which commercial fishing activity has full or partial fishing restrictions beyond that which normally would be applied by DoF. DoF is also considering making provisions for compensation to be applicable for marine management areas.

The *Western Australian Marine Act 1982* and *Navigable Waters Regulations 1958* regulate boating in all state waters. These acts are administered by DoT. The establishment of mooring control areas in marine parks and reserves will be achieved through the *Shipping and Pilotage Act 1967* or other appropriate legislative instrument. DEC will seek appointment of an appropriate 'controlling authority', in accordance with the *Shipping and Pilotage (Mooring Control Areas) Regulations 1983,* or alternative legislative mechanism as appropriate, to facilitate the management and control of mooring control areas in marine parks and reserves. In addition, any development that may have a significant effect on the environment in or adjacent to a marine park or reserve (for example, marina, port or jetty) may be referred to the EPA to determine if it needs to be assessed under Part IV of the EP Act by the EPA. DEC has responsibility for the regulation of pollution in state marine waters, also under the EP Act.

### Responsibilities of authorities and government agencies

DEC, as the primary manager of marine parks and reserves, collaborates with other authorities and agencies that have responsibilities for marine and/or coastal areas (Table 2) to ensure that various regulatory and management practices are complementary. In some cases, MOUs are developed to facilitate cooperation and promote operational efficiency. For example, in 2005 a MOU was developed between the then Minister for the Environment and the then Minister for Fisheries to establish principles of cooperation and integration between DEC and DoF in the management of the state's marine protected areas. Under this MOU, DEC works closely with DoF through collaborative operational plans for efficient and effective delivery of the strategies contained within the management plan for which there is overlapping or shared agency responsibility, or mutual interest.

**Table 2: State authorities and agencies with responsibilities in the proposed marine parks**

| | |
|---|---|
| Marine Parks and Reserves Authority | • vesting body for marine conservation reserves<br>• provides policy advice to the Minister for Environment<br>• audits marine management plan implementation by DEC. |
| Department of Environment and Conservation | • manages marine parks and reserves vested in the MPRA. This includes:<br>a. preparation of management plans<br>b. implementation of management plans<br>c. coordination of other agencies' involvement<br>d. implementation of education, public participation and monitoring programs<br>e. wildlife research and management<br>f. management of nature-based tourism<br>g. ensuring compliance with the CALM Act and WC Act.<br>• ensures integrated management of marine parks and reserves with adjoining mainland and island conservation reserves<br>• assists the EPA in the process of assessing proposals that may significantly affect the marine environment, including marine parks and reserves<br>• administers pollution control legislation. |
| Department of Fisheries | • manages and regulates commercial and recreational fishing and aquaculture in all state waters, including marine parks and reserves, which includes the application of restricted seasons, bag and size limits<br>• lead role in enforcement of fisheries legislation in marine parks and reserves<br>• implements education programs. |
| Department of Transport | • 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)<br>• chairs and supports the State Coordinating Committee, which provides the mechanism to coordinate the management of marine pollution incidents<br>• responsible for management of vessel navigation and in the development and management of support facilities. |
| Environmental Protection Authority | • assesses, reports and makes recommendations on proposals that may significantly affect the marine environment, including marine parks and reserves. |
| Department of Water | • responsible for licensing, regulation and allocation of water supplies<br>• monitors streams, groundwater quality and flows. |
| Department of Mines and Petroleum | • administers Acts that control mineral and petroleum exploration and development<br>• regulates petroleum and mining industry operations. |
| Department of Indigenous Affairs | • protects Indigenous heritage and culture under the Aboriginal Heritage Act 1972. |
| Western Australian Maritime Museum | • protects pre-1900 shipwrecks and artefacts under the *Maritime Archaeology Act 1973*. All shipwrecks over 75 years old are declared and protected under the Commonwealth *Historic Shipwrecks Act 1976*. |

### National and international context

At the national level, the conservation of marine biodiversity, maintenance of ecological processes, and the sustainable use of marine resources, are addressed by the Intergovernmental Agreement on the Environment. This agreement is implemented through actions developed under national strategies, such as the National Strategy for Ecologically Sustainable Development (Commonwealth of Australia, 1992), the National Strategy for the Conservation of Australia's Biological Diversity (Commonwealth of Australia, 1996), 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 (Australian and New Zealand Environment Conservation Council Task Force on Marine Protected Areas, 1999).

