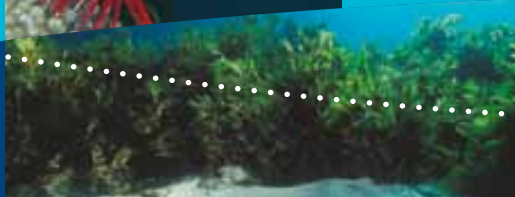




Australian Government

**Department of Sustainability, Environment,
Water, Population and Communities**



Marine bioregional plan for the North-west Marine Region

prepared under the *Environment Protection and
Biodiversity Conservation Act 1999*

Draft for Consultation

**THIS DRAFT PLAN DOES NOT INCLUDE THE PROPOSED
COMMONWEALTH MARINE RESERVES FOR THE REGION. THESE
ARE ADDRESSED IN A SEPARATE CONSULTATION DOCUMENT.**

Disclaimer

© Commonwealth of Australia 2011

This work is copyright. Apart from any use as permitted under the *Copyright Act 1968*, no part may be reproduced by any process without prior written permission from the Commonwealth. Requests and enquiries concerning reproduction and rights should be addressed to Department of Sustainability, Environment, Water, Population and Communities, Public Affairs, GPO Box 787 Canberra ACT 2601 or email public.affairs@environment.gov.au

Images:

Striped Nudibranch – C.Zwick and DSEWPaC, Raccoon butterfly fish – N.Wolfe, Display of colourful coral – Tourism WA, Red and yellow feather star (crinoids) – Tourism WA, Sea Grass Meadow – Lochman Transparencies, Whale tail – Tourism WA, Snorkelling in Ningaloo Marine Park – Tourism WA, Green Turtle – Tourism WA, Black tip reef shark – N.Wolfe, Whale Shark – GBRMPA



Australian Government

Department of Sustainability, Environment,
Water, Population and Communities



Marine bioregional plan for the North-west Marine Region

prepared under the *Environment Protection and
Biodiversity Conservation Act 1999*

Draft for Consultation

**THIS DRAFT PLAN DOES NOT INCLUDE THE PROPOSED
COMMONWEALTH MARINE RESERVES FOR THE REGION. THESE
ARE ADDRESSED IN A SEPARATE CONSULTATION DOCUMENT.**

MINISTERIAL FOREWORD

Draft North-west Marine Bioregional Plan



For generations, Australians have understood the need to preserve precious areas on land as national parks. Our oceans contain many iconic, precious and fragile sites that deserve protection too.

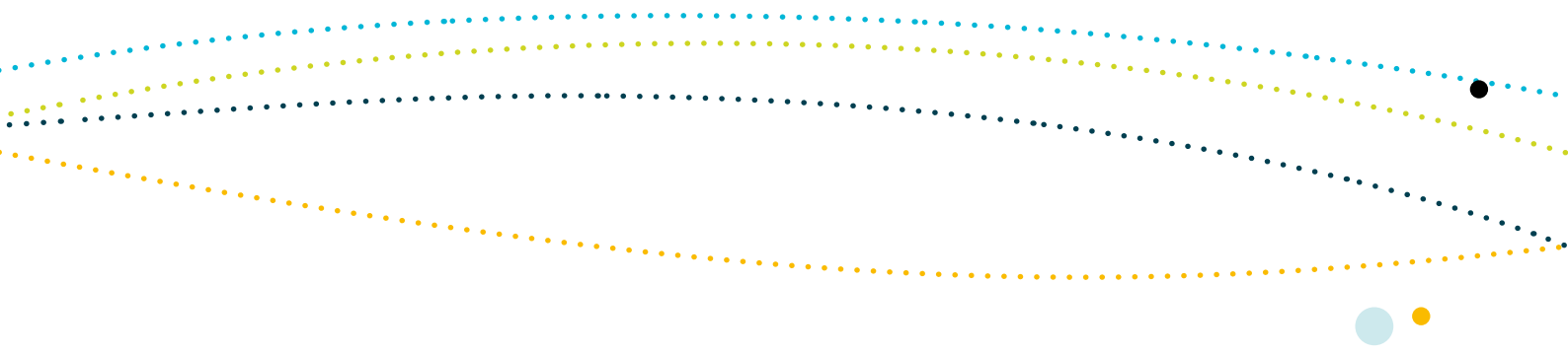
Australia has the third-largest marine area of any nation in the world. Our marine region runs from the coral-rich tropical seas of the north to the subantarctic waters of the Southern Ocean. Our oceans cover almost 16 million square kilometres—twice the size of our continental landmass. About 40 per cent of the North-west Marine Region is less than 200 metres in depth but it also includes two areas of abyssal plain where water depths are 5000 metres or more. The region includes extensive systems of banks and shoals, extensive canyon systems and a number of coral reef

systems, including Ningaloo, which was placed on the World Heritage List in June this year in recognition of its outstanding natural values.

The North-west Marine Region includes the world famous whale shark aggregations at Ningaloo and every year, humpback whales migrate through the region to and from their breeding grounds off the Kimberley coast. Six of the seven species of marine turtle in the world are known to inhabit the region; all have threatened conservation status. Two vulnerable species of sawfish and the Australian snubfin dolphin, which is only present on the Australian continental shelf, are also found in the region.

We know that Australia's oceans are a direct link for trade with the world. Our commercial and recreational fishing and energy sectors help to drive economic and social prosperity in communities throughout the nation.

But we also know that Australians need their oceans to be healthy if they are going to provide us with fish to eat, a place to fish, sustainable tourism opportunities and a place for families to enjoy for generations to come.



That's why the Gillard Government has committed to developing plans to manage our oceans better and is creating a national network of Commonwealth marine reserves.

These plans are being developed under the *Environment Protection and Biodiversity Conservation Act 1999* and backed by the best available science.

In this draft plan for the North-west Marine Region, you will find information about the extraordinary array of marine life and ecosystems in this part of Australia.

This draft plan will be open for community input for the next three months and I encourage you to have your say. The feedback the government receives during this time will help finalise this plan and inform the government's decision on the proposed network of marine reserves in the region.

We have a once-in-a-generation opportunity to put in place the measures needed to protect our precious marine environment for future generations.

Tony Burke
Minister for the Environment



HAVE YOUR SAY

The release of the draft North-west Marine Bioregional Plan marks the start of the formal public consultation period on both the draft plan and the proposed North-west Commonwealth Marine Reserve Network. Members of the public have 90 days to submit comments on both the draft plan and the proposed marine reserve network.

The Australian Government Department of Sustainability, Environment, Water, Population and Communities invites public feedback on the draft North-west Marine Bioregional Plan and the proposed marine reserve network.

There are three ways to submit feedback:

- on the web—complete a submission form available on the department's website, www.environment.gov.au/coasts/mbp/north-west/index.html
- by email—save the submission form from the department's website to your computer, and email the completed form along with any additional information to Submissions.Northwest@environment.gov.au
- by post—print the submission form from the department's website and post the completed form free of charge to:

Department of Sustainability, Environment, Water, Population and Communities
MBP Submissions – North-west
Reply Paid 787
Canberra ACT 2601

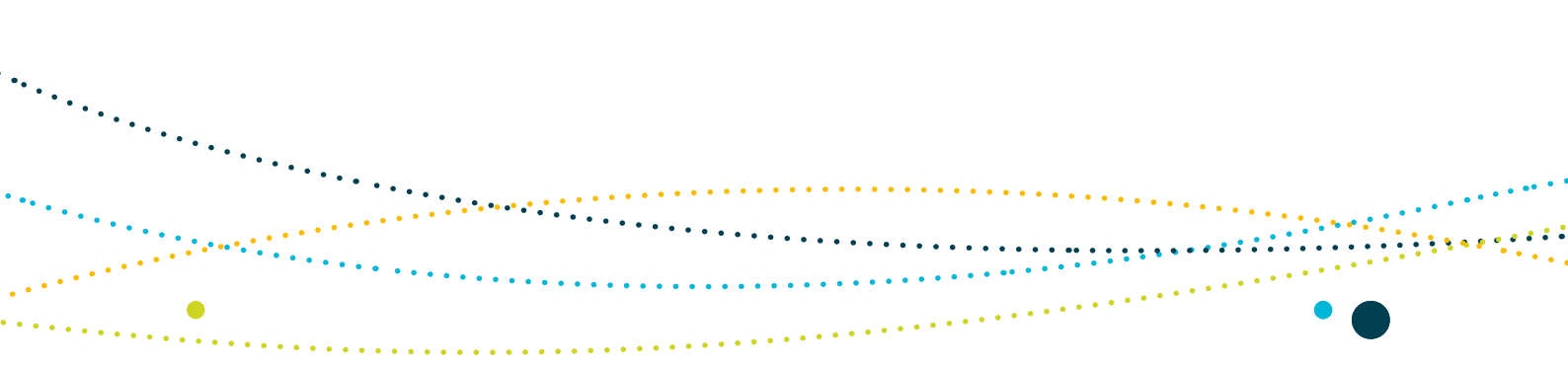
Further details about the public consultation process and opportunities to be involved are available at www.environment.gov.au/coasts/mbp/north-west/index.html. The website also contains fact sheets on specific items of interest and answers to a number of frequently asked questions. If you have any questions about how to make a submission or on any other aspect of the marine bioregional planning process, please email Northwest.MarinePlan@environment.gov.au or telephone 1800 069 352.





CONTENTS

Ministerial Foreword	ii
Have your say.....	iv
1 The North-west Marine Bioregional Plan	1
1.1 Goal of the plan	1
1.2 Scope of the plan	1
1.3 Objectives of the plan.....	2
1.4 Contents of the plan and supporting information resources	2
1.5 Definitions.....	3
2 The North-west Marine Region and its conservation values	7
2.1 Conservation values—the Commonwealth marine environment.....	8
2.2 Conservation values—protected species.....	15
2.3 Conservation values—protected places.....	17
3 Regional priorities, strategies and actions	21
3.1 Regional priorities	21
3.2 Strategies and actions.....	48
Schedule 1: Assessment of pressures affecting conservation values of the North-west Marine Region	53
Schedule 2: Regional advice on matters of national environmental significance.....	138
S2.1: The Commonwealth marine environment of the North-west Marine Region	142
S2.2: Cetaceans of the North-west Marine Region	175
S2.3: Dugong of the North-west Marine Region.....	193
S2.4: Reptiles of the North-west Marine Region.....	200
S2.5: Seabirds of the North-west Marine Region	225
S2.6: Listed sharks and sawfishes of the North-west Marine Region.....	247
Map data sources	265





1 THE NORTH-WEST MARINE BIOREGIONAL PLAN

1.1 Goal of the plan

The North-west Marine Bioregional Plan has been prepared under section 176 of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The plan aims to strengthen the operation of the EPBC Act in the Commonwealth marine area of the North-west Marine Region to help ensure that the marine environment of the region remains healthy and resilient.

The bioregional plan describes the marine environment and conservation values (protected species, protected places and key ecological features) of the North-west Marine Region, sets out broad objectives for its biodiversity,¹ identifies regional priorities, and outlines strategies and actions to achieve these.

1.2 Scope of the plan

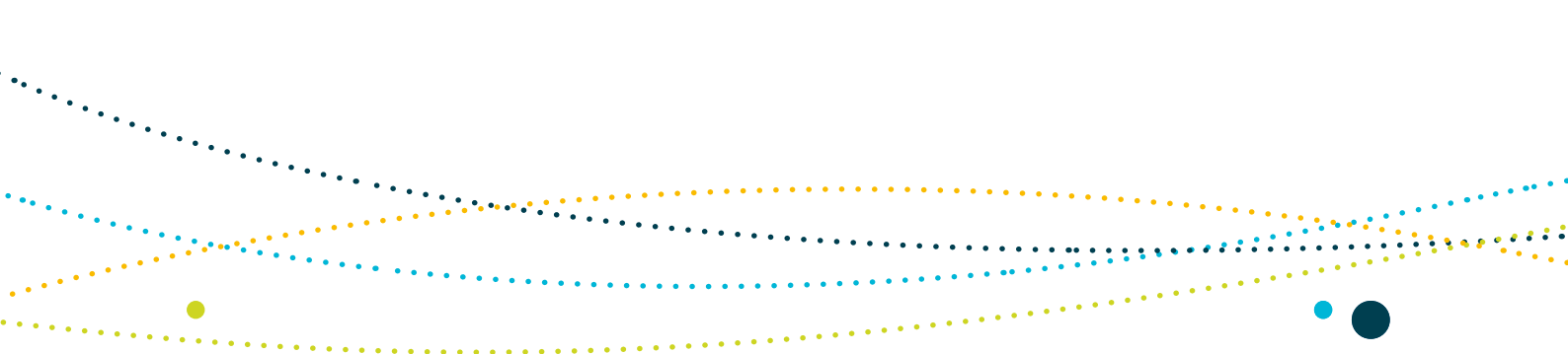
This plan is for the North-west Marine Region, which covers Commonwealth waters from the Western Australia – Northern Territory border to Kalbarri, south of Shark Bay in Western Australia. The Commonwealth marine area starts at the outer edge of state waters, usually 3 nautical miles (5.5 kilometres) from the shore (territorial sea baseline), and extends to the outer boundary of Australia's exclusive economic zone, 200 nautical miles from the territorial sea baseline. Section 24 of the EPBC Act defines the Commonwealth marine area.

The plan does not cover state waters but, where relevant, does include information about inshore environments and the way they interact with species and habitats of the Commonwealth marine area.

¹ Biodiversity is defined under the EPBC Act as *the variability among living organisms from all sources (including terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part) and includes:*

(a) diversity within species and between species; and

(b) diversity of ecosystems.



Under section 176 of the EPBC Act, once a bioregional plan has been made, the minister responsible for the environment must have regard to it when making any decision under the Act to which this plan is relevant. However, the plan does not otherwise alter the scope of the minister's statutory responsibilities, nor does it narrow the matters the minister is required to take into account or may wish to take into account in making decisions. The EPBC Act provides that this plan is not a legislative instrument.

1.3 Objectives of the plan

Consistent with the objectives of the EPBC Act, and in the context of the principles for ecologically sustainable development as defined in the Act, the North-west Marine Bioregional Plan sets the following objectives for the North-west Marine Region:

- conserving biodiversity and maintaining ecosystem health
- ensuring the recovery and protection of threatened species
- improving understanding of the region's biodiversity and ecosystems and the pressures they face.

1.4 Contents of the plan and supporting information resources

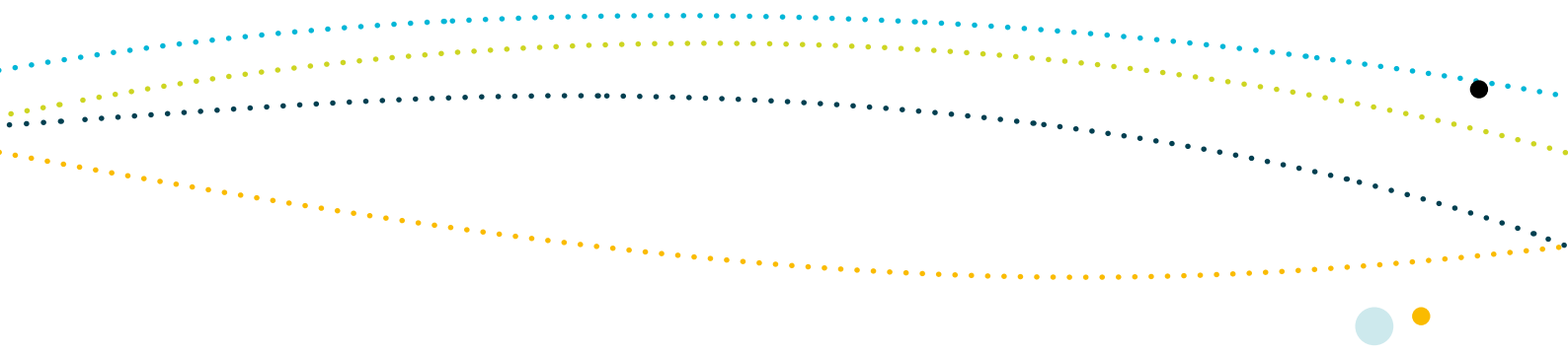
Part 2 of the plan describes the conservation values of the region (see Section 1.5 for the definition). Part 3 introduces the regional conservation priorities (see Section 1.5 of the Overview) and outlines strategies and actions to address them.

Schedule 1 presents a full description of the pressures on the conservation values of the North-west Marine Region that are assessed as being *of concern* or *of potential concern* (see Section 2.2 of the Overview). Schedule 2 provides specific advice on matters of national environmental significance in the region.

A series of information resources has been produced to support implementation of this plan. Conservation value report cards summarise the most up-to-date scientific information on the distribution, conservation status, vulnerabilities, pressures and management of the Commonwealth marine environment, cetaceans, dugongs, seabirds, reptiles, sharks, bony fish and protected places.

A conservation values atlas presents a series of maps detailing the location and spatial extent of conservation values (where sufficient information exists to do so). The atlas is available at www.environment.gov.au/coasts/mbp/north-west/index.html.





These resources will be updated as significant new information becomes available.

Additionally, the bioregional profile (at www.environment.gov.au/coasts/mbp/north-west.html) for the North-west Marine Region is an important reference document. It provides a full description of the region with comprehensive scientific reference lists.

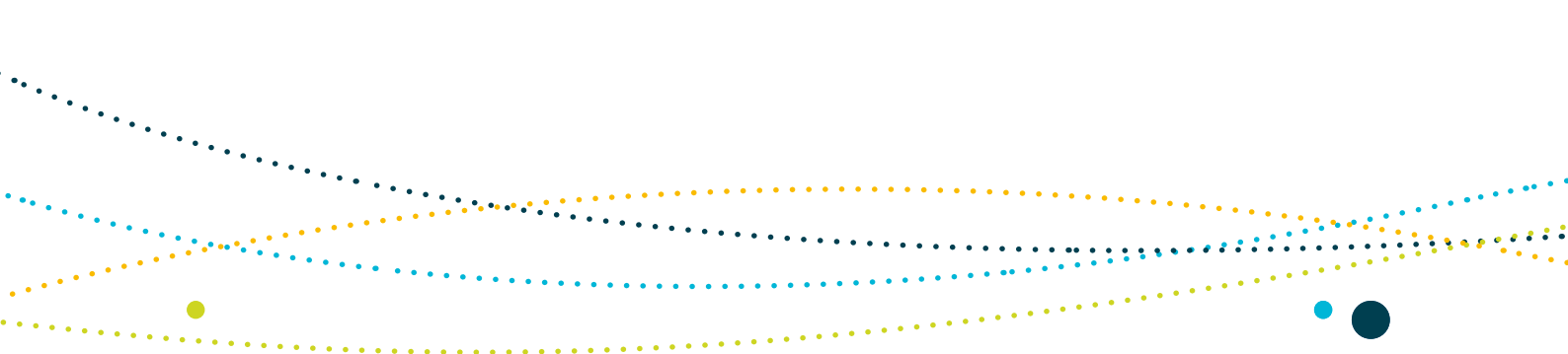
1.5 Definitions

Biologically important areas: These are areas where aggregations of individuals of a protected species display biologically important behaviour, such as breeding, foraging, resting or migration. Biologically important areas are those parts of a region that are particularly important for the protection and conservation of protected species. Regional advice (Schedule 2 of the plan) often pertains to these areas because of their known relevance to a protected species. Regional advice focused on these areas should not be construed to mean that legislative obligations do not apply outside these areas. Biologically important areas should not be confused with 'critical habitat' as defined in the EPBC Act (see below).

Commonwealth marine environment: Section 24 of the EPBC Act defines a Commonwealth marine area. Under the Act, the environment in a Commonwealth marine area is a matter of national environmental significance (see below, and sections 23 and 24A of the EPBC Act). In this plan, the 'Commonwealth marine environment' refers to the environment in a Commonwealth marine area.

Conservation values: For the purpose of marine bioregional planning, conservation values are defined as those elements of the region that are either specifically protected under the EPBC Act, have heritage values for the purposes of the EPBC Act, or have been identified through the planning process as key ecological features in the Commonwealth marine environment. Although key ecological features are not specifically protected under the EPBC Act, the marine environment as a whole is a matter of national environmental significance under the Act. Key ecological features are identified as conservation values within the Commonwealth marine environment to help inform decisions about the marine environment.

Critical habitat: A register of critical habitat is maintained under the EPBC Act. The register lists habitats considered critical to the survival of a listed threatened species or listed threatened ecological community. Once a habitat is listed in the register, the habitat is protected when it is in or on a Commonwealth area, and the EPBC Act makes it an offence for a person to take an action that the person knows significantly damages or will significantly damage critical habitat.



Ecologically significant population: This definition applies to species listed as migratory. In accordance with the EPBC Act Policy Statement 1.1: Significant impact guidelines—matters of national environmental significance, for listed migratory species, consideration should be given to whether an ecologically significant proportion of a population is found in the area. Whether the species in the area represents an ecologically significant proportion of a population needs to be determined on a case-by-case basis, as different species have different life histories and populations. Some key factors that should be considered include the species' population status, genetic distinctiveness and species-specific behavioural patterns (e.g site fidelity and dispersal rates).

Environment minister/environment department: The minister and department administering the *Environment Protection and Biodiversity Conservation Act 1999*.

Important population: This definition relates to populations of species listed as vulnerable. An important population is a population that is necessary for a species' long-term survival and recovery. This may include populations identified as such in recovery plans, and/or populations that are:

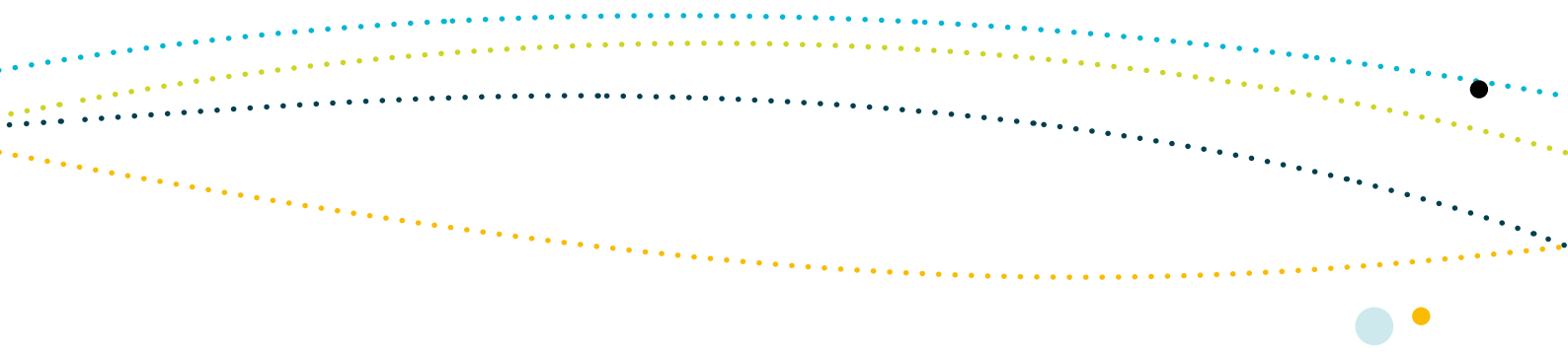
- key source populations either for breeding or dispersal
- necessary for maintaining genetic diversity
- near the limit of the species range.

This definition is consistent with that provided in the EPBC Act Policy Statement 1.1: Significant impact guidelines—matters of national environmental significance. In accordance with these guidelines, in determining the significance of an impact on a vulnerable listed species, consideration should be given to whether an important population is found in the area.

Key ecological features: Key ecological features are elements of the Commonwealth marine environment that, based on current scientific understanding, are considered to be of regional importance for either the region's biodiversity or ecosystem function and integrity.

For the purpose of marine bioregional planning, key ecological features of the marine environment meet one or more of the following criteria:

- a species, group of species or community with a regionally important ecological role, where there is specific knowledge about why the species or species group is important to the ecology of the region, and the spatial and temporal occurrence of the species or species group is known
- a species, group of species or community that is nationally or regionally important for biodiversity, where there is specific knowledge about why the species or species group is regionally or nationally important for biodiversity, and the spatial and temporal occurrence of the species or species group is known

- 
- an area or habitat that is nationally or regionally important for:
 - enhanced or high biological productivity²
 - aggregations of marine life
 - biodiversity and endemism
 - a unique seafloor feature with ecological properties of regional significance.

Matters of national environmental significance: The matters of national environmental significance protected under the EPBC Act are:

- world heritage properties
- national heritage places
- wetlands of international importance (listed under the Ramsar Convention³)
- listed threatened species (except those listed as extinct or conservation dependent) and ecological communities (except those listed as vulnerable)
- migratory species protected under international agreements
- the Commonwealth marine environment
- the Great Barrier Reef Marine Park.

Additionally, nuclear activity, including uranium mines, is a matter of national environmental significance.

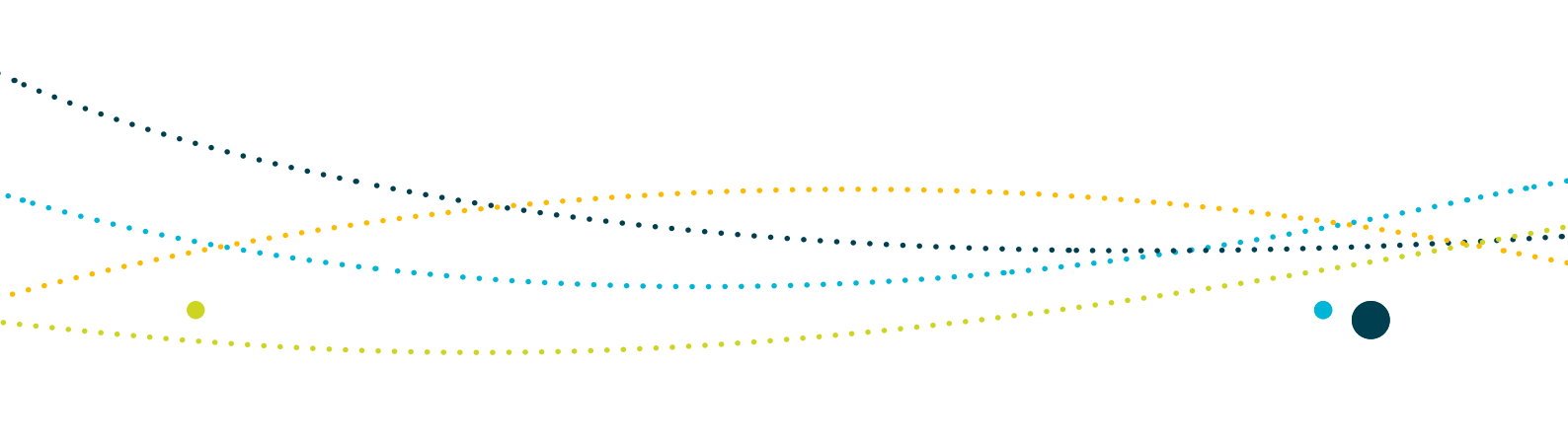
Population: A population of a species is defined under the EPBC Act as an occurrence of the species in a particular area. In relation to critically endangered, endangered or vulnerable threatened species, occurrences include but are not limited to:

- a geographically distinct regional population or collection of local populations
- a population or collection of local populations that occur within a particular bioregion.

Protected places: Protected places are those protected under the EPBC Act as matters of national environmental significance (places listed as world heritage properties, national heritage places or wetlands of international importance), Commonwealth marine reserves and places deemed to have heritage value in the Commonwealth marine environment (such as places on the Commonwealth Heritage List or shipwrecks under the *Historic Shipwrecks Act 1976*).

2 Productivity (or biological productivity) means the process through which algae and seagrasses transform inorganic nutrients into organic matter through photosynthesis. This process is at the basis of the ocean's food web, as phytoplankton and algae are consumed respectively by zooplankton and grazing organisms and these in turn are consumed by larger and larger predators. Nutrient-rich waters promote and support productivity.

3 www.environment.gov.au/water/topics/wetlands/ramsar-convention/index.html



Protected species: Species protected under the EPBC Act are commonly referred to as protected species. Under the Act, protected species can be listed as threatened, migratory or marine species. All cetaceans (whales, dolphins and porpoises) are protected under the EPBC Act in the Australian Whale Sanctuary⁴ (and, to some extent, beyond its outer limits). It is an offence to kill, injure, take, trade, keep or move a listed species without authorisation.

Those protected species that are threatened species listed as critically endangered, endangered, vulnerable or migratory are matters of national environmental significance.

Species that do not fall in one of the two categories above and that are:

- listed as marine (EPBC Act s. 248)
- cetaceans (whales, dolphins and porpoises)
- threatened species listed as extinct or conservation dependent

are protected under the EPBC Act but are not matters of national environmental significance.

4 The Australian Whale Sanctuary includes all Commonwealth waters from the 3-nautical-mile state waters limit out to the boundary of the exclusive economic zone (i.e. out to 200 nautical miles, and further in some places).

2 THE NORTH-WEST MARINE REGION AND ITS CONSERVATION VALUES

The North-west Marine Region comprises Commonwealth waters from the Western Australia – Northern Territory border to Kalbarri, south of Shark Bay (Figure 2.1). The region covers approximately 1.07 million square kilometres of tropical and subtropical waters and abuts the coastal waters of Western Australia. The region's north-western boundary is defined in accordance with the Perth Treaty negotiated with the Republic of Indonesia and includes areas over which Australia exercises jurisdiction over both the water column and the seabed and its associated resources. The region extends from shallow waters on the continental shelf at the state waters boundary 3 nautical miles (5.5 kilometres) from shore, to the deep ocean environments at the edge of Australia's exclusive economic zone, 200 nautical miles from shore.

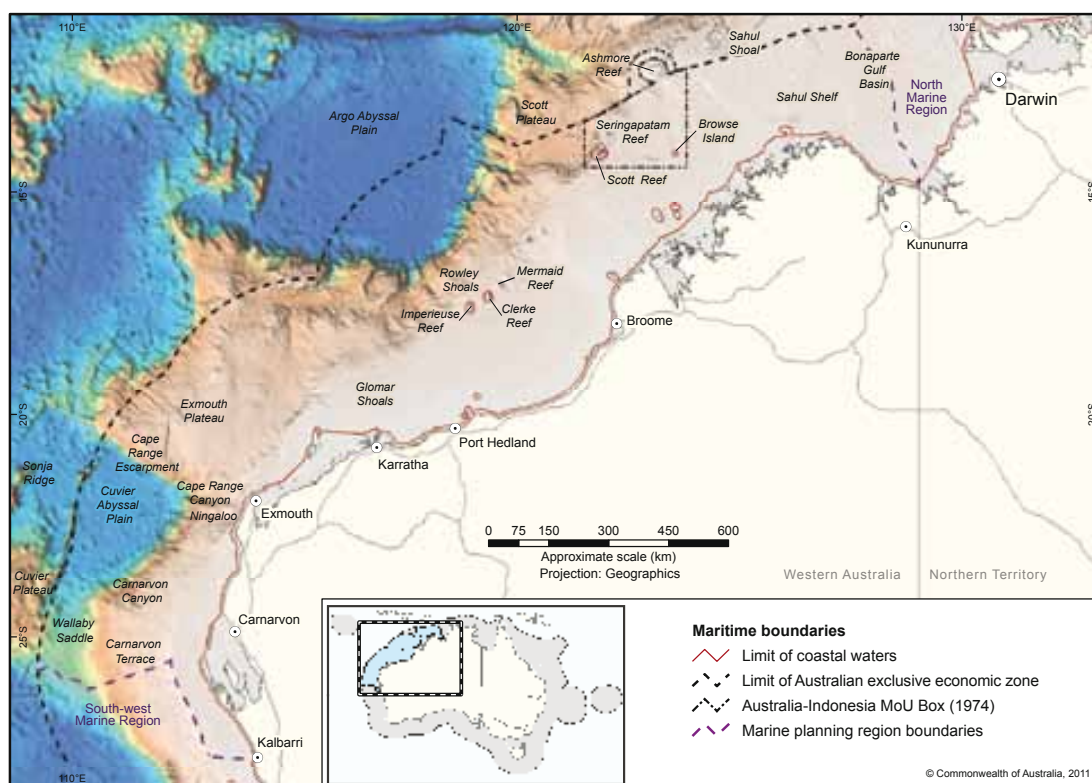


Figure 2.1: The North-west Marine Region



The main physical features of the region are:


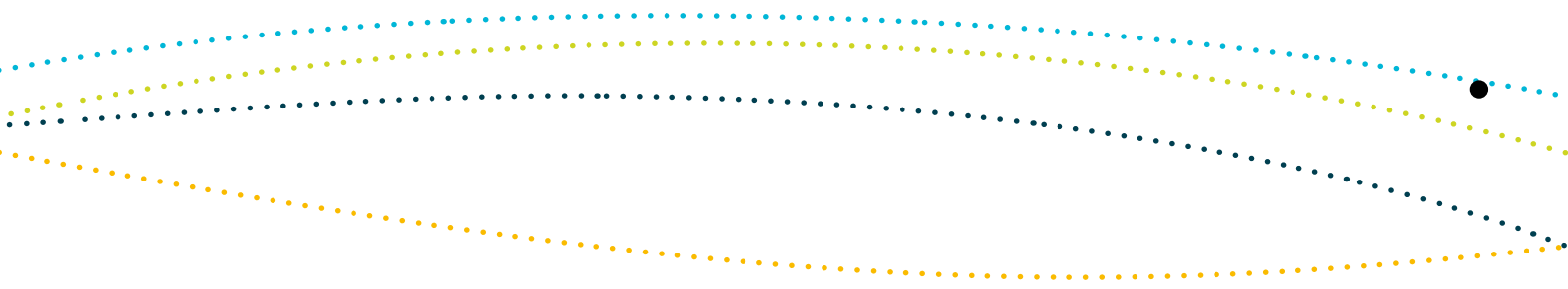
- extensive areas of continental shelf and slope, plateaux and terraces including the North West and Sahul shelves, the Exmouth and Scott plateaux, the Wallaby Saddle and the Rowley Terrace
- the narrowest continental shelf on Australia's coastal margin, which occurs near North West Cape where the shelf is just 7 kilometres wide
- coralline algal reefs, and carbonate pinnacles and shoals in the far north of the region
- coral reefs including Ashmore, Hibernia, Scott, Seringapatam, Ningaloo and the Rowley Shoals, all of which have a high diversity of corals and associated fish and other species of both commercial and conservation importance
- the Joseph Bonaparte Gulf, a muddy basin with sparse coverage of sessile filter-feeding organisms and mobile invertebrates
- a number of major canyons on the continental slope that act as conduits for sediment and nutrient transport, including Cape Range, Cloates, Carnarvon and Swan canyons
- two areas of abyssal plain (Cuvier and Argo) with depths in excess of 5000 metres
- the Indonesian Throughflow, a low-salinity water mass that is one of the major elements of the global transfer of heat and water between oceans and which plays a key role in initiating the Leeuwin Current.

The remainder of this chapter describes the conservation values of the North-west Marine Region, including the Commonwealth marine environment and its protected species and places.

2.1 Conservation values—the Commonwealth marine environment

Biodiversity

The North-west Marine Region is characterised by shallow-water tropical marine ecosystems with high species richness. Most of the region's species are tropical and are also found in other parts of the Indian and western Pacific oceans. The southern part of the region is a transition zone between tropical and temperate waters and includes the northern extent of the ranges of some temperate species that are more typical of the South-west Marine Region. High diversity is partly driven by the interaction between seafloor features and the currents of the region. The interaction of seafloor features and oceanographic processes also supports unique ecosystems and associated trophic interactions and communities.



The high species richness of the region is also thought to be associated with the diversity of habitats available. Hard habitats such as the limestone pavements of the North West Shelf, coral reefs of the Kimberley, and pinnacles and reefs on the edge of the shelf support a high diversity of benthic filter feeders and producers. Soft-bottom substrates support seagrass along the Pilbara coast, muddy infaunal communities in the Joseph Bonaparte Gulf, and deep sessile communities of filter and deposit feeders in the abyssal plains.

The region has generally low productivity, with boom and bust cycles driven by monsoonal seasonality, but some locations have predictably higher productivity. These are:

- Ningaloo Reef and the associated Cloates and Cape Range canyons
- canyon systems including the Carnarvon Canyon in the south of the region
- coral reefs along the shelf edge including Ashmore, Scott, Seringapatam and the Rowley Shoals
- the carbonate banks and pinnacles of the Sahul Shelf.

Because the region is relatively shallow—less than 200 metres deep for more than 40 per cent of the region—surface currents exert a strong influence. The region is dominated by the Indonesian Throughflow, which is a key link in the global exchange of water and heat between ocean basins and a significant element of the global climate system. It brings warm, low-nutrient (oligotrophic), low-salinity water from the western Pacific Ocean through the Indonesian archipelago to the Indian Ocean. It is the primary driver of the oceanographic and ecological processes in the region.

Another important factor driving the ecological processes in the region is the strong seasonality in wind direction and rainfall. The region experiences monsoonal climate patterns with highly variable tidal regimes and a pronounced cyclone season between December and March. The weakening of the Indonesian Throughflow and Leeuwin Current in the dry season (April to September and particularly during El Niño years), along with the seasonal reversal in wind and cyclones, enhances biological productivity through increased mixing of the deeper, cold, nutrient-rich waters with surface waters.

One of the most unusual and significant oceanographic features of the region, a result of pronounced temperature differences in the water column and the interaction between currents and the sea floor, is the occurrence of internal waves. Internal waves are large in amplitude (up to 75 metres high) and encourage the mixing of surface waters with deeper, more nutrient-rich waters, which is important for biological productivity in the region. Areas such as Exmouth Plateau and the slope adjacent to the North West Shelf are known sites of internal wave activity. Breaking internal waves can increase productivity through enhanced vertical mixing.

The region supports internationally important breeding and feeding grounds for a number of threatened and migratory marine species, including humpback whales, which mate and give birth in the waters off the Kimberley coast. Significant turtle rookeries are found on coastal beaches and offshore islands in and adjacent to the region. Shark Bay is home to one of the largest remaining dugong populations in the world, and the annual aggregation of whale sharks at Ningaloo Reef is the highest known density of whale sharks in the world.

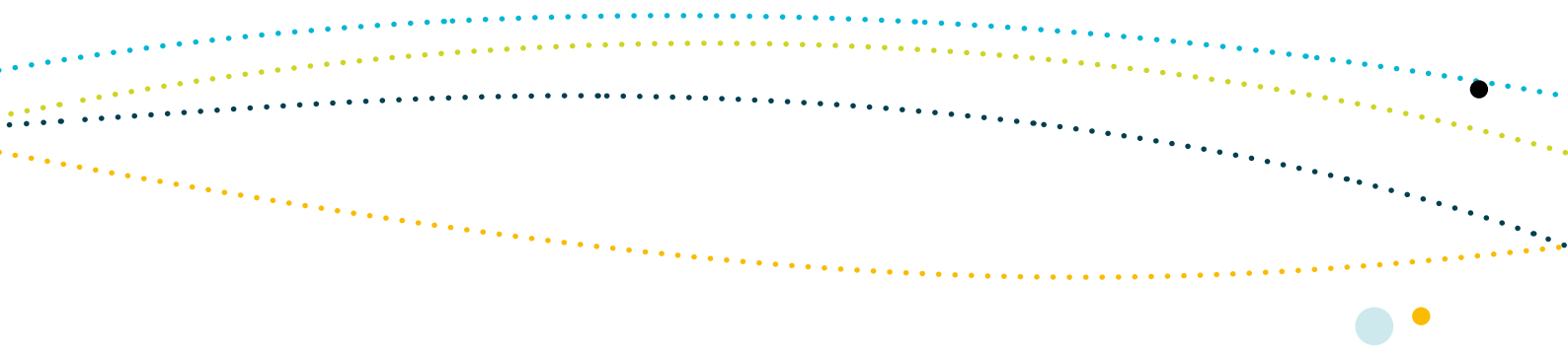
Key ecological features

Key ecological features are elements of the Commonwealth marine environment in the North-west Marine Region that, based on current scientific understanding, are considered to be of regional importance for either the region's biodiversity or ecosystem function and integrity (Table 2.1 and Figure 2.2).

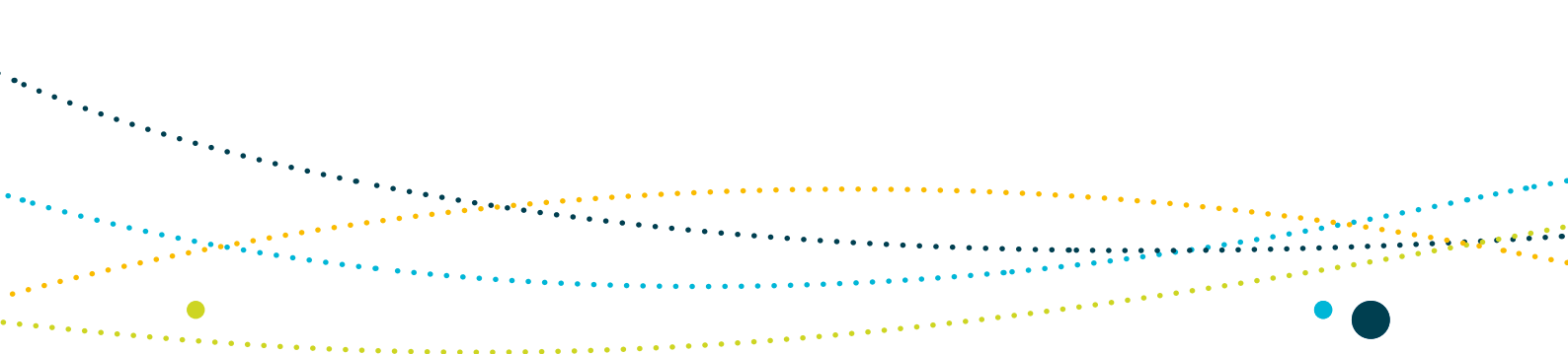
Table 2.1: Key ecological features of the North-west Marine Region

Feature	Description
Carbonate bank and terrace system of the Sahul Shelf	<p>Values: unique seafloor feature</p> <p>Little is known about the bank and terrace system of the Sahul Shelf but it is regionally important because of its likely ecological role in enhancing biodiversity and local productivity relative to its surrounds</p> <p>The banks are thought to support a high diversity of organisms including reef fish, sponges, soft and hard corals, gorgonians, bryozoans, ascidians and other sessile filter feeders</p> <p>The banks are known to be foraging areas for loggerhead, olive ridley and flatback turtles</p> <p>Cetaceans and green and freshwater sawfish are likely to occur in the area</p>
Pinnacles of the Bonaparte Basin	<p>Values: Unique seafloor feature</p> <p>As they provide areas of hard substrate in an otherwise relatively featureless environment, the pinnacles are likely to support a high number of species, although a better understanding of the species richness and diversity associated with these structures is required</p>



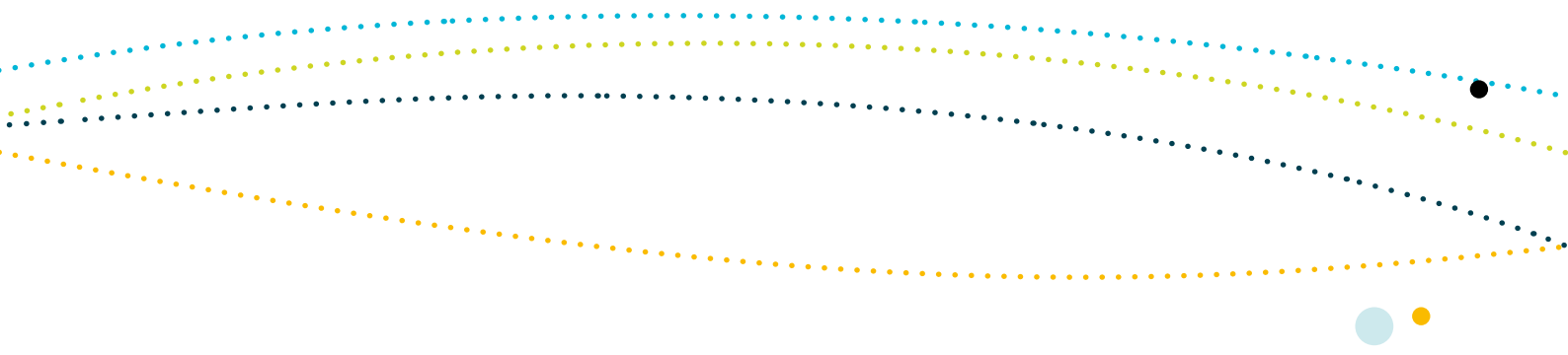


Feature	Description
Ashmore Reef and Cartier Island and surrounding Commonwealth waters	<p>Values: High productivity and aggregations of marine life</p> <p>Ashmore Reef is the largest of only three emergent oceanic reefs present in the north-eastern Indian Ocean and is the only oceanic reef in the region with vegetated islands</p> <p>Ashmore Reef and Cartier Island and the surrounding Commonwealth waters are regionally important for feeding and breeding aggregations of birds and other marine life; they are areas of enhanced primary productivity in an otherwise low-nutrient environment</p> <p>Ashmore Reef supports the highest number of coral species of any reef off the west Australian coast</p>
Seringapatam Reef and Commonwealth waters in the Scott Reef complex	<p>Values: High productivity and aggregations of marine life</p> <p>Seringapatam Reef and the Commonwealth waters in the Scott Reef complex are regionally important in supporting the diverse aggregations of marine life, high primary productivity and high species richness associated with the reefs themselves</p> <p>As two of the few offshore reefs in the north-west, they provide an important biophysical environment in the region</p>
Continental slope demersal fish communities	<p>Values: High levels of endemism</p> <p>The diversity of demersal fish assemblages on the continental slope in the Timor Province, the Northwest Transition and the Northwest Province is high compared to elsewhere along the continental slope</p>
Canyons linking the Argo Abyssal Plain and Scott Plateau	<p>Values: High productivity and aggregations of marine life</p> <p>The canyons linking the Argo Abyssal Plain and Scott Plateau are important features likely to be associated with aggregations of marine life</p>
Ancient coastline at 125 m depth contour	<p>Values: Unique seafloor feature with ecological properties of regional significance</p> <p>Parts of the ancient coastline, particularly where it exists as a rocky escarpment, are thought to provide biologically important habitats in areas otherwise dominated by soft sediments. The topographic complexity of these escarpments may also facilitate vertical mixing of the water column, providing relatively nutrient-rich local environments</p>



Feature	Description
<p>Glomar Shoals</p>	<p>Values: High productivity and aggregations of marine life</p> <p>The Glomar Shoals are regionally important for their high biological diversity and high localised productivity</p> <p>Biological data specific to Glomar Shoals is limited; however, the fish of Glomar Shoals are probably a subset of reef-dependent species and anecdotal and fishing industry evidence suggests they are particularly abundant</p>
<p>Mermaid Reef and Commonwealth waters surrounding Rowley Shoals</p>	<p>Values: High productivity and aggregations of marine life</p> <p>The reefs of the Rowley Shoals (including Mermaid Reef) are areas of enhanced productivity and high species richness</p> <p>Enhanced productivity that contributes to this species richness is thought to be facilitated by the breaking of internal waves in the waters surrounding the reefs, causing mixing and re-suspension of nutrients from water depths of 500–700 m into the photic zone. The steep changes in slope around the reef also attract a range of migratory pelagic species such as dolphins, tuna, billfish and sharks</p>
<p>Exmouth Plateau</p>	<p>Values: Unique seafloor feature with ecological properties of regional significance</p> <p>The Exmouth Plateau is a regionally and nationally unique deep-sea plateau in tropical waters</p> <p>The plateau is a very large topographic obstacle that may modify the flow of deep waters, generating internal tides and may contribute to upwelling of deeper water nutrients closer to the surface, thus serving an important ecological role</p>
<p>Canyons linking the Cuvier Abyssal Plain and the Cape Range Peninsula</p>	<p>Values: Unique seafloor features with ecological properties of regional significance</p> <p>The canyons are associated with upwelling as they channel deep water from the Cuvier Abyssal Plain up onto the slope. This nutrient-rich water interacts with the Leeuwin Current at the canyon heads</p> <p>Aggregations of whale sharks, manta rays, sea snakes, sharks, large predatory fish and seabirds are known to occur in this area</p>





Feature	Description
<p>Commonwealth waters adjacent to Ningaloo Reef</p>	<p>Values: High productivity and aggregations of marine life</p> <p>The Leeuwin and Ningaloo currents interact, leading to areas of enhanced productivity in the Commonwealth waters adjacent to Ningaloo Reef</p> <p>Aggregations of whale sharks, manta rays, humpback whales, sea snakes, sharks, large predatory fish and seabirds are known to occur in this area</p>
<p>Wallaby Saddle</p>	<p>Values: High productivity and aggregations of marine life</p> <p>The Wallaby Saddle may be an area of enhanced productivity. Historical whaling records provide evidence of sperm whale aggregations in the area of the Wallaby Saddle, possibly due to the enhanced productivity of the area and aggregations of baitfish</p>

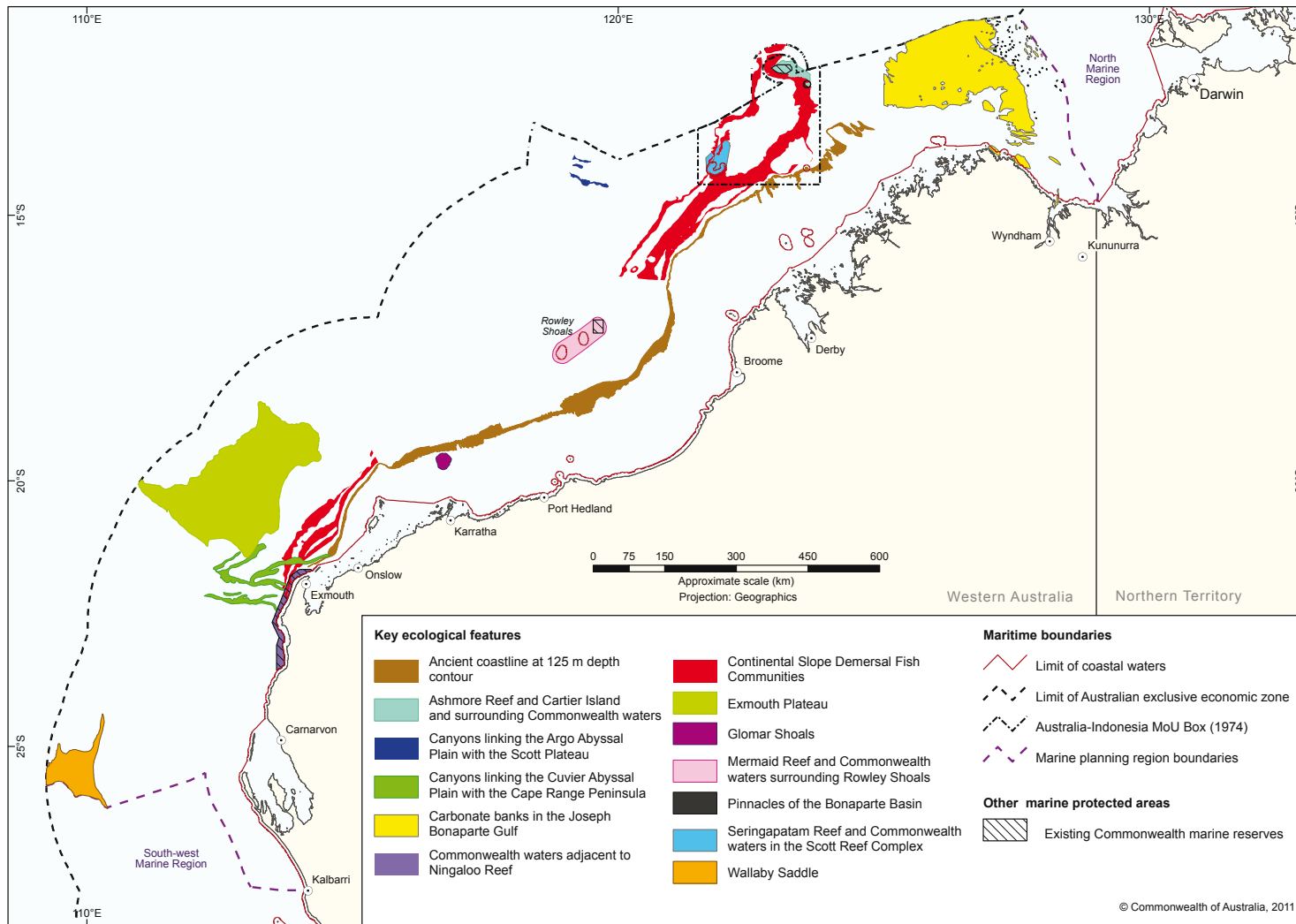
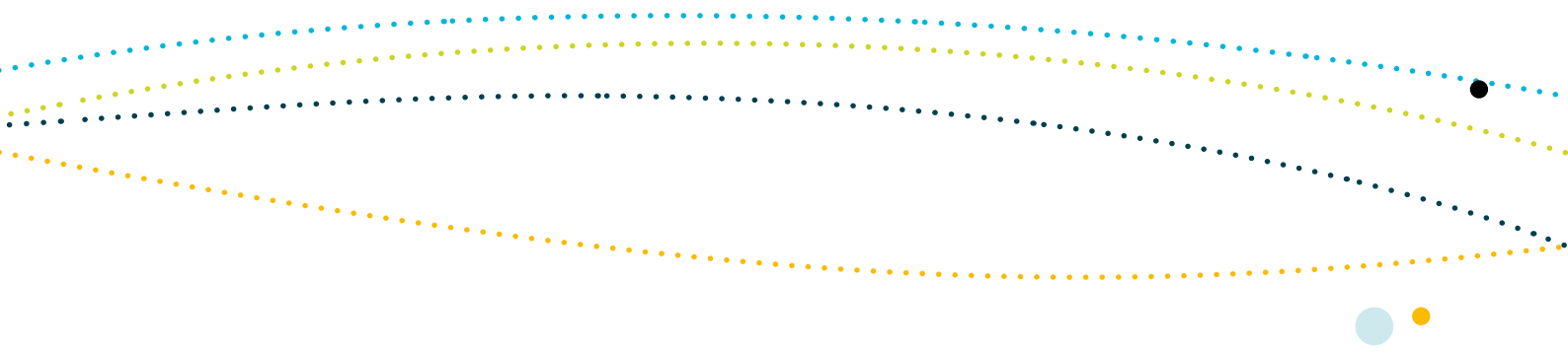


Figure 2.2: Key ecological features in the North-west Marine Region



Further information on the North-west Marine Region's key ecological features is available in the Commonwealth marine environment report card at www.environment.gov.au/coasts/mbp/north-west.html.

2.2 Conservation values—protected species

The North-west Marine Region is an important area for protected species (for a definition see Section 1.5). Under the EPBC Act, species can be listed as threatened, migratory, cetacean or marine.

Threatened species are, in broad terms, species that have been identified as being in danger of becoming extinct. Species may be listed in the following categories:

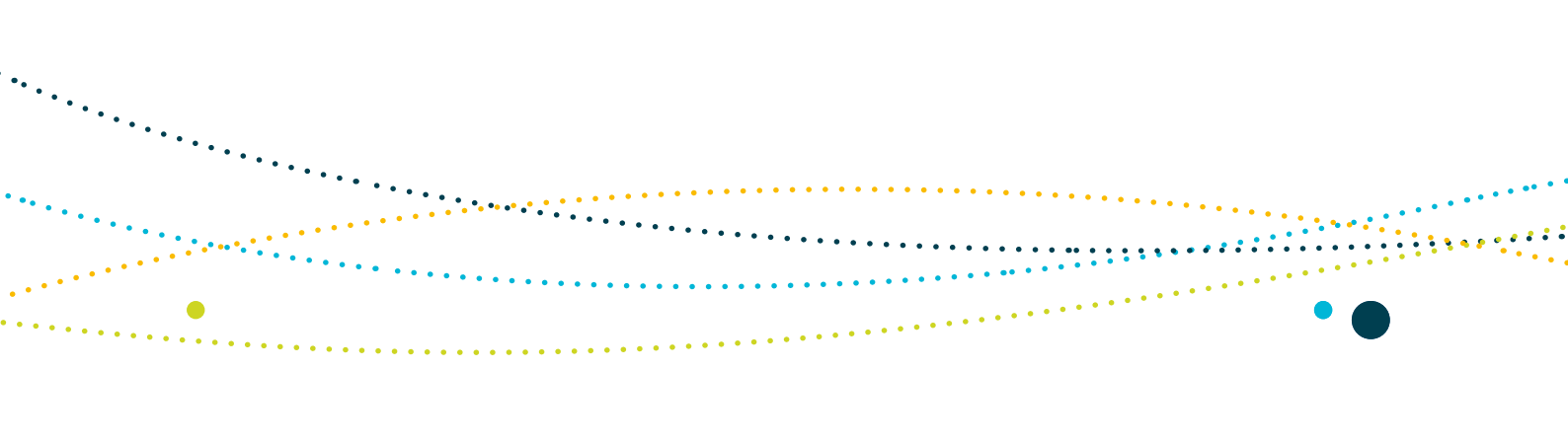
- a) conservation dependent
- b) vulnerable
- c) endangered
- d) critically endangered
- e) extinct
- f) extinct in the wild.

Migratory species are those species that are listed under:

- the Convention on the Conservation of Migratory Species of Wild Animals (CMS or Bonn Convention)
- the Agreement between the Government of Australia and the Government of Japan for the Protection of Migratory Birds in Danger of Extinction and their Environment 1974 (JAMBA)
- the Agreement between the Government of Australia and the Government of the People's Republic of China for the Protection of Migratory Birds and their Environment 1986 (CAMBA)
- the Agreement between the Government of Australia and the Government of the Republic of Korea on the Protection of Migratory Birds 2007 (ROKAMBA)
- any other international agreement, or instrument made under other international agreements approved by the environment minister.

Further information on the CMS, JAMBA, CAMBA and ROKAMBA is provided at www.environment.gov.au/biodiversity/migratory/index.html.

Cetaceans—all cetaceans (whales, dolphins and porpoises) are protected under the EPBC Act in the Australian Whale Sanctuary (and, to some extent, beyond its outer limits).



Marine species belong to taxa that the Australian Government has recognised as requiring protection to ensure their long-term conservation, in accordance with the EPBC Act (ss. 248–250). Listed marine species occurring in the North-west Marine Region include species of:

- sea snakes (families Hydrophiidae and Laticaudidae)
- dugong (family Dugongidae)
- marine turtles (families Cheloniidae and Dermochelyidae)
- seahorses, sea dragons, pipefish and ghost pipefish (families Syngnathidae and Solenostomidae)
- seabirds (i.e. bird species that occur naturally in Commonwealth marine areas).

Protected species can be listed under more than one category.

Under the EPBC Act, species listed as threatened or migratory are matters of national environmental significance (although species listed as extinct or conservation dependent are not matters of national environmental significance—see Section 1.5). Information about species that occur in the region and are matters of national environmental significance is provided in Schedule 2.

Many of the species listed under the EPBC Act are also protected under state legislation. For example, dolphins are protected under the EPBC Act and also under Western Australian legislation.

The lists of protected species established under the EPBC Act are updated periodically. This plan refers to the current lists of protected species in the region included in the conservation values report cards (www.environment.gov.au/coasts/mbp/north-west.html). The report cards include detailed information about species groups and species distribution and ecology in the North-west Marine Region.

Based on current data and expert advice, biologically important areas (for definition see Section 1.5) are defined for some protected species known to occur in the region. Biologically important areas and the data underpinning them are available in the North-west Marine Conservation Values Atlas (www.environment.gov.au/coasts/mbp/north-west.html).



2.3 Conservation values—protected places

Protected places are areas protected under the EPBC Act as matters of national environmental significance (places listed as world heritage properties, national heritage places or wetlands of international importance), Commonwealth marine reserves or places deemed to have heritage value in the Commonwealth marine environment (such as places on the Commonwealth Heritage List or shipwrecks under the *Historic Shipwrecks Act 1976*).

There is one world heritage place, one national heritage place, one Ramsar site, five Commonwealth heritage places, four historic shipwrecks and four Commonwealth marine reserves in the North-west Marine Region (Figure 2.3).

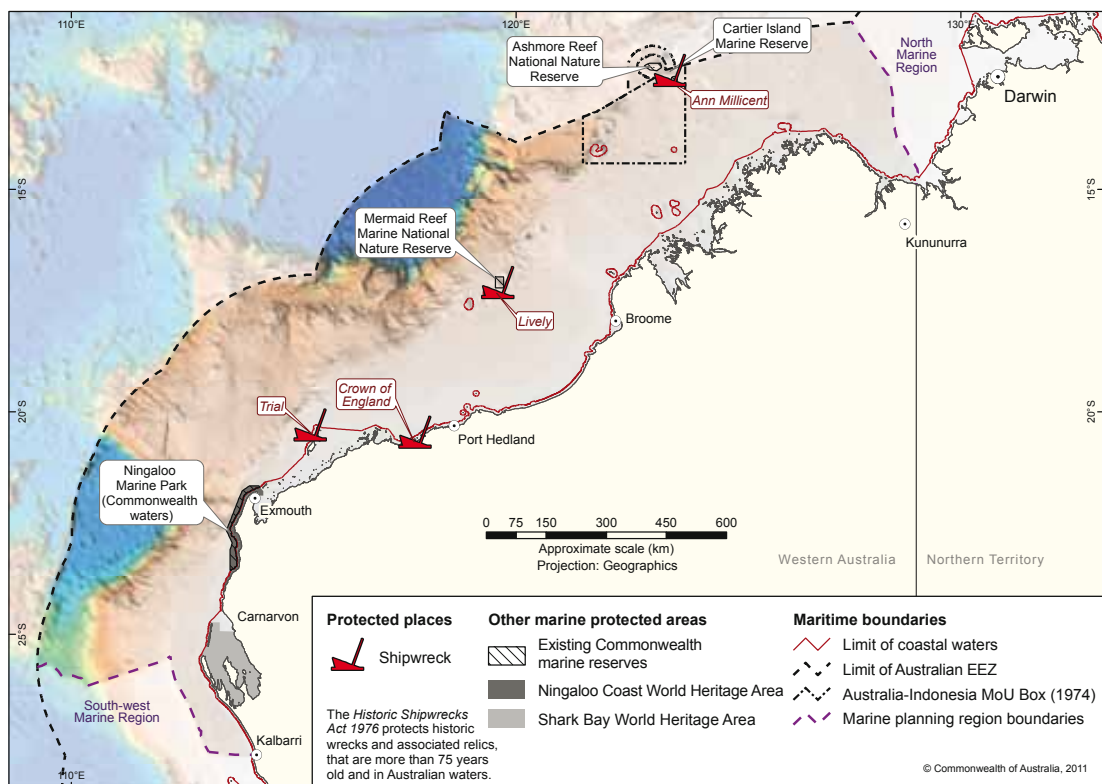


Figure 2.3: Protected places in the North-west Marine Region



World heritage places

The World Heritage List identifies heritage that is of outstanding universal value. In June 2011, the Ningaloo Coast was included on the World Heritage List and is protected as a matter of national environmental significance.

National heritage places

The National Heritage List includes natural, historic and Indigenous places that are of outstanding national heritage value to Australia. In January 2010, the Ningaloo Coast was included on the National Heritage List and is protected as a matter of national environmental significance.

Ramsar sites

Ashmore Reef National Nature Reserve was designated a Ramsar site in 2003 due to the importance of its islands as a resting place for migratory shorebirds and as breeding sites for large colonies of seabirds. By virtue of its listing under the Ramsar Convention, Ashmore Reef is a matter of national environmental significance.

Commonwealth heritage places

The Commonwealth Heritage List is a list of natural, Indigenous and historic heritage places owned or controlled by the Australian Government. Mermaid Reef, Ashmore Reef National Nature Reserve, Seringapatam Reef and Surrounds, Scott Reef and Surrounds – Commonwealth area, and the Ningaloo Marine Area – Commonwealth waters are listed on the Commonwealth Heritage List.

Historic shipwrecks

Four historic shipwrecks are located in the region. The *Trial* was an East India Company ship wrecked north of the Montebello Islands in 1622 and is the oldest known shipwreck in Australian waters. The *Lively* was wrecked in 1810 on the western edge of Mermaid Reef. *Ann Millicent* was sunk in 1888 on Cartier Island and the *Crown of England* foundered during a cyclone in 1912 at Depuch Island off the Pilbara coast.



Commonwealth marine reserves

There are four Commonwealth marine reserves in the region: Ashmore Reef National Nature Reserve, Cartier Island Marine Reserve, Mermaid Reef Marine National Nature Reserve and Ningaloo Marine Park (Commonwealth waters).

Ashmore Reef National Nature Reserve (Ashmore) is located on Australia's North West Shelf in the Indian Ocean, about 450 nautical miles (840 kilometres) west of Darwin, 330 nautical miles (610 kilometres) north of Broome and 60 nautical miles (110 kilometres) south of the Indonesian island of Roti. Ashmore covers 583 square kilometres and includes two extensive lagoons, shifting sand flats and cays, seagrass meadows and a large reef flat covering an area of 239 square kilometres. Within Ashmore are three small islands known as East, Middle and West islands.

Cartier Island Marine Reserve (Cartier) is located 25 nautical miles (45 kilometres) south-east of Ashmore Reef. Covering an area of 167 square kilometres, Cartier includes an unvegetated sand island (Cartier Island) and the area within a 4-nautical-mile radius of the centre of the island, to a depth of 1 kilometre below the sea floor. The area around the island includes a variety of habitats including a mature reef flat, a small submerged pinnacle, known as Wave Governor Bank, and two shallow pools to the north-east of the island.

Ashmore and Cartier support large numbers of marine species including sea snakes, dugongs, reef-building corals, fish and other marine invertebrate fauna. The reserves also provide important seabird and marine turtle nesting sites and provide staging points and feeding areas for large populations of migratory shorebirds. Ashmore was designated a Ramsar⁵ wetland of international importance in 2003 due to the importance of its islands in providing a resting place for migratory shorebirds and supporting large colonies of breeding seabirds.

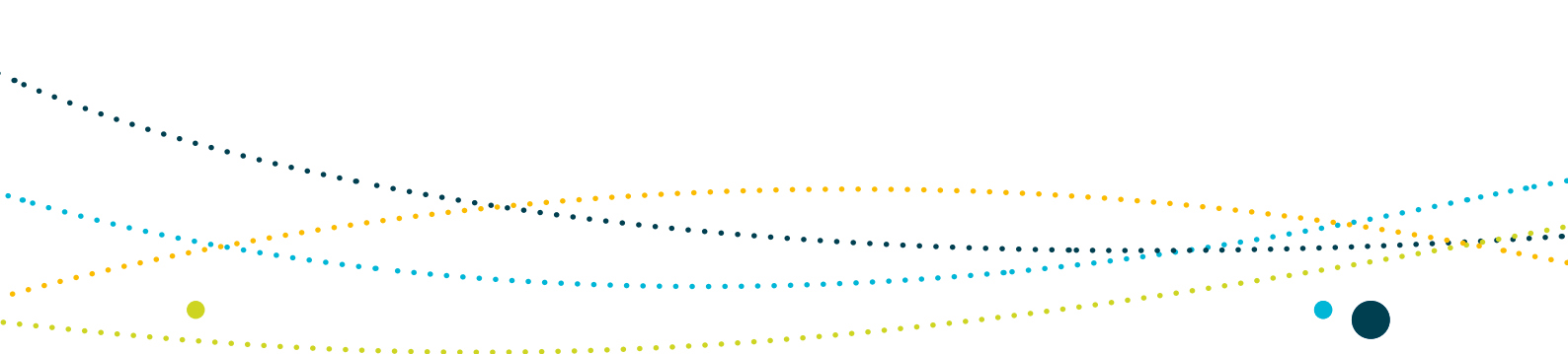
Mermaid Reef Marine National Nature Reserve (Mermaid) surrounds Mermaid Reef, which is located about 150 nautical miles (290 kilometres) north-west of Broome, Western Australia. Mermaid is located near the edge of Australia's continental slope and is surrounded by waters that extend to a depth of more than 500 metres.

Mermaid Reef is the most north-easterly of three reef systems forming the Rowley Shoals. Mermaid Reef is totally submerged at high tide and therefore falls under Australian Government jurisdiction. The other two reefs of the Rowley Shoals, Clerke Reef and Imperieuse Reef, are managed by the Western Australian Government as the Rowley Shoals Marine Park.

The Rowley Shoals including Mermaid Reef have an abundance and variety of marine wildlife that is in a relatively undisturbed condition, as well as spectacular and unusual underwater topography. Mermaid Reef is listed on Australia's Commonwealth Heritage List and all three reefs of the Rowley Shoals have been registered on the Register of the National Estate.

Ningaloo Marine Park (Commonwealth waters) stretches approximately 300 kilometres along the west coast of the Cape Range Peninsula near Exmouth, Western Australia, approximately

5 www.environment.gov.au/water/topics/wetlands/ramsar-convention/index.html



1200 kilometres north of Perth. The total area of the reserve is 2435 square kilometres. Ningaloo Reef, the longest fringing barrier reef in Australia, and the only example in the world of extensive fringing coral reef on the west coast of a continent, is adjacent to the Commonwealth reserve and is protected by the Ningaloo Marine Park (state waters), which lies between the reserve and the Western Australian coast. The combined state and Commonwealth waters of the Ningaloo Marine Park cover a total area of 5070 square kilometres.

The reserve is located in a transition zone between tropical and temperate waters and sustains tropical and temperate plants and animals, with many species at the limit of their distribution. The reserve's water depths range from a relatively shallow 30 metres to oceanic waters more than 500 metres deep. One of the key features of the reserve is its annual visitors, the whale sharks, who visit the reserve each year between March and June.

In June 2011, Ningaloo Marine Park (Commonwealth waters) was included on the World Heritage List as part of the Ningaloo Coast World Heritage Area.





3 REGIONAL PRIORITIES, STRATEGIES AND ACTIONS

Section 176 of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) provides for a bioregional plan to identify objectives for the biodiversity and other values of a region and to include priorities to achieve these objectives. The objectives for this plan are set out in Section 1.3. They are:

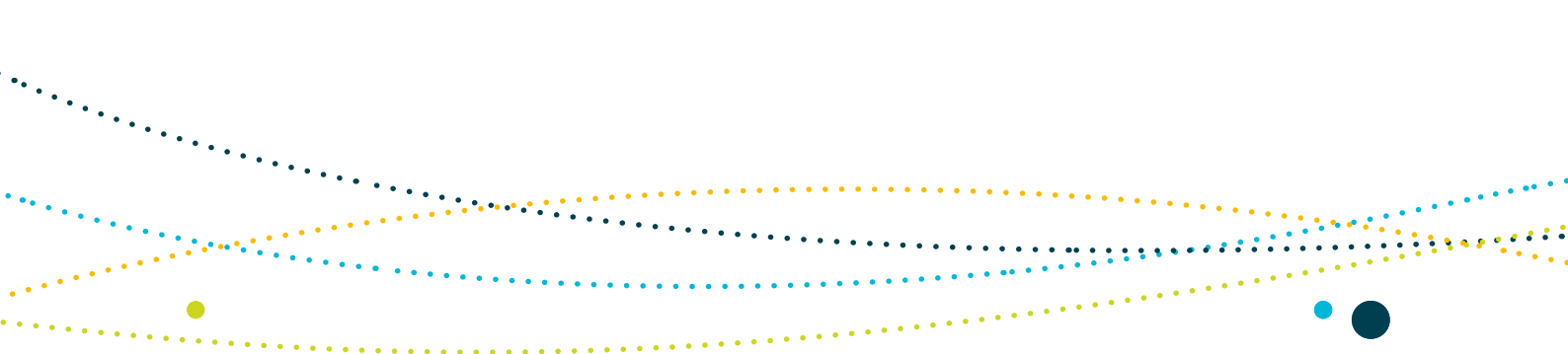
- conserving biodiversity and maintaining ecosystem health
- ensuring the recovery and protection of threatened species
- improving understanding of the region's biodiversity and ecosystems and the pressures they face.

In the context of these objectives, Part 3:

- details the regional priorities and the rationale underpinning the determination of each priority (Section 3.1)
- outlines the strategies and actions developed to address the regional priorities (Section 3.2).

3.1 Regional priorities

Regional priorities are key areas of focus that have been identified to inform decision-making about marine conservation and planning, as well as industry development and other human activities. The regional priorities provide context for implementing the government's statutory responsibilities, such as recovery planning for threatened species and the development and implementation of threat abatement measures. They also point to where future government initiatives and future investments in marine conservation, including in research and monitoring, would be best directed.



The identification of the regional priorities has been guided by the outcomes of the pressure analysis. This analysis considered factors such as the conservation status of conservation values, the location and extent of pressures and the expected impacts arising from conservation value–pressure interactions. In identifying regional priorities, consideration has been given to the following criteria:

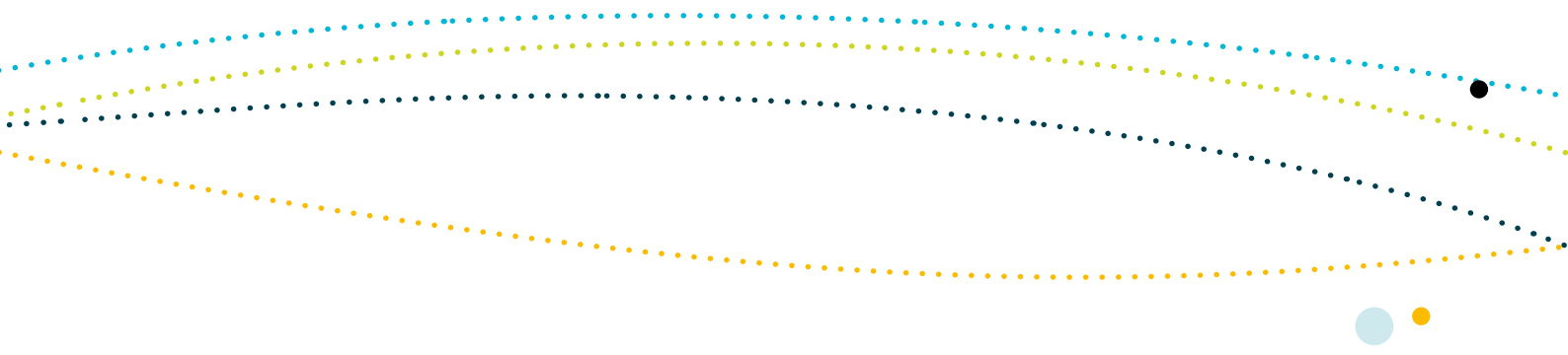
- a conservation value that is subject to
 - a pressure considered *of concern* for the conservation value, and
 - pressures that together are likely to result in cumulative impacts on the value, and/or
 - pressure(s) that are likely to increase substantially in intensity and extent over the next 5–10 years
- a pressure that is considered *of concern* for multiple conservation values
- an area where better knowledge would improve the government’s capacity to meet conservation and ecologically sustainable use objectives
- an Australian Government policy priority for the marine region.

Pressures

For the purpose of this plan, pressures are defined broadly as human-driven processes and events that do or can detrimentally affect the region’s conservation values. These pressures were assessed during the development of this plan. In the assessment process, pressures were classified as *of concern*, *of potential concern*, *of less concern* and *not of concern*. The assessment process is described in Section 2.2 of the *Overview of marine bioregional plans*, and details of the outcomes are included in Schedule 1 to this plan.

There are two main sources of pressures in the North-west Marine Region: those associated directly with anthropogenic (human) activities and those related to climate change.

Anthropogenic pressures on marine ecosystems and biodiversity in the North-west Marine Region are, by global standards, low. This is partly due to the relatively low levels of marine resource use and coastal population pressure across the region (exceptions being in proximity to the large urban and industrial centres), and partly due to Australia’s generally sound management of the marine environment.



A number of sources of pressures nevertheless exist in the region, which is next to one of the fastest growing economies in Australia. The main drivers and sources of anthropogenic pressure on conservation values in the North-west Marine Region are:

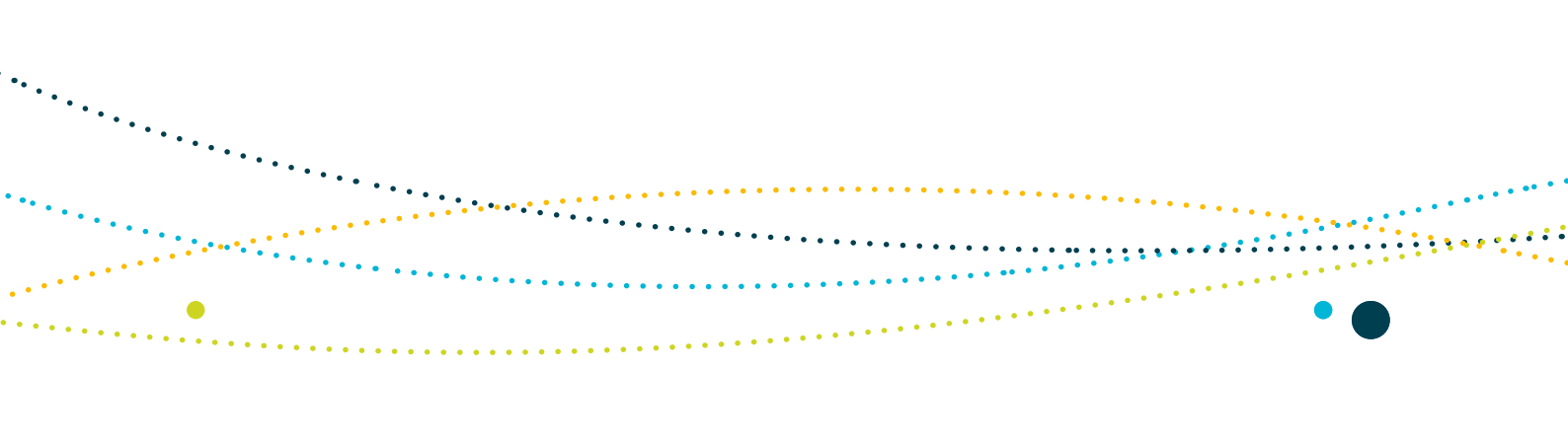
- climate change and associated large-scale effects, including shifts in major currents, rising sea levels, ocean acidification, and changes in the variability and extremes of climatic features (e.g. sea temperature, winds, storm frequency and intensity)
- domestic and international harvesting of living resources
- increasing petroleum and mineral exploration and development
- rapid industrial development in areas adjacent to the region
- increases in shipping activities and development of port infrastructure.

Only a subset of conservation values and pressures assessed as being *of concern* or *of potential concern* has been identified as regional priorities. Generally, when a pressure affects multiple values and its effects are *of concern* for at least some of these values, then the pressure is identified as a regional priority. Similarly, if a conservation value is, or is likely to be, affected detrimentally by multiple pressures, and at least one of the pressures has been assessed as *of concern*, it is considered to be a regional priority. Other key considerations in determining pressure-based regional priorities included issues of scale, legislative responsibility, conservation status, effectiveness of existing management, and level of uncertainty about distribution, abundance and status of conservation values and the pressures acting on them.

North-west Marine Region priorities

This plan identifies 23 regional priorities for the North-west Marine Region: 12 conservation values and 11 pressures.

- Conservation values of regional priority (in no particular order) are (Table 3.1):
 1. Marine turtles
 2. Inshore dolphins (3 species)
 3. Sawfish (2 species)
 4. Sea snakes
 5. Humpback whale
 6. Seabirds (10 species)
 7. Whale shark
 8. Dugong
 9. Ashmore Reef and Cartier Island and surrounding Commonwealth waters
 10. Seringapatam Reef and Commonwealth waters in the Scott Reef complex
 11. Mermaid Reef and the Commonwealth waters surrounding the Rowley Shoals
 12. Commonwealth waters adjacent to Ningaloo Reef.

- 
- Pressures of regional priority are (Table 3.2):

13. Climate change
14. Marine debris
15. Noise pollution
16. Light pollution
17. Extraction of living resources
18. Bycatch
19. Invasive species
20. Physical habitat modification
21. Collision with vessels
22. Changes in hydrological regimes
23. Human presence at sensitive sites.

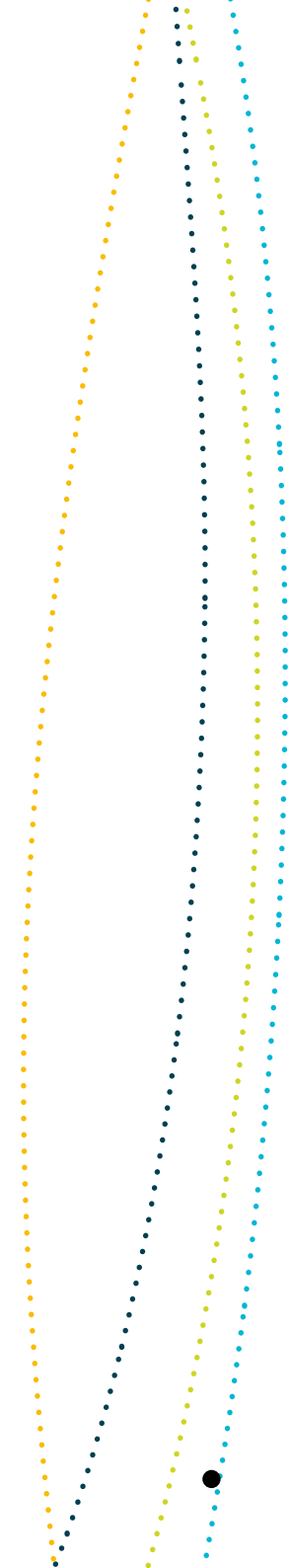
Tables 3.1 and 3.2 provide information on the regional priorities identified for the North-west Marine Region. Further details on the conservation values of the North-west Marine Region and the pressures facing them, and relevant references, are available in Schedule 1 of this plan and the conservation value report cards (www.environment.gov.au/coasts/mbp/north-west/index.html).

Building on the regional priority analyses, available information and existing administrative guidelines, this plan provides advice to assist decision-makers, marine industries and other users to understand and meet the obligations that exist with respect to these priorities under the EPBC Act (see Schedule 2).

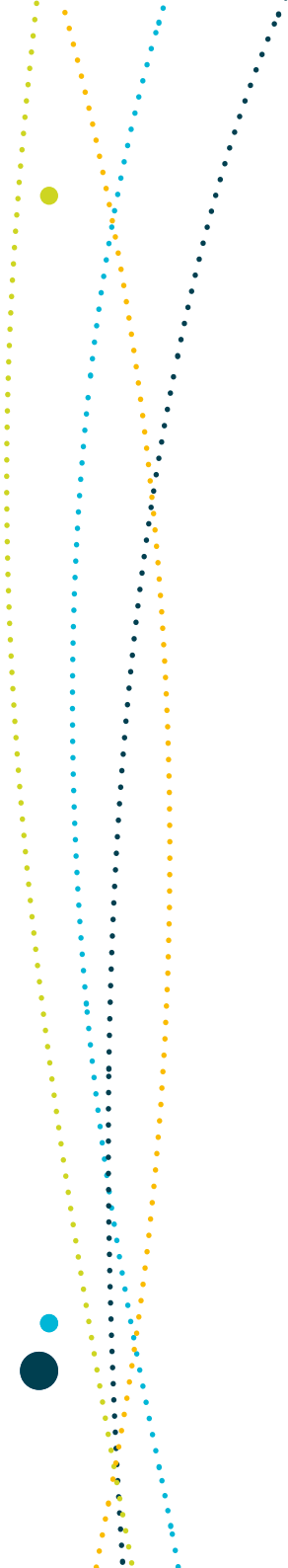


Table 3.1: Conservation values of regional priority for the North-west Marine Region

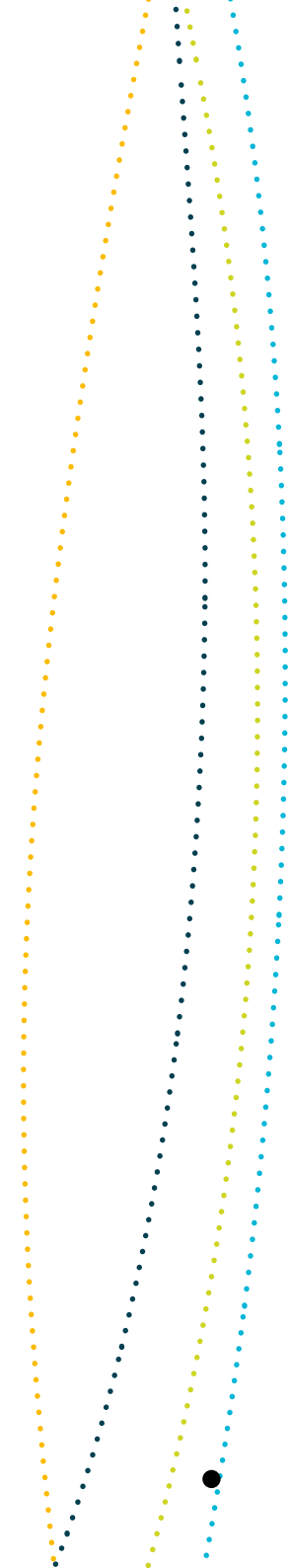
	Conservation value	Rationale (why it is a priority)	Focus for conservation effort
1	<p>Marine turtles</p> <p><i>Flatback turtle</i></p> <p><i>Green turtle</i></p> <p><i>Hawksbill turtle</i></p> <p>(EPBC Act listed as vulnerable, migratory and marine)</p> <p><i>Loggerhead turtle</i></p> <p><i>Olive ridley turtle</i></p> <p><i>Leatherback turtle</i></p> <p>(EPBC Act listed as endangered, migratory and marine)</p>	<p>The North-west Marine Region supports important nesting areas for green, hawksbill, loggerhead and flatback turtles. Olive ridley turtles are known to forage in the northern parts of the region, but records indicate that they nest only occasionally in the region.</p> <p>In the North-west Marine Region, marine turtles are subject to a number of pressures assessed as <i>of concern</i>: invasive species (3 species); dredging (1 species); marine debris (net entanglement and ingestion of debris) (6 species); light pollution from onshore activities (4 species); and human presence at sensitive sites, such as nesting areas (3 species).</p> <p>Marine turtles are also subject to several pressures assessed as <i>of potential concern</i>: changes in sea temperatures; changes in sand temperatures (4 species); bycatch in commercial fishing (4 species); noise pollution associated with seismic testing (6 species) and offshore development (4 species); physical habitat modification due to dredging (4 species); and the use of fishing gear (3 species); collision with vessels (3 species); nutrient pollution (1 species); Indigenous harvest (3 species); and changes in turbidity as a result of dredging activities (1 species).</p> <p>The conservation status of marine turtles, the significance of the North-west Marine Region to their recovery and the pressures facing them in the region make the species group a priority for conservation effort.</p>	<p><u>Ongoing:</u></p> <p>Collaborate with government and non-government organisations through international agreements, such as the Memorandum of Understanding on the Conservation and Management of Marine Turtles and Their Habitats of the Indian Ocean and South-East Asia (IOSEA MoU), to conserve marine turtles and manage the pressures on them.</p> <p>Coordinate marine turtle species recovery efforts across relevant agencies and through community partnerships.</p> <p><u>Short term:</u></p> <p>Increase collaboration with relevant agencies and industries to improve understanding of industry impacts on marine turtles in the North-west Marine Region.</p> <p>Improve reporting of interactions between industry and marine turtles and develop improved mitigation measures.</p> <p><u>Medium term:</u></p> <p>Increase understanding of marine turtles and the pressures facing them in the North-west Marine Region, particularly by supporting research into biologically important areas for marine turtles and the potential impacts of climate change-related pressures.</p>



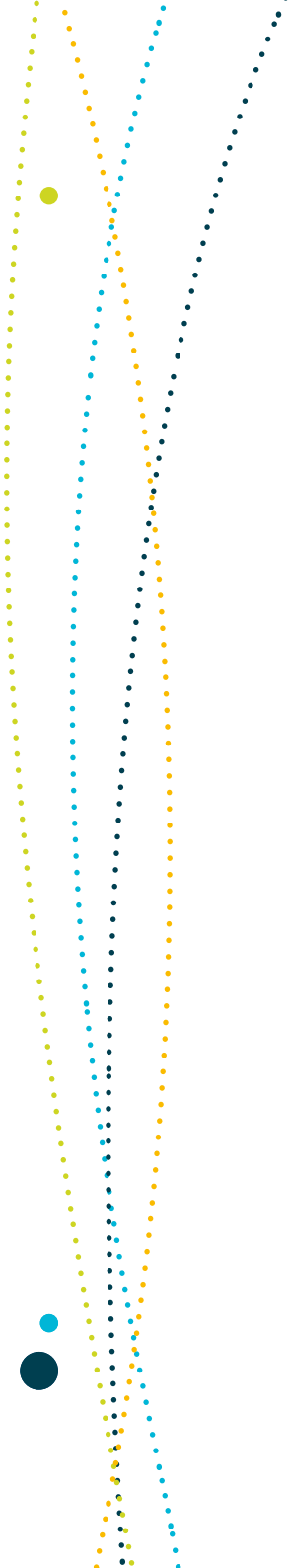
	Conservation value	Rationale (why it is a priority)	Focus for conservation effort
2	<p>Inshore dolphins</p> <p><i>Australian snubfin dolphin</i></p> <p><i>Indo-Pacific bottlenose dolphin (Arafura–Timor sea population)</i></p> <p><i>Indo-Pacific humpback dolphin</i></p> <p>(EPBC Act listed as migratory and cetacean)</p>	<p>Australian snubfin, Indo-Pacific humpback and Indo-Pacific bottlenose dolphins rely on the waters in and adjacent to the North-west Marine Region for breeding and foraging.</p> <p>Inshore dolphins are particularly vulnerable to impacts from human activities because their distribution overlaps with areas of intensive human use. Their vulnerability to pressures is intensified due to their small and fragmented populations and their life history characteristics (they are long lived, females take many years to reach sexual maturity, and they have a low rate of reproduction).</p> <p>In the North-west Marine Region, inshore dolphins are subject to several pressures assessed as <i>of concern</i>: bycatch in commercial fishing; marine debris; and collision with vessels. Inshore dolphins are also subject to several pressures assessed as <i>of potential concern</i>: physical habitat modification (dredging); prey depletion; noise pollution; oil pollution; chemical and nutrient pollution; changes in sea temperatures; ocean acidification; physical habitat modification caused by storm events; sea level rise; human presence at sensitive sites; and changes to hydrological regimes.</p> <p>The conservation status of inshore dolphins, the significance of the North-west Marine Region to their survival (especially given their limited and fragmented ranges) and the pressures facing them in the region make these species a priority for conservation effort.</p>	<p><u>Short term:</u></p> <p>Increase collaboration with relevant agencies and industries to improve the understanding of industry and recreational activity impacts on inshore dolphins in the North-west Marine Region.</p> <p>Improve reporting of interactions between inshore dolphins and industry and recreational activities, and develop improved mitigation measures.</p> <p>Continue to collaborate with government and non-government organisations through international agreements to reduce the occurrence of illegal, unregulated and unreported fishing in the North-west Marine Region.</p> <p><u>Medium term:</u></p> <p>Increase understanding of inshore dolphins and the pressures facing them in the North-west Marine Region, particularly by supporting research into biologically important areas for inshore dolphins and the potential impacts of climate change–related pressures.</p>



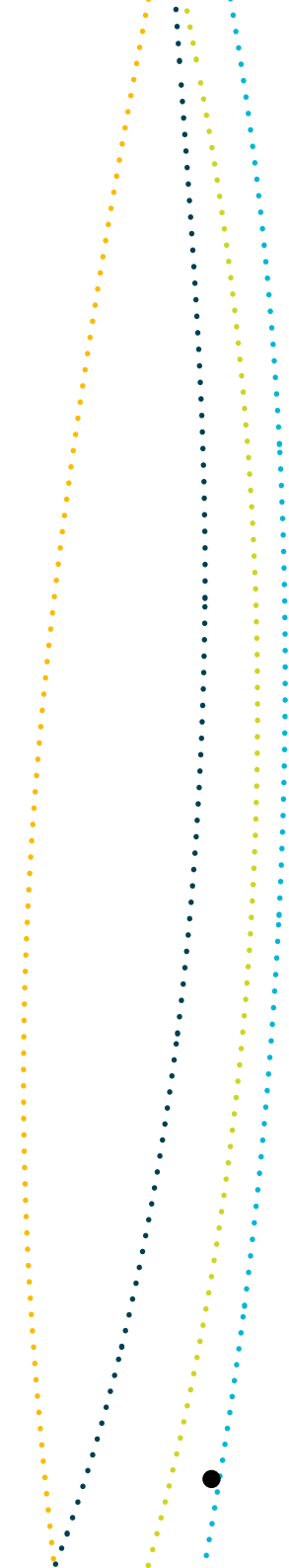
	Conservation value	Rationale (why it is a priority)	Focus for conservation effort
3	<p>Sawfish</p> <p><i>Freshwater sawfish</i></p> <p><i>Green sawfish</i></p> <p>(EPBC Act listed as vulnerable)</p>	<p>While relatively little is known about the distribution and abundance of sawfish species in north-western Australia, the North-west Marine Region is considered an important area for the species group, because the region and adjacent inshore coastal waters and riverine environments contain nationally and globally significant populations of sawfish species.</p> <p>Due to their slow growth and maturation rates, longevity, low fecundity and low rates of natural mortality, sawfish are particularly vulnerable to human-induced pressures. In the North-west Marine Region, sawfish are subject to several pressures assessed as <i>of concern</i>: bycatch (commercial and recreational fishing); and changes in hydrological regimes. Sawfish are also subject to pressures assessed as <i>of potential concern</i>: sea level rise; and marine debris.</p> <p>Some research has been undertaken into the distribution, population size, population trends and factors influencing the recovery of species. However, there are significant gaps in knowledge about sawfish species in north-western Australia. These knowledge gaps, along with the conservation status of sawfish, the significance of the North-west Marine Region to them and the pressures facing them in the region make these species a priority for conservation effort.</p>	<p><u>Short term:</u></p> <p>Coordinate sawfish species recovery efforts across relevant agencies and partnerships with communities through the development and implementation of a recovery plan for sawfish and river shark species.</p> <p>Increase collaboration with relevant agencies and industries to improve understanding of industry impacts on sawfish in the North-west Marine Region.</p> <p>Improve reporting of interactions between industry and sawfish and develop improved mitigation measures.</p> <p><u>Medium term:</u></p> <p>Increase understanding of sawfish and the pressures facing them in the North-west Marine Region, particularly by supporting research into biologically important areas for sawfish and the potential impacts of climate change-related pressures.</p>



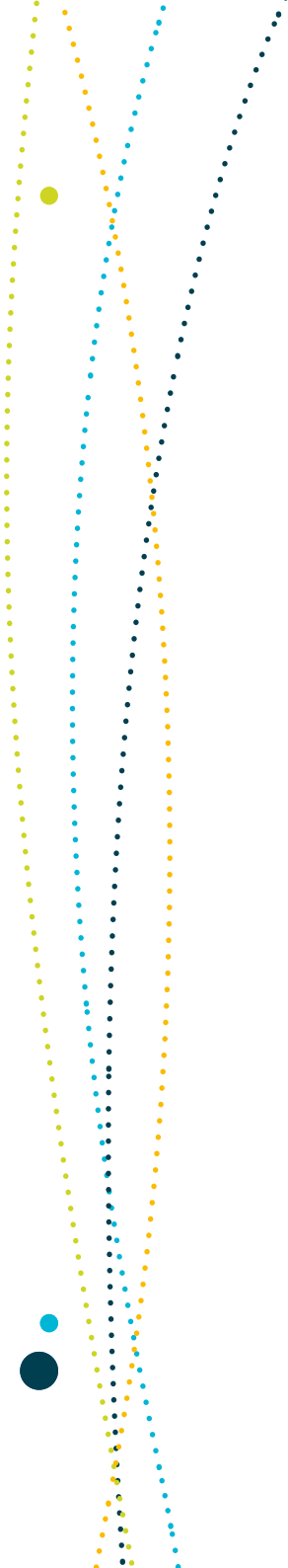
	Conservation value	Rationale (why it is a priority)	Focus for conservation effort
4	<p>Sea snakes (EPBC Act listed as marine)</p>	<p>Twenty-five species of sea snake are known to occur in the North-west Marine Region, two of which (short-nosed seasnake and leaf-scaled seasnake) are listed as critically endangered.</p> <p>Sea snakes are vulnerable to human-induced pressures because of their slow growth rates and low fecundity. Some species also have very specific diets that can make them vulnerable to changes in the food web. Bycatch in commercial fishing is assessed as <i>of concern</i> for sea snakes in the North-west Marine Region. Sea snakes are also subject to several pressures assessed as <i>of potential concern</i>: physical habitat modification; oil pollution; changes in sea temperature; and ocean acidification.</p> <p>The conservation status of sea snakes, the significance of the North-west Marine Region to their survival and the pressures facing them in the region make the species group a priority for conservation effort.</p>	<p><u>Short term:</u></p> <p>Increase collaboration with relevant agencies and industries to improve understanding of industry impacts on sea snakes in the North-west Marine Region.</p> <p>Improve reporting of bycatch interactions between industry and sea snakes and develop improved mitigation measures.</p> <p><u>Medium term:</u></p> <p>Increase understanding of sea snakes and the pressures facing them in the North-west Marine Region, particularly by supporting research into biologically important areas for sea snakes and the potential impacts of climate change-related pressures.</p> <p>Understand, and if possible address, the reasons for sea snake population decline at Ashmore Reef.</p>



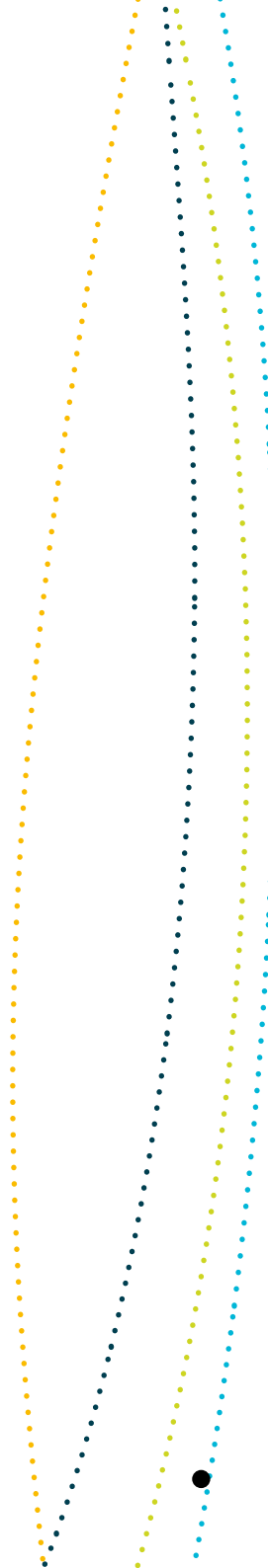
	Conservation value	Rationale (why it is a priority)	Focus for conservation effort
5	Humpback whale (EPBC Act listed as vulnerable, migratory and cetacean)	<p>Humpback whales migrate around June each year from their feeding grounds in Antarctica to the North-west Marine Region where they mate and calve in inshore areas, predominantly between Broome and north Camden Sound. The west Australian population of humpbacks is genetically distinct from the east Australian population and is estimated at around 28 830 individuals.</p> <p>Although the humpback whale population has increased substantially since the cessation of commercial whaling, the species is vulnerable to human-induced pressures because it is long-lived, slow to reach sexual maturity and has a low rate of reproduction. In the North-west Marine Region, noise pollution from seismic surveys was assessed as <i>of concern</i> for humpback whales. They are also subject to several pressures assessed as <i>of potential concern</i>: noise pollution from construction; and collision with vessels.</p> <p>The conservation status of humpback whales, the significance of the North-west Marine Region to them and the pressures facing them in the region make the species a priority for conservation effort.</p>	<p><u>Short term:</u></p> <p>Coordinate humpback whale recovery efforts across relevant agencies and partnerships with communities through the Humpback Whale Recovery Plan.</p> <p>Increase collaboration with relevant agencies and industries to improve understanding of industry impacts on humpback whales in the North-west Marine Region.</p> <p>Improve reporting of interactions between industry and humpback whales, and develop improved mitigation measures.</p> <p><u>Medium term:</u></p> <p>Increase understanding of humpback whales and the pressures facing them in the North-west Marine Region.</p> <p>Support research into biologically important areas for humpback whales, particularly migration pathways and the northern extent of the population.</p>



	Conservation value	Rationale (why it is a priority)	Focus for conservation effort
6	<p>Seabirds</p> <p><i>Brown booby</i></p> <p><i>Red-footed booby</i></p> <p><i>White-tailed tropicbird</i></p> <p><i>Greater frigatebird</i></p> <p><i>Lesser frigatebird</i></p> <p><i>Wedge-tailed shearwater</i></p> <p><i>Lesser crested tern</i></p> <p><i>Little tern</i></p> <p><i>Roseate tern</i></p> <p>(EPBC Act listed as marine and/or migratory)</p> <p><i>Fairy tern</i> (sub-species <i>Sternula nereis nereis</i>)</p> <p>(EPBC Act listed as vulnerable)</p>	<p>Seabirds in the region include terns, noddies, petrels, shearwaters, tropicbirds, frigatebirds and boobies. These species spend most of their lives at sea, ranging over large distances to forage over the open ocean. Many of these species also breed in and adjacent to the North-west Marine Region, including significant populations of terns, shearwaters and boobies.</p> <p>Seabirds are vulnerable to human-induced pressures due to their low fecundity, longevity and vulnerability to introduced predators. In the North-west Marine Region, seabirds are subject to several pressures assessed as <i>of potential concern</i>: invasive species; oil pollution; sea level rise; changes in sea temperatures; ocean acidification; light pollution; and human presence at sensitive sites.</p> <p>The conservation status of seabirds, the significance of the North-west Marine Region to their survival and the pressures facing them in the region make these species a priority for conservation effort.</p>	<p><u>Ongoing</u>:</p> <p>Collaborate with relevant agencies and non-government organisations through international agreements to conserve seabirds and manage the pressures facing them.</p> <p><u>Short term</u>:</p> <p>Increase collaboration with relevant agencies and industries to improve understanding of industry impacts on seabirds in the North-west Marine Region and develop improved mitigation measures.</p> <p><u>Medium term</u>:</p> <p>Increase understanding of seabirds and the pressures facing them in the North-west Marine Region, particularly by supporting research into biologically important areas for seabirds and understanding the potential impacts of climate change-related pressures.</p>

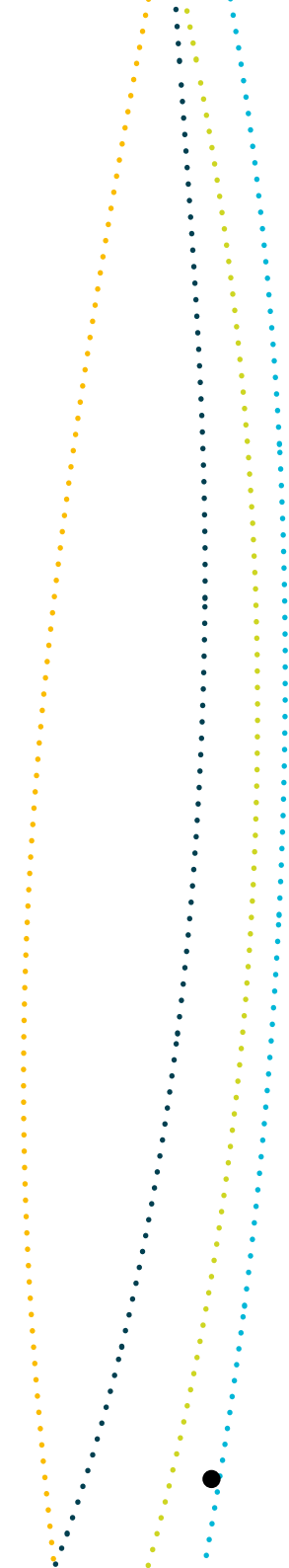


	Conservation value	Rationale (why it is a priority)	Focus for conservation effort
7	<p>Whale shark (EPBC Act listed as vulnerable)</p>	<p>Whale sharks are migratory, have a widespread global distribution in tropical and warm temperate seas and are widely distributed in Australian waters. Ningaloo Reef is the main known aggregation site for whale sharks in Australian waters and has the greatest known density of whale sharks per square kilometre in the world.</p> <p>The length of gestation, localities of birth and frequency of reproduction are not yet known for the whale shark but, in general, shark life history characteristics (late maturity, slow growth rate, low fecundity, longevity and low rate of natural mortality) result in a limited capacity to withstand human-induced pressures. In the North-west Marine Region, whale sharks are subject to several pressures assessed as <i>of potential concern</i>: changes in sea temperature; and the catch of whale sharks in international waters.</p> <p>The pressures facing whale sharks in the region and the limited information about the species make it a priority for conservation effort.</p>	<p><u>Ongoing:</u></p> <p>Collaborate with relevant agencies and non-government organisations through international agreements to conserve whale sharks and manage the pressures facing them.</p> <p>Coordinate whale shark recovery efforts across relevant agencies and through community partnerships.</p> <p><u>Medium term:</u></p> <p>Increase understanding of whale sharks and the pressures facing them in the North-west Marine Region, particularly by supporting research into biologically important areas and migration pathways, and the potential impacts of climate change-related pressures.</p>

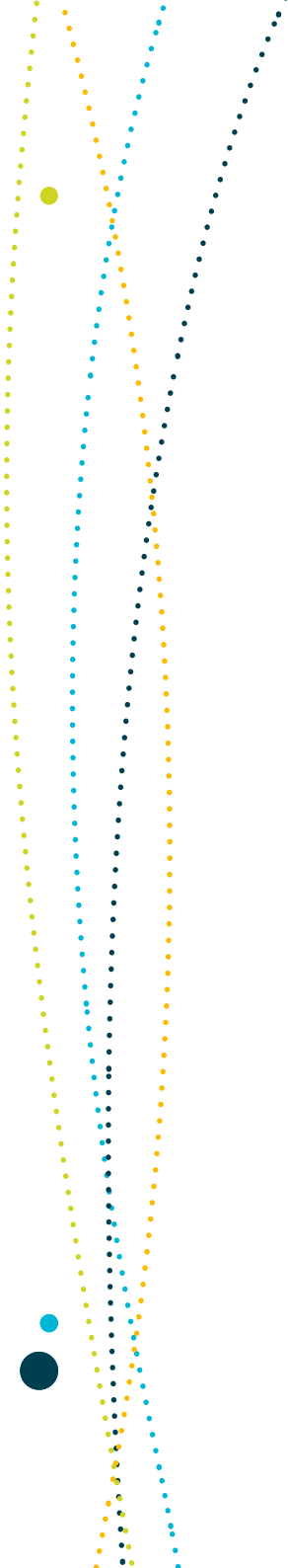


	Conservation value	Rationale (why it is a priority)	Focus for conservation effort
8	Dugong (EPBC Act listed as migratory and marine)	<p>While most dugongs are found in coastal waters adjacent to the North-west Marine Region, they do migrate through Commonwealth waters and a small, genetically distinct population exists at Ashmore Reef.</p> <p>Some of the coastal waters adjacent to the North-west Marine Region support significant populations of dugong; Shark Bay has an estimated population of approximately 10 000 dugongs.</p> <p>Dugongs are susceptible to human-induced impacts as a result of their biological characteristics, including their longevity (>70 years), long gestation (12–14 months), single offspring, long intervals between births (>2.5 years) and prolonged period until sexual maturity (6–17 years). In the North-west Marine Region, dugongs are subject to several pressures assessed as <i>of potential concern</i>: invasive species; vessel collision; oil pollution; physical habitat modification (dredging and coastal development); Indigenous harvest; marine debris (net entanglement and ingestion of debris); sea level rise; changes in sea temperature; and physical habitat modification due to climate change.</p> <p>The conservation status of dugongs, the significance of the North-west Marine Region to their survival and the pressures facing them make the species a priority for conservation effort.</p>	<p><u>Ongoing:</u></p> <p>Collaborate with other range states under the Memorandum of Understanding on the Conservation and Management of Dugongs and Their Habitats throughout Their Range (made under the auspices of the Convention on the conservation of Migratory Species).</p> <p><u>Short term:</u></p> <p>Increase collaboration with relevant agencies, industries and Indigenous and recreational sectors to improve understanding of anthropogenic impacts on dugongs in the North-west Marine Region.</p> <p>Improve the reporting of interactions (e.g. vessel strike, entanglement) and develop improved mitigation measures.</p> <p><u>Medium term:</u></p> <p>Increase understanding of dugongs and the pressures facing them in the North-west Marine Region, particularly by supporting research into biologically important areas for dugong and the potential impacts of climate change–related pressures.</p>

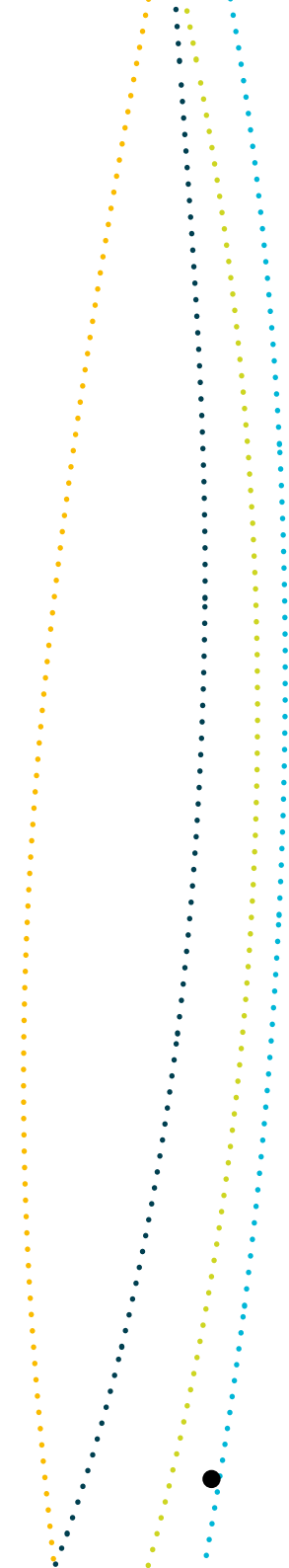
	Conservation value	Rationale (why it is a priority)	Focus for conservation effort
9	<p>Ashmore Reef and Cartier Island and surrounding Commonwealth waters</p> <p>(Key ecological feature)</p>	<p>This area constitutes a key ecological feature due to their ecologically important aggregations of marine life. The area supports significant assemblages of many animals including coral, seabirds, shorebirds, sea snakes and dugongs. Ashmore Reef is the largest of only three emergent oceanic reefs in the north-eastern Indian Ocean and is the only oceanic reef in the region with vegetated islands. Emergent reefs are areas of enhanced primary productivity in an otherwise oligotrophic environment.</p> <p>Ashmore Reef and Cartier Island and the surrounding Commonwealth waters are vulnerable to human-induced pressures due to the area's proximity to the edge of the Australian exclusive economic zone. The pressures assessed as <i>of potential concern</i> are: invasive species; illegal, unregulated and unreported fishing; oil pollution; marine debris; physical habitat modification due to storm events; sea level rise; changes in sea temperatures; and ocean acidification. Changes in the environment at Ashmore Reef may be responsible for the rapid decline in sea snake diversity and abundance witnessed in recent years.</p> <p>Ashmore Reef and Cartier Island and surrounding Commonwealth waters are a priority for conservation efforts because they are a key ecological feature of the region that is facing pressures assessed as <i>of potential concern</i>.</p>	<p><u>Ongoing:</u></p> <p>Collaborate with relevant agencies on environmental protection efforts to mitigate invasive species and to reduce the occurrence of illegal, unregulated and unreported fishing in the North-west Marine Region.</p> <p><u>Medium term:</u></p> <p>In collaboration with Australian and Indonesian agencies, develop and implement an agreed, shared approach to the sustainable harvest of marine resources by traditional Indonesian fishers and the conservation of the marine environment within the Memorandum of Understanding (MoU) Box (see Figure 2.1).</p> <p>Increase understanding of Ashmore Reef and Cartier Island and the surrounding Commonwealth waters and the pressures facing them, particularly in regard to the potential impacts of climate change-related pressures.</p>



	Conservation value	Rationale (why it is a priority)	Focus for conservation effort
10	<p>Seringapatam Reef and Commonwealth waters in the Scott Reef complex</p> <p>(Key ecological feature)</p>	<p>Seringapatam Reef and Commonwealth waters in the Scott Reef complex constitute a key ecological feature as they support diverse aggregations of marine life, high primary productivity relative to other parts of the region and high species richness.</p> <p>North and South Scott reefs, Seringapatam Reef and the Commonwealth waters surrounding them are vulnerable to human-induced pressures in part due to the area's proximity to the edge of the Australian exclusive economic zone, their presence within the Memorandum of Understanding (MoU) Box, and the high prospectivity for oil and gas exploration. Traditional Indonesian fishing is a pressure <i>of concern</i> for Seringapatam Reef and Commonwealth waters in the Scott Reef complex. The pressures assessed as <i>of potential concern</i> are: invasive species; physical habitat modification (construction activities, anchorage, Indonesian traditional fishing practices); oil pollution; marine debris; physical habitat modification due to increasing frequency and intensity of storm events; sea level rise; changes in sea temperatures; and ocean acidification.</p> <p>Seringapatam Reef and Commonwealth waters in the Scott Reef complex are a priority for conservation efforts because they are a key ecological feature of the region that is facing pressures assessed as <i>of concern</i> and <i>of potential concern</i>.</p>	<p><u>Ongoing:</u></p> <p>Collaborate with relevant agencies on environmental protection efforts to mitigate or manage the pressures on Seringapatam Reef and Commonwealth waters in the Scott Reef complex.</p> <p><u>Medium term:</u></p> <p>In collaboration with Australian and Indonesian agencies, develop and implement an agreed, shared approach to the sustainable harvest of marine resources by traditional Indonesian fishers and the conservation of the marine environment within the Memorandum of Understanding (MoU) Box (see Figure 2.1).</p> <p>Increase understanding of Seringapatam Reef and Commonwealth waters in the Scott Reef complex and the pressures facing them, particularly in regard to the potential impacts of climate change–related pressures.</p>



	Conservation value	Rationale (why it is a priority)	Focus for conservation effort
11	<p>Mermaid Reef and Commonwealth waters surrounding Rowley Shoals</p> <p>(Key ecological feature)</p>	<p>Mermaid Reef and the Commonwealth waters surrounding Rowley Shoals are regionally important because they support high species diversity, enhanced productivity and aggregations of marine life. The steep changes in slope around the reef also attract a range of migratory pelagic species including dolphins, tuna, billfish and sharks.</p> <p>Mermaid Reef and the Commonwealth waters surrounding Rowley Shoals are vulnerable to human-induced pressures such as the expansion of the oil and gas industry and the increasing number of vessels using the area. The pressures assessed as <i>of potential concern</i> are: invasive species; physical habitat modification from storm events; oil pollution; changes in sea temperatures; sea level rise; and ocean acidification.</p> <p>Mermaid Reef and the Commonwealth waters surrounding Rowley Shoals are a priority for conservation efforts because they are a key ecological feature of the region that is facing pressures assessed as <i>of potential concern</i>.</p>	<p><u>Ongoing:</u></p> <p>Collaborate with relevant agencies on environmental protection efforts to manage the pressures on Mermaid Reef and the Commonwealth waters surrounding Rowley Shoals.</p> <p>Continue to cooperate with state agencies in management arrangements for adjoining state and Commonwealth marine reserves.</p> <p><u>Short term:</u></p> <p>Establish and manage a Commonwealth Marine Reserve Network in the North-west to contribute to the protection of key ecological features in the region, including Commonwealth waters surrounding the existing Mermaid Reef and Rowley Shoals marine reserves.</p> <p><u>Medium term:</u></p> <p>Increase understanding of Mermaid Reef and the Commonwealth waters surrounding Rowley Shoals and the pressures facing them, particularly in regard to the potential impacts of climate change–related pressures.</p>



	Conservation value	Rationale (why it is a priority)	Focus for conservation effort
12	<p>Commonwealth waters adjacent to Ningaloo Reef</p> <p>(Key ecological feature)</p>	<p>The Commonwealth waters adjacent to Ningaloo Reef are a key ecological feature of the North-west Marine Region. The reef is globally significant as the only extensive coral reef in the world that fringes the west coast of a continent. It is also globally significant as a seasonal aggregation site for whale sharks.</p> <p>The Commonwealth waters adjacent to Ningaloo Reef are potentially vulnerable to human-induced pressures associated with the expansion of the oil and gas industry and the increasing number of vessels using the area. The pressures assessed as <i>of potential concern</i> are: invasive species; oil pollution; sea level rise; changes in sea temperatures; and ocean acidification.</p> <p>The Commonwealth waters adjacent to Ningaloo Reef are a priority for conservation efforts because they are a key ecological feature of the region facing pressures assessed as <i>of potential concern</i>.</p>	<p><u>Ongoing:</u></p> <p>Collaborate with relevant agencies, and partner with communities on environmental protection efforts to manage the impacts of invasive species and physical habitat modification on the Commonwealth waters adjacent to Ningaloo Reef.</p> <p>Maintain cooperative management arrangements with state agencies for adjoining state and Commonwealth marine reserves.</p> <p><u>Immediate:</u></p> <p>Provide regional advice about potential impacts on Commonwealth waters adjacent to Ningaloo Reef to assist decision-making consistent with the EPBC Act (see Schedule 2 of this plan).</p> <p><u>Short term:</u></p> <p>Establish and manage a Commonwealth Marine Reserve Network in the North-west Marine Region to further contribute to the protection of key ecological features in the region, including the Commonwealth waters adjacent to Ningaloo Reef.</p> <p><u>Medium term:</u></p> <p>Increase understanding of the Commonwealth waters adjacent to Ningaloo Reef and the pressures facing them, particularly in regard to the potential impacts of climate change–related pressures.</p>

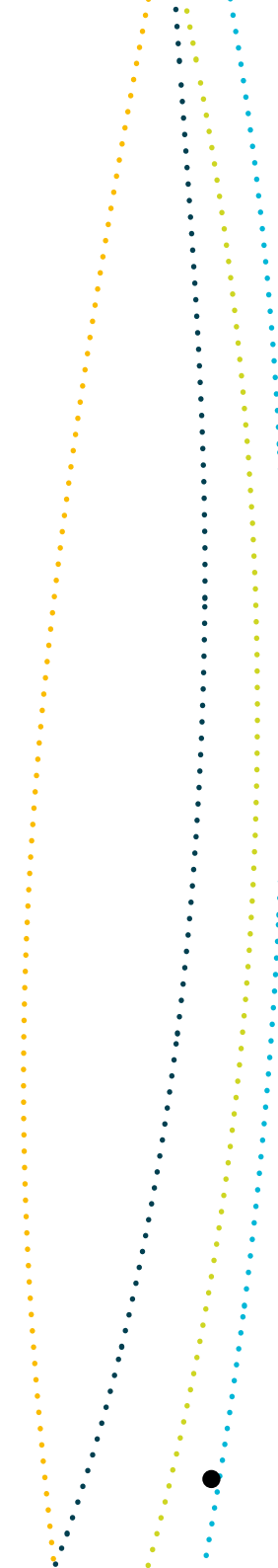
EPBC Act = *Environment Protection and Biodiversity Act 1999*

Table 3.2: Pressures of regional priority for the North-west Marine Region

	Pressure ^a	Rationale (why it is a priority)	Focus for conservation effort
13	Climate change	<p>Climate change–related pressures, including sea level rise, sea temperatures, ocean acidification and storm intensity, are predicted to increase in the North-west Marine Region. Climate change scenarios for Australia predict sea level rise of 0.5–1 m by 2100 and waters around Australia are expected to warm by 1 °C by 2030.</p> <p>In the North-west Marine Region, pressures related to climate change are assessed as <i>of potential concern</i> for all six species of marine turtle known to occur in the region, inshore dolphins, sawfish, sea snakes, whale shark, dugong, all species of seabird assessed and the nine priority key ecological features of the region (Table 3.1).</p> <p>Climate change is a priority for conservation effort in the North-west Marine Region because it is assessed as <i>of potential concern</i> for multiple conservation values, pressures associated with it are likely to increase and have unforeseen consequences for the region’s natural systems and biodiversity, and because there is a significant gap in knowledge about how the pressures will impact the conservation values of the region.</p>	<p><u>Ongoing:</u></p> <p>Collaborate with relevant agencies on environmental protection efforts to manage climate change–related pressures and mitigate their impact on conservation values in the North-west Marine Region.</p> <p>Collaborate with government and non-government organisations through international agreements to understand and address the impacts of climate change, including in the North-west Marine Region.</p> <p><u>Short term:</u></p> <p>Increase collaboration with relevant industries to improve understanding of climate change and its impacts on conservation values in the North-west Marine Region and develop improved mitigation measures.</p> <p><u>Medium term:</u></p> <p>Increase understanding of climate change in the North-west Marine Region and the impacts on conservation values.</p>

EPBC Act = *Environment Protection and Biodiversity Act 1999*

- a Similar pressures have been amalgamated where appropriate to form pressures of regional priority. For example, the pressures of bycatch from commercial fishing and bycatch from recreational fishing have been combined to form the regional priority of bycatch. More detailed information on the analysis of pressures can be found in Schedule 1 of this plan (available online at www.environment.gov.au/coasts/mbp/north-west), and in the conservation value report cards (available online at www.environment.gov.au/coasts/mbp/north-west).



	Pressure ^a	Rationale (why it is a priority)	Focus for conservation effort
14	Marine debris	<p>Marine debris data for the North-west Marine Region is limited. However, key contributing factors for the introduction and spread of debris in the region are present, including high levels of commercial shipping, increasing use of recreational vessels, major current systems (the Leeuwin Current), active fisheries (recreational and commercial), and significant coastal urban and industrial development.</p> <p>Vertebrate marine life injury and fatality caused by ingestion of, or entanglement in, harmful marine debris is a listed key threatening process under the EPBC Act.</p> <p>In the North-west Marine Region, interactions with marine debris are <i>of concern</i> for marine turtles and inshore dolphins. Interactions with marine debris are <i>of potential concern</i> for sawfish, dugong, the Ashmore Reef, Cartier Island and surrounding Commonwealth waters, and Seringapatam Reef and Commonwealth waters in the Scott Reef complex.</p> <p>Marine debris is a priority for conservation efforts in the North-west Marine Region because it is <i>of concern</i> or <i>of potential concern</i> for multiple conservation values in the region, because of the vulnerability of the region to the pressure, and because it is listed under the EPBC Act as a key threatening process.</p>	<p><u>Ongoing:</u></p> <p>Coordinate environmental protection efforts across relevant agencies and partner with communities to implement actions in the Marine Debris Threat Abatement Plan to manage marine debris and mitigate its impacts on conservation values in the North-west Marine Region.</p> <p>Collaborate with government and non-government organisations through international agreements to manage marine debris and reduce its occurrence in the North-west Marine Region.</p> <p><u>Short term:</u></p> <p>Collaborate with fisheries management agencies, the fishing industry and other relevant industries to improve understanding of marine debris and address its cumulative effects on the conservation values of the North-west Marine Region.</p> <p><u>Medium term:</u></p> <p>Increase understanding of the sources and extent of marine debris in the North-west Marine Region and its impacts on conservation values.</p>

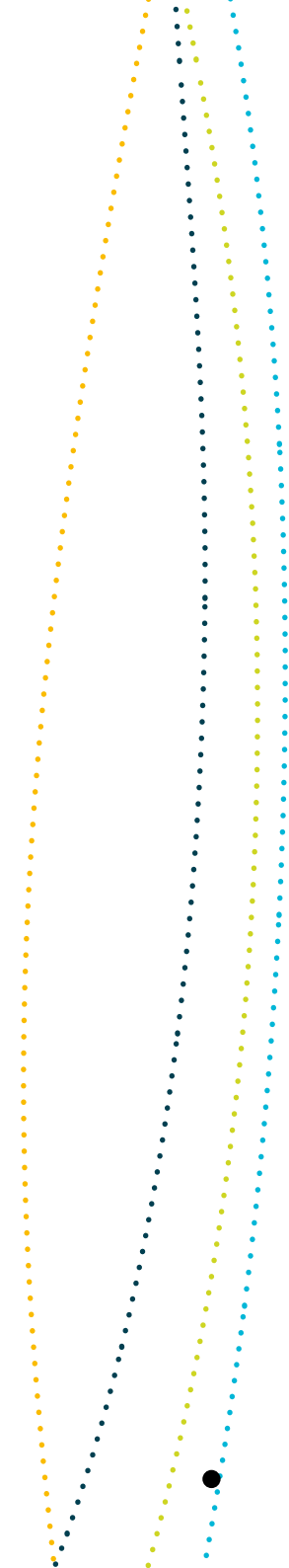
EPBC Act = *Environment Protection and Biodiversity Act 1999*

- a Similar pressures have been amalgamated where appropriate to form pressures of regional priority. For example, the pressures of bycatch from commercial fishing and bycatch from recreational fishing have been combined to form the regional priority of bycatch. More detailed information on the analysis of pressures can be found in Schedule 1 of this plan (available online at www.environment.gov.au/coasts/mbp/north-west), and in the conservation value report cards (available online at www.environment.gov.au/coasts/mbp/north-west).

	Pressure ^a	Rationale (why it is a priority)	Focus for conservation effort
15	Noise pollution	<p>Noise pollution from a range of activities, including shipping, seismic surveys, and offshore and onshore construction, is predicted to increase in the North-west Marine Region. There is growing concern that anthropogenic noise poses a significant threat to some species, particularly cetaceans, because it may mask sounds that are vital for their essential activities and behaviours including navigation, identifying the location of prey and predators, attracting mates, and maintaining group cohesion and social interactions. Noise pollution may modify behaviour through attraction and avoidance to sound or cause temporary or permanent physical injury.</p> <p>In the North-west Marine Region, noise pollution is <i>of concern</i> for humpback whales and <i>of potential concern</i> for inshore dolphins, bottlenose dolphin and the six species of marine turtles known to occur in the region.</p> <p>Noise pollution is a priority for conservation effort in the North-west Marine Region because it is <i>of concern</i> or <i>of potential concern</i> for multiple conservation values and the pressure is likely to increase in the region.</p>	<p><u>Ongoing:</u></p> <p>Collaborate with relevant agencies on environmental protection efforts to manage noise pollution and mitigate its impacts on conservation values in the North-west Marine Region.</p> <p><u>Short term:</u></p> <p>Increase collaboration with relevant industries to improve the understanding of noise pollution in the North-west Marine Region and develop improved mitigation measures.</p> <p><u>Medium term:</u></p> <p>Increase understanding of the impacts of noise pollution on conservation values in the North-west Marine Region.</p>

EPBC Act = *Environment Protection and Biodiversity Act 1999*

- a Similar pressures have been amalgamated where appropriate to form pressures of regional priority. For example, the pressures of bycatch from commercial fishing and bycatch from recreational fishing have been combined to form the regional priority of bycatch. More detailed information on the analysis of pressures can be found in Schedule 1 of this plan (available online at www.environment.gov.au/coasts/mbp/north-west), and in the conservation value report cards (available online at www.environment.gov.au/coasts/mbp/north-west).



	Pressure ^a	Rationale (why it is a priority)	Focus for conservation effort
16	Light pollution	<p>Light pollution is defined as excessive or obtrusive artificial light, which itself is distinct from natural light in five main ways: source, scattering, reflection, directivity and direction. For marine turtle and seabird species, light pollution along, or adjacent to, nesting beaches or rookeries may cause alterations to critical behaviours, such as foraging at sea, the selection of nesting sites and the passage of emerging turtle hatchlings from the beach to the sea. The attraction some species have for artificial light sources can also significantly increase their vulnerability to predation. Sources of light pollution include coastal development, shipping and offshore sites, such as oil rigs.</p> <p>In the North-west Marine Region, light pollution is <i>of concern</i> for flatback, green, hawksbill and loggerhead turtles and is <i>of potential concern</i> for all species of seabird assessed (Table 3.1).</p> <p>Light pollution is a priority for conservation effort in the North-west Marine Region because it is <i>of concern</i> or <i>of potential concern</i> for multiple conservation values and the pressure is likely to increase in the region.</p>	<p><u>Ongoing:</u></p> <p>Collaborate with relevant agencies on environmental protection efforts to manage light pollution and mitigate its impacts on conservation values in the North-west Marine Region.</p> <p><u>Short term:</u></p> <p>Increase collaboration with relevant industries to improve the understanding of light pollution in the North-west Marine Region and develop improved mitigation measures.</p> <p><u>Medium term:</u></p> <p>Increase understanding of the impacts of light pollution on conservation values in the North-west Marine Region.</p>

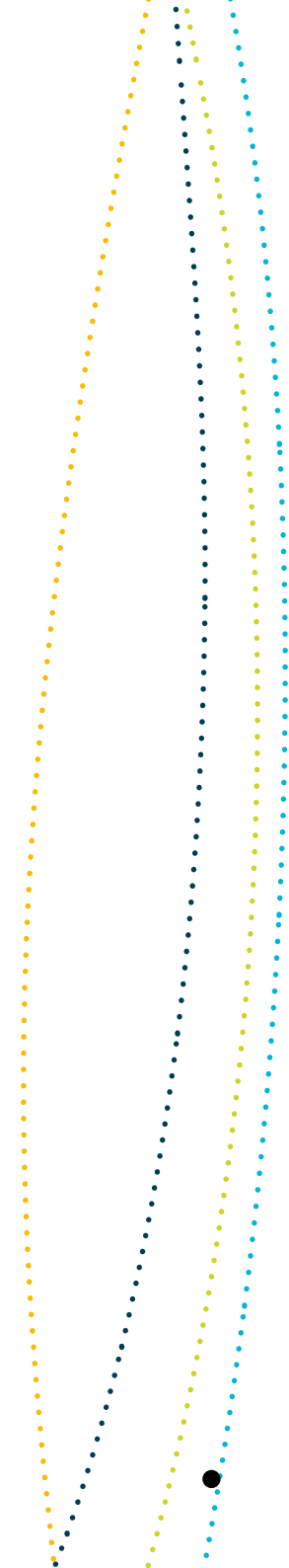
EPBC Act = *Environment Protection and Biodiversity Act 1999*

- a Similar pressures have been amalgamated where appropriate to form pressures of regional priority. For example, the pressures of bycatch from commercial fishing and bycatch from recreational fishing have been combined to form the regional priority of bycatch. More detailed information on the analysis of pressures can be found in Schedule 1 of this plan (available online at www.environment.gov.au/coasts/mbp/north-west), and in the conservation value report cards (available online at www.environment.gov.au/coasts/mbp/north-west).

	Pressure ^a	Rationale (why it is a priority)	Focus for conservation effort
17	Extraction of living resources	<p>Some conservation values in the North-west Marine Region are vulnerable to extraction of living resources from a number of sources including traditional Indonesian fishing; commercial and recreational fishing; illegal, unregulated and unreported fishing; and Indigenous harvest. Commercial fishing effort overlaps with the Glomar Shoals and it is unclear whether the removal of non-target species is impacting on its values. Traditional Indonesian fishing effort is intense at Seringapatam Reef and Commonwealth waters in the Scott Reef complex. Depending on the intensity of effort and composition of catch, the extraction of living resources from these key ecological features may affect trophic structures and ecological functioning.</p> <p>The extraction of living resources via illegal, unregulated and unreported fishing along the northern edges of the region is a pressure of <i>potential concern</i> for the carbonate bank and terrace system of the Sahul Shelf, the pinnacles of the Bonaparte Basin, and the Commonwealth waters surrounding Ashmore Reef and Cartier Island.</p> <p>Indigenous harvest of traditional marine resources (e.g. turtles and dugong) adjacent to the region is a pressure of <i>potential concern</i>.</p> <p>Extraction of living resources is a priority for conservation effort in the North-west Marine Region because it is of <i>potential concern</i> for multiple conservation values and because the region is vulnerable to the pressure.</p>	<p><u>Ongoing:</u></p> <p>Collaborate with relevant agencies to continue to improve the sustainability of fisheries management and the mitigation of fisheries impacts on conservation values in the North-west Marine Region.</p> <p>Collaborate with government and non-government organisations through international agreements to manage illegal, unregulated and unreported fishing and reduce its occurrence in the North-west Marine Region.</p> <p>In collaboration with Australian and Indonesian agencies, develop and implement an agreed, shared approach to the sustainable harvest of marine resources by traditional Indonesian fishers and the conservation of the marine environment within the Memorandum of Understanding (MoU) Box (see Figure 2.1).</p> <p>Collaborate with relevant agencies and Indigenous groups to ensure the sustainable take of turtles and dugong.</p>

EPBC Act = *Environment Protection and Biodiversity Act 1999*

- a Similar pressures have been amalgamated where appropriate to form pressures of regional priority. For example, the pressures of bycatch from commercial fishing and bycatch from recreational fishing have been combined to form the regional priority of bycatch. More detailed information on the analysis of pressures can be found in Schedule 1 of this plan (available online at www.environment.gov.au/coasts/mbp/north-west), and in the conservation value report cards (available online at www.environment.gov.au/coasts/mbp/north-west).



	Pressure ^a	Rationale (why it is a priority)	Focus for conservation effort
18	Bycatch	<p>Some conservation values in the North-west Marine Region are vulnerable to bycatch from commercial fishing operations in the region, increasing levels of recreational fishing in and adjacent to the region, and the region's proximity to the illegal, unreported and unregulated fishing operations that take place at the edges of the Australian exclusive economic zone.</p> <p>In the North-west Marine Region, bycatch is <i>of concern</i> for sawfish, sea snakes, Indo-Pacific bottlenose dolphin, bottlenose dolphin and Fraser's dolphin. Bycatch is <i>of potential concern</i> for the snubfin dolphin, Indo-Pacific humpback dolphin, flatback turtle, green turtle, hawksbill turtle, loggerhead turtle, other pelagic dolphins and bony fish.</p> <p>Bycatch is a priority for conservation effort in the North-west Marine Region because it is <i>of concern</i> or <i>of potential concern</i> for multiple conservation values and because the region is vulnerable to the pressure.</p>	<p><u>Ongoing:</u></p> <p>Collaborate with relevant agencies on environmental protection efforts to manage bycatch and mitigate its impacts on conservation values in the North-west Marine Region.</p> <p>Collaborate with government and non-government organisations through international agreements to manage illegal, unregulated and unreported fishing and reduce its occurrence in the North-west Marine Region.</p> <p><u>Short term:</u></p> <p>Collaborate with fisheries management agencies, the fishing industry and other relevant industries to improve understanding of bycatch and address its cumulative effects on the conservation values of the North-west Marine Region.</p> <p><u>Medium term:</u></p> <p>Increase understanding of the levels of bycatch in the North-west Marine Region and its impacts on conservation values.</p>

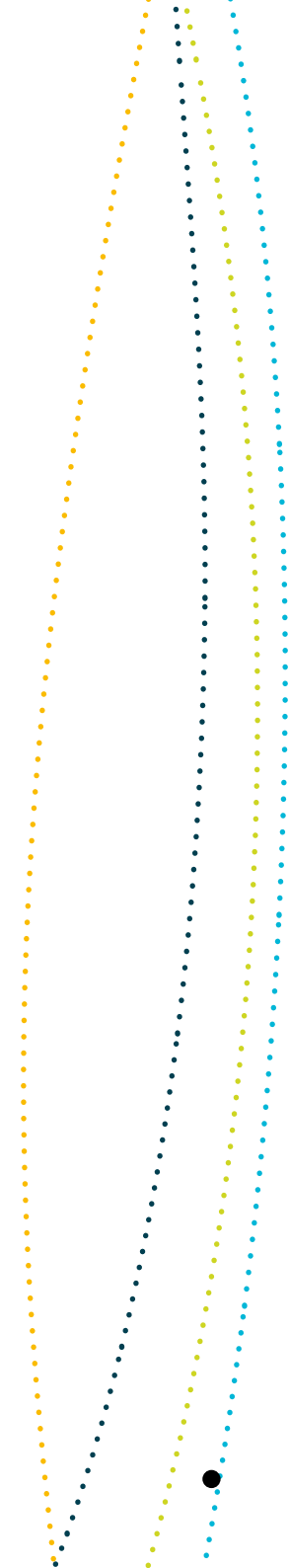
EPBC Act = *Environment Protection and Biodiversity Act 1999*

- a Similar pressures have been amalgamated where appropriate to form pressures of regional priority. For example, the pressures of bycatch from commercial fishing and bycatch from recreational fishing have been combined to form the regional priority of bycatch. More detailed information on the analysis of pressures can be found in Schedule 1 of this plan (available online at www.environment.gov.au/coasts/mbp/north-west), and in the conservation value report cards (available online at www.environment.gov.au/coasts/mbp/north-west).

	Pressure ^a	Rationale (why it is a priority)	Focus for conservation effort
19	Invasive species	<p>Some conservation values in the North-west Marine Region are vulnerable to invasive species including pest species introduced into the marine environment by vessel traffic, and introduced species such as feral pigs and dogs that prey on native species and their eggs (feral pigs, dogs and foxes prey on turtle eggs in coastal areas adjacent to the northern part of the region).</p> <p>In the North-west Marine Region, interactions with invasive species are <i>of concern</i> for green, flatback and loggerhead turtles. Interactions with invasive species are <i>of potential concern</i> for dugong and the 10 species of seabird (Table 3.1).</p> <p>The North-west Marine Region has high levels of international shipping traffic; traditional Indonesian fishing; and illegal, unreported and unregulated fishing activity. These activities are potential vectors of invasive species via hull fouling and ballast water. Invasive species have been assessed as <i>of potential concern</i> for the following key ecological features: Ashmore Reef and Cartier Island and surrounding Commonwealth waters; Seringapatam Reef and Commonwealth waters in the Scott Reef complex; Glomar Shoals; Mermaid Reef and the Commonwealth waters surrounding Rowley Shoals; and the Commonwealth waters adjacent to Ningaloo Reef.</p> <p>Invasive species are a focus for conservation effort in the North-west Marine Region because they are <i>of concern</i> or <i>of potential concern</i> for multiple conservation values and because the region is vulnerable to the pressure.</p>	<p><u>Ongoing:</u></p> <p>Collaborate with relevant agencies, and partner with communities on environmental protection efforts to manage invasive species and mitigate their impacts on conservation values in the North-west Marine Region. This includes contributing to the implementation of the National System for the Prevention and Management of Marine Pest Incursions and threat abatement plans for feral pigs and foxes.</p> <p><u>Short term:</u></p> <p>Increase collaboration with relevant industries to improve the understanding of invasive species in the North-west Marine Region and develop improved mitigation measures.</p> <p><u>Medium term:</u></p> <p>Increase understanding of the causes of invasive species and their impacts on conservation values in the North-west Marine Region.</p>

EPBC Act = *Environment Protection and Biodiversity Act 1999*

- a Similar pressures have been amalgamated where appropriate to form pressures of regional priority. For example, the pressures of bycatch from commercial fishing and bycatch from recreational fishing have been combined to form the regional priority of bycatch. More detailed information on the analysis of pressures can be found in Schedule 1 of this plan (available online at www.environment.gov.au/coasts/mbp/north-west), and in the conservation value report cards (available online at www.environment.gov.au/coasts/mbp/north-west).



	Pressure ^a	Rationale (why it is a priority)	Focus for conservation effort
20	Physical habitat modification	<p>The North-west Marine Region is vulnerable to physical habitat modification from dredging operations (and associated changes in turbidity); anchoring; onshore and offshore construction associated with mining and oil and gas infrastructure; and coastal development. This pressure is increasing in and adjacent to the region with growth in the number of large-scale projects associated with the resources sector.</p> <p>In the North-west Marine Region, physical habitat modification is <i>of concern</i> for flatback turtles and <i>of potential concern</i> for sea snakes; olive ridley, green, loggerhead and hawksbill turtles; dugong; inshore dolphins; bony fish assessed (syngnathids and solenostomids) and Seringapatam Reef and Commonwealth waters in the Scott Reef complex.</p> <p>Physical habitat modification is a priority for conservation effort in the North-west Marine Region because it is <i>of concern</i> or <i>of potential concern</i> for multiple conservation values, it is likely to increase in the region and it is likely to have cumulative impacts on a range of conservation values.</p>	<p><u>Ongoing</u>:</p> <p>Collaborate with relevant agencies on environmental protection efforts to manage physical habitat modification and mitigate the impacts on conservation values in the North-west Marine Region.</p> <p><u>Short term</u>:</p> <p>Increase collaboration with relevant industries to improve the understanding of physical habitat modification and its impacts in the North-west Marine Region and develop improved mitigation measures.</p> <p><u>Medium term</u>:</p> <p>Increase understanding of the causes of physical habitat modification in the North-west Marine Region and the impacts on conservation values.</p>

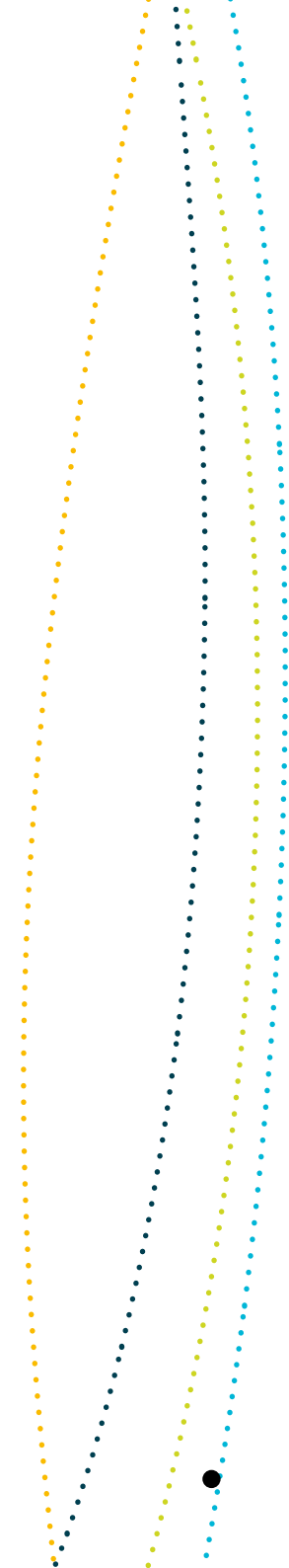
EPBC Act = *Environment Protection and Biodiversity Act 1999*

- a Similar pressures have been amalgamated where appropriate to form pressures of regional priority. For example, the pressures of bycatch from commercial fishing and bycatch from recreational fishing have been combined to form the regional priority of bycatch. More detailed information on the analysis of pressures can be found in Schedule 1 of this plan (available online at www.environment.gov.au/coasts/mbp/north-west), and in the conservation value report cards (available online at www.environment.gov.au/coasts/mbp/north-west).

	Pressure ^a	Rationale (why it is a priority)	Focus for conservation effort
21	Collision with vessels	<p>There is significant vessel traffic in the North-west Marine Region associated with commercial and recreational fishing, tourism, international shipping, and oil and gas operations. There are several major harbours adjacent to the region including the ports of Broome, Port Hedland and Dampier, and new ports are under development. Vessel traffic is likely to increase markedly in the region with the continued expansion of the resources sector, a rise in tourism and population growth in north-western communities.</p> <p>Collision with vessels is <i>of concern</i> for Australian snubfin, Indo-Pacific humpback and Indo-Pacific bottlenose dolphins. Collision with vessels is <i>of potential concern</i> for the humpback whale; dugong; and green, hawksbill and loggerhead turtles.</p> <p>This pressure is a priority for conservation effort in the North-west Marine Region because it is <i>of concern</i> or <i>of potential concern</i> for multiple conservation values and because the pressure is likely to increase in the region.</p>	<p><u>Ongoing:</u></p> <p>Collaborate with relevant agencies on environmental protection efforts to manage vessel traffic, reduce the likelihood of collisions and mitigate the impacts of collision on conservation values in the North-west Marine Region.</p> <p><u>Short term:</u></p> <p>Increase collaboration with relevant industries to improve understanding of the impacts of vessel collision upon conservation values in the North-west Marine Region, and develop improved mitigation measures.</p> <p><u>Medium term:</u></p> <p>Increase understanding of the frequency of vessel collision and its impacts on conservation values in the North-west Marine Region.</p>

EPBC Act = *Environment Protection and Biodiversity Act 1999*

- a Similar pressures have been amalgamated where appropriate to form pressures of regional priority. For example, the pressures of bycatch from commercial fishing and bycatch from recreational fishing have been combined to form the regional priority of bycatch. More detailed information on the analysis of pressures can be found in Schedule 1 of this plan (available online at www.environment.gov.au/coasts/mbp/north-west), and in the conservation value report cards (available online at www.environment.gov.au/coasts/mbp/north-west).



	Pressure ^a	Rationale (why it is a priority)	Focus for conservation effort
22	Changes in hydrological regimes	<p>The North-west Marine Region is vulnerable to changes in hydrological regimes due to expanding coastal development and irrigation scheme proposals adjacent to the region. Australian tropical rivers have highly energetic, episodic flows related to the monsoonal wet season that transport sediments downstream with little trapping of materials in waterways. Changes in hydrological regimes can cause siltation, changes to saltwater intrusion, and a reduction in connectivity and environmental or lifecycle cues between estuary and offshore waters.</p> <p>Changes in hydrological regimes adjacent to the North-west Marine Region are assessed as <i>of concern</i> for sawfish and <i>of potential concern</i> for inshore dolphins.</p> <p>This pressure is a priority for conservation effort in the North-west Marine Region because it is <i>of concern</i> or <i>of potential concern</i> for multiple conservation values and are likely to increase in areas adjacent to the region.</p>	<p><u>Short term:</u></p> <p>Increase collaboration with the Western Australian Government and relevant industries to improve understanding of changes in hydrological regimes and their impacts on conservation values in the North-west Marine Region and develop improved mitigation measures.</p> <p><u>Medium term:</u></p> <p>Increase understanding of changes in hydrological regimes as a result of coastal development in the North-west Marine Region and the impacts on conservation values.</p>

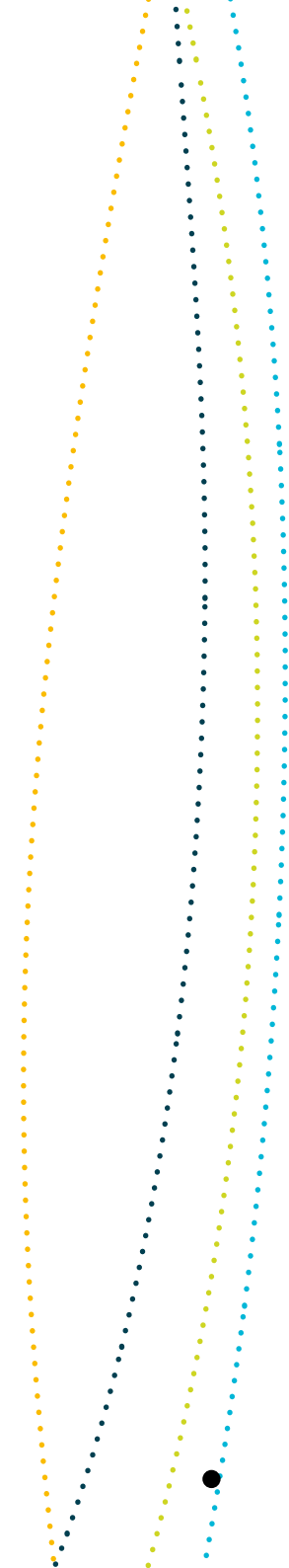
EPBC Act = *Environment Protection and Biodiversity Act 1999*

- a Similar pressures have been amalgamated where appropriate to form pressures of regional priority. For example, the pressures of bycatch from commercial fishing and bycatch from recreational fishing have been combined to form the regional priority of bycatch. More detailed information on the analysis of pressures can be found in Schedule 1 of this plan (available online at www.environment.gov.au/coasts/mbp/north-west), and in the conservation value report cards (available online at www.environment.gov.au/coasts/mbp/north-west).

	Pressure ^a	Rationale (why it is a priority)	Focus for conservation effort
23	Human presence at sensitive sites	<p>Some conservation values in the North-west Marine Region are vulnerable to human presence as a result of tourism and recreational and charter fishing. Tourism and coastal development are expanding in and adjacent to the region. Important behaviours including nesting, breeding, feeding or resting can be disturbed by vessels, vehicles, camp fires, animals (e.g. dogs) and human beings.</p> <p>In the North-west Marine Region, human presence at sensitive sites is assessed as <i>of concern</i> for flatback, green and loggerhead turtles and <i>of potential concern</i> for inshore dolphins and the species of seabirds assessed (Table 3.1).</p> <p>Human presence at sensitive sites is a priority for conservation effort in the North-west Marine Region because it is assessed as <i>of concern</i> or <i>of potential concern</i> for multiple conservation values and is likely to increase in areas adjacent to the region.</p>	<p><u>Ongoing:</u></p> <p>Collaborate with relevant agencies on environmental protection efforts to manage human presence at sensitive sites, reduce the likelihood of interaction with conservation values and mitigate the impacts on conservation values in the North-west Marine Region.</p> <p><u>Short term:</u></p> <p>Improve understanding and identification of biologically important areas for conservation values in Commonwealth waters and adjacent areas to facilitate better management of interactions.</p>

EPBC Act = *Environment Protection and Biodiversity Act 1999*

- a Similar pressures have been amalgamated where appropriate to form pressures of regional priority. For example, the pressures of bycatch from commercial fishing and bycatch from recreational fishing have been combined to form the regional priority of bycatch. More detailed information on the analysis of pressures can be found in Schedule 1 of this plan (available online at www.environment.gov.au/coasts/mbp/north-west), and in the conservation value report cards (available online at www.environment.gov.au/coasts/mbp/north-west).



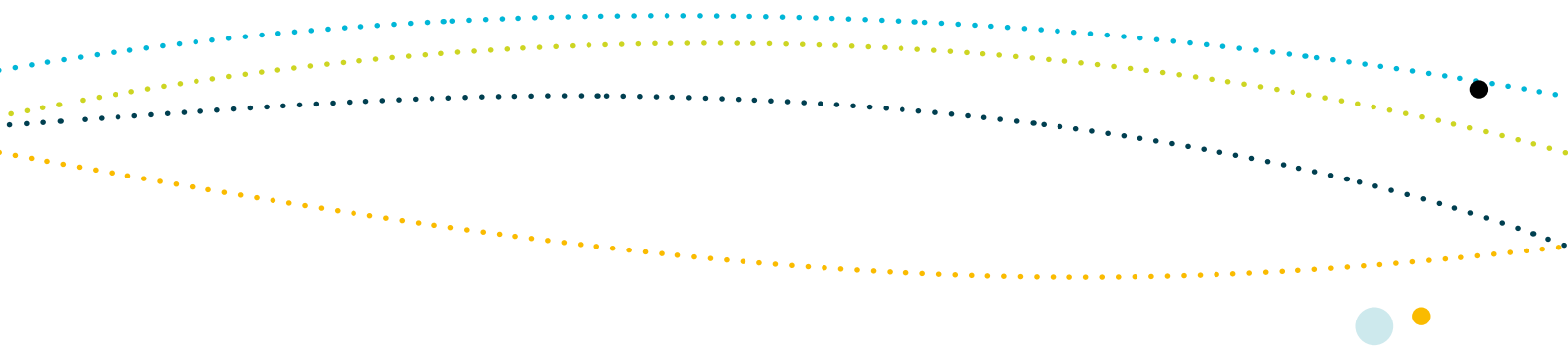


3.2 Strategies and actions

The bioregional plan for the North-west Marine Region includes eight strategies to address its priorities:

- Strategy A:** Increase collaboration with relevant research organisations to inform and influence research priorities and to increase the uptake of research findings to inform management and administrative decision-making.
- Strategy B:** Establish and manage a Commonwealth marine reserve network in the North-west Marine Region as part of a national representative system of marine protected areas.
- Strategy C:** Provide relevant, accessible and evidence-based information to support decision-making with respect to development proposals that come under the jurisdiction of the EPBC Act.
- Strategy D:** Increase collaboration with fisheries management agencies and the fishing industry to improve understanding of fisheries impacts and address the cumulative effects of fisheries on the region's key ecological features and protected species.
- Strategy E:** Develop partnerships with relevant industries to increase understanding of the impacts of anthropogenic disturbance on the region's key ecological features and protected species.
- Strategy F:** Develop targeted collaborative programs to coordinate species recovery and environmental protection efforts across Australian Government and state agencies with responsibilities for the marine environment.
- Strategy G:** Improve monitoring, evaluation and reporting on ecosystem health in the marine environment.
- Strategy H:** Participate in international efforts to manage conservation values and pressures of regional priority.

Within each strategy, actions have been designed to address one or more of the regional priorities. A few actions are not linked directly to regional priorities but have been included as enabling actions—that is, they provide the necessary foundation and/or mechanisms for addressing the regional priorities in a coordinated, effective and efficient way.

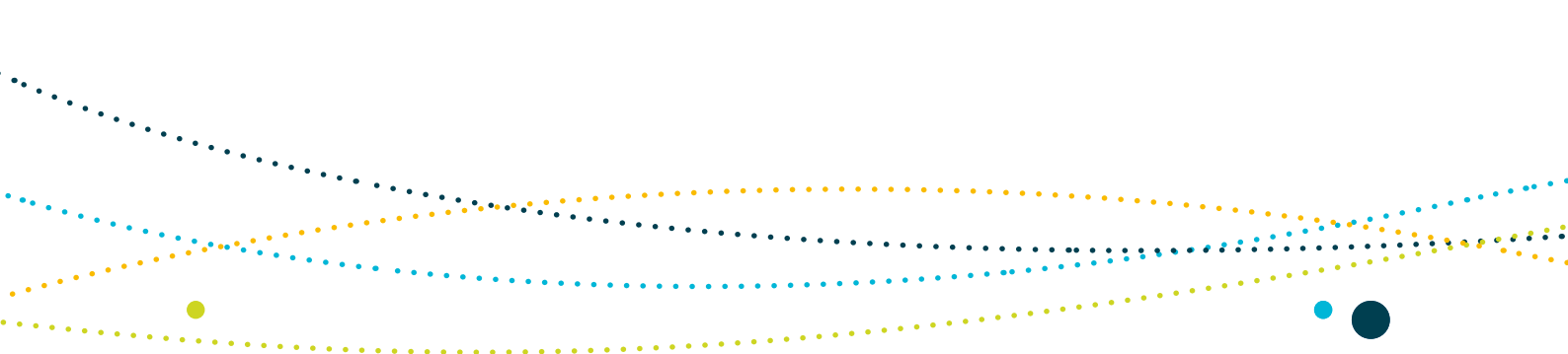


Actions under the strategies are classified in terms of their implementation timeframe:

- **Immediate actions** are those expected to be implemented within 6–12 months (these usually relate to priorities where the level of concern is high and management responses are either under way or expected to begin in the near future).
- **Short-term actions** are expected to be implemented within 2 years.
- **Medium-term actions** are expected to be implemented within 3–5 years.
- **Long-term actions** are expected to be implemented within 8–10 years, and usually relate to research into ecological effects that involves observational studies requiring long timeframes.
- **Ongoing actions** commonly cover routine administrative decision-making under the EPBC Act (e.g. administration of the fisheries assessment provisions).

Strategy A: Increase collaboration with relevant research organisations to inform and influence research priorities and to increase the uptake of research findings to inform management and administrative decision-making

- Improve existing mechanisms and establish new mechanisms to facilitate the uptake of marine research findings so that they can inform administrative and management decisions (short term).
- Support research undertaken through relevant recovery plans or taskforces for marine turtles, whale shark, sawfish, humpback whale and dugong (regional priorities 1, 3, 5, 7, 8—short term; regional priority 3—medium term).
- Support research to improve information on the impacts of climate change on protected species and key ecological features; in particular, their vulnerability and adaptive capacity to predicted changes (regional priorities 1–13—medium to long term).
- Improve knowledge of the processes driving biodiversity and ecosystem functioning of priority key ecological features of the North-west Marine Region (regional priorities 9–12—medium to long term).
- Improve knowledge on the pressures of marine debris, noise pollution, light pollution, extraction of living resources, bycatch, invasive species, physical habitat modification, collision with vessels, changes in hydrological regimes and human presence at sensitive sites in the North-west Marine Region (regional priorities 14–23—short to medium term).

- 
- Improve information on biologically important areas for protected species and species considered under pressure occurring within the North-west Marine Region, with priority given to:
 - marine turtles (regional priority 1—short to medium term)
 - inshore dolphins (regional priority 2—short to medium term)
 - sawfish (regional priority 3—short to medium term)
 - sea snakes (regional priority 4—short to medium term)
 - humpback whale (regional priority 5—short to medium term)
 - seabirds (regional priority 6—short to medium term)
 - whale shark (regional priority 7—short to medium term)
 - dugong (regional priority 8—short to medium term).
 - Support research to understand the decline in sea snakes at Ashmore Reef (regional priorities 4, 9—short to long term).

Strategy B: Establish and manage a Commonwealth marine reserve network in the North-west Marine Region as part of the national representative system of marine protected areas

- Ensure that management arrangements for the marine reserves contribute where possible to the protection and conservation of the region's biodiversity and ecosystem function and integrity (regional priorities 9–12—medium to long term).
- Ensure that management arrangements for the reserves minimise, where appropriate, the risk and impacts of pressures rated as being *of concern* or *of potential concern* in the North-west Marine Region (regional priorities 9–23—medium to long term).

Strategy C: Provide relevant, accessible and evidence-based information to support decision-making with respect to development proposals that come under the jurisdiction of the EPBC Act

- Improve access to information, particularly spatial data, on the region's key ecological features and protected species and the pressures on them (short to medium term).
- Assess the need for—and, if appropriate, promote—strategic assessments under the EPBC Act of coastal and inshore marine environments adjacent to the region that are expected to experience rapid change and have the potential to increase pressure on the Commonwealth marine environment (regional priorities 20– 22—short to medium term).
- Provide regional advice to assist in assessing and determining the significance of potential impacts on the region's conservation values to the extent that they are (or are components of) matters of national environmental significance (see Schedule 2) (regional priorities 1–3, 5–12—immediate).

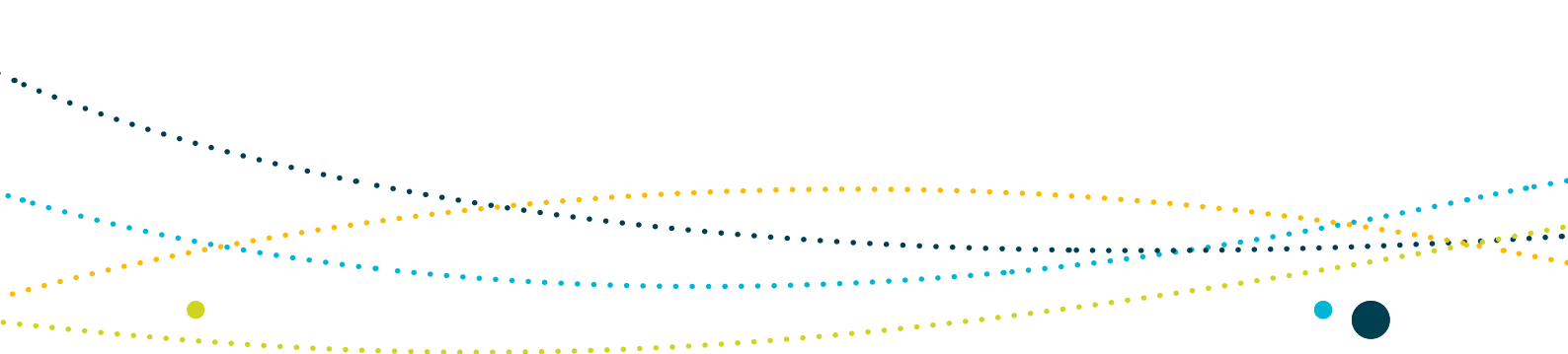
- Ensure that the information provided through this plan and the supporting information resources continue to reflect the most relevant and up-to-date scientific data and knowledge (ongoing).
- Evaluate the role of the plan and its supporting information resources in improving the effectiveness of decision-making under the EPBC Act at all levels (i.e. the environment minister, the environment department, or persons proposing to take actions likely to impact on matters of national environmental significance in the North-west Marine Region) (medium term).

Strategy D: Increase collaboration with fisheries management agencies and the fishing industry to improve the understanding of fisheries impacts and address the cumulative effects of fisheries on the region's key ecological features and protected species

- Collaborate with relevant fisheries management organisations and industry to support research, information exchange and the development of improved management initiatives to address bycatch of protected species—particularly sawfish, sea snakes, marine turtles, inshore dolphins, bottlenose and Fraser's dolphins, and bony fish species—focusing on improving information on the cumulative effects of bycatch