The proposed marine park contributes to the NRSMPA. The NRSMPA is a national system of marine protected areas that contain representative samples of Australia's marine ecosystems. The NRSMPA is being developed cooperatively by government agencies responsible for conservation, protection and management of the marine environment. 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 (Australian and New Zealand Environment Conservation Council Task Force on Marine Protected Areas, 1999). The principles of the reserve system being comprehensive, adequate and representative are outlined below:

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

Development of the NRSMPA fulfils Australia's international responsibilities and obligations as a signatory to the Convention on Biological Diversity (United Nations Environment Program, 1994), provides a means of meeting obligations under the Convention on Migratory Species (Bonn Convention) and Australia's bilateral Migratory Bird Agreements with Japan, China and the Republic of Korea. In addition, it supports the International Union for the Conservation of Nature's (IUCN) Protected Areas Program that promotes the establishment and management of a global representative system of marine protected areas (Australian and New Zealand Environment Conservation Council Task Force on Marine Protected Areas, 1999).

The Commonwealth EPBC Act, which is administered by SEWPAC, includes provisions to protect matters of national environmental significance. These include the ecological character of internationally important wetlands, nationally listed threatened species and ecological communities, listed migratory species, the Commonwealth marine environment, the values of world heritage properties, the values of national heritage places, and protection of the environment from the impact of nuclear actions. Listed migratory species include those listed under the Bonn Convention and bilateral agreements for protection of migratory birds with Japan, China and Republic of Korea. This list also includes a number of cetaceans, dugong *(Dugong dugon)*, whale shark *(Rhincodon typus)* and great white shark *(Carcharodon carcharias).* Other listed marine species include seals, marine turtles, sea snakes, crocodiles, seahorses, sea-dragons and pipefish.

# Appendix IV: Management framework

### Best practice management model

In 1997, a working group of Australian and New Zealand Environment Conservation Council (ANZECC) undertook a benchmarking best-practice project to review the status of management of protected areas across natural resource management agencies in Australia. The ANZECC working group identified criteria that they considered critical for natural resource management which were included in a best-practice model outlined in the report *Best Practice in Performance Reporting in Natural Resource Management* (Meredith, 1997). In 2000, a taskforce of the IUCN World Commission on Protected Areas developed a management effectiveness framework (Hockings *et al.*, 2000). This framework is now being used widely around Australia and overseas to help guide and structure management approaches and performance reporting.

These best-practice approaches and principles have implications for management planning and have been embedded into the development and structure of this outcome-based management plan.

### Ecological and socio-economic values

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

The ecological values should (where appropriate) include:

- species and communities that have special conservation status (for example, endangered or rare species)
- species endemic to the proposed reserve (if known)
- key structural components of the ecosystem (for example, macroalgae, finfish and bird communities)
- exploited species and communities (for example, targeted fish populations)
- key physical–chemical components of the ecosystem (for example, water quality, sediment quality and geomorphology).

Socio-economic values are the major cultural, aesthetic, recreational and economic uses of the area.

### Management objectives

Management objectives are presented for each management program and value in sections 4–6 and identify what the primary aims of management are. They also reflect the statutory responsibilities required by the CALM Act for marine parks and reserves. The management objectives for each value provide broad direction for management in relation to protecting or managing the value from existing or likely pressures.

### Management strategies and actions

Management strategies provide direction on *how* the management objectives will be achieved. The management programs provide overarching strategies to guide implementation of strategies developed for each ecological and socio-economic value. All strategies have been prioritised as high *(H),* medium *(M)* or low *(L)* to provide an indication of their relative importance. A number of management strategies within each management program considered to be critical to achieving the strategic objectives of the management plan (Section 3), are presented as key management strategies *(H–KMS).*

Prioritised management strategies and actions for specific ecological and socio-economic values are also established in this plan to guide operational work programs over the life of the management plan.

### Performance measures

Performance measures are *indicators of management effectiveness* in achieving the park's objectives and targets. Performance measures should be quantitative, representative and, where possible, simple and cost-effective. The management plan usually contains generic performance measures (for example, often diversity and abundance/biomass). Specific performance indicators will be developed during the design and implementation of monitoring programs. Performance measures for indirect (for example, nutrient enrichment impacts on seagrass meadows) and direct (for example, mooring impacts on seagrass meadows) impacts should focus on surrogate (for example, changes in phytoplankton biomass and species composition) and direct (for example, changes in seagrass biomass) measures of the value, respectively. These will be developed during the early phase of the implementation of the management plan.

In regard to the active social values (that is, those social values that have the potential to impact negatively on the ecological values of the proposed marine park) a different approach to performance assessment is required. This has been termed "reporting" in Section 6 for the social values 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 marine park.

### Management targets

Management targets represent the *end points of management.* Targets should be measurable, time bound and expressed spatially. Ecological targets will be set as either the 'natural state' or some acceptable departure from the 'natural state'. The long-term targets provide specific benchmarks to assess the success or otherwise of management actions within the life of the management plan. The short-term target, where identified, provides a rehabilitation milestone and is used when the condition of the value is well below the desired condition (that is, the long-term target). Where no short-term target is identified, it is considered that the condition of the value is close to or at the desired condition and, as such, the long-term target applies. The targets for active socio-economic values (for example, tourism and coastal use and recreational fishing) are process-based and are generally stated as *'Implementation of management strategies within agreed timeframe'*.

### Key performance indicators

KPIs are a measure of the *overall effectiveness* of management in relation to the strategic objectives of the reserves. Management targets of key ecological and socio-economic values of the reserves are used as *key performance indicators* of management effectiveness. The key ecological and socio-economic values reflect the highest conservation (from biodiversity and ecosystem integrity perspectives) and management (socio-economic) priorities of the MPRA, DEC and the community. KPIs are a key element of the MPRA audit process (Section 7).

### Determining management priorities

A pro-active and precautionary approach to conserving marine and estuarine biodiversity is used to determine management priorities. A risk assessment is undertaken by considering the likelihood of existing and potential pressures affecting the ecological and socio-economic values and their associated ecological and socio-economic consequences. The relative 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 *biological intensity* of the pressure – pressures that impact lower trophic levels (for example,. primary producers, such as seagrasses and macroalgal communities) are often of greater concern than pressures on higher trophic levels
- the *temporal* scale of the pressure – ongoing pressures are generally of greater management concern than pressures that are short-lived

- the *spatial* scale of the pressure – pressures that occur over a large area are often of greater management concern than localised pressures
- the *socio-economic consequence* – acknowledges that different pressures have different socio-economic and political consequences. A high socio-economic–political consequence is often of greater management concern
- the *probability* of a pressure occurring within the timeframe of the management plan.

It is therefore necessary to determine how each value is, or is likely to be, affected by existing or future pressures. The ecological values and the major uses of the area are generally understood. However, the short-term and long-term cumulative ecological effects of pressures are not fully understood. For the purposes of developing management priorities, pressures on the values are confined to current pressures and those likely to occur during the life of the management plan and considered to be manageable within a reserves context. By definition, this excludes global pressures such as climate change. The vision and strategic objectives of the management plan (Section 2) provide the longer-term outcomes to be achieved.

The strategies for the proposed marine park focus on managing pressures while providing opportunities for use and enjoyment consistent with the management plan's objectives. Impacts on the ecological values can be direct effects such as damage to seagrass habitats by indiscriminate anchoring or impacts on fish stocks due to fishing. Indirect effects on the parks' 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 nutrient enrichment from catchment-based activity. With a projected rise in users of the proposed marine park in the next decade, the pressures on the ecological and socio-economic values of the park will increase and potential conflicts between users will need to be managed.

## Appendix V: List of acronyms

| | |
|---|---|
| ANZECC | Australia and New Zealand Environment and Conservation Council |
| CALM Act | *Conservation and Land Management Act 1984* |
| DEC | Department of Environment and Conservation |
| DIA | Department of Indigenous Affairs |
| DoF | Department of Fisheries |
| DMP | Department of Mines and Petroleum |
| DoT | Department of Transport |
| DPC | Department of the Premier and Cabinet |
| EP Act | *Environmental Protection Act 1986* |
| EPA | Environmental Protection Authority |
| EPBC Act | *Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth) |
| FRM Act | *Fish Resources Management Act 1994* |
| ILUA | Indigenous Land Use Agreement |
| IMCRA | Integrated Marine and Coastal Regionalisation for Australia |
| IPA | Indigenous Protected Area |

| | |
|---|---|
| IUCN | International Union for the Conservation of Nature |
| IWG | Interagency Working Group |
| LGA | Local Government Authority |
| MAC | Management Advisory Committee |
| MOU | Memorandum of Understanding |
| MPRA | Marine Parks and Reserves Authority |
| NRSMPA | National Representative System of Marine Protected Areas |
| Ramsar Convention | Convention on Wetlands of International Importance, especially as Waterfowl Habitat 1971 |
| SEWPAC | Department of Sustainability, Environment, Water, Populations and Communities (Commonwealth) |
| SWQMS | State Water Quality Management Strategy |
| UCL | Unallocated Crown land |
| WC Act | *Wildlife Conservation Act 1950* |
| WC Regulations | *Wildlife Conservation Regulations 2002* |

# Part D

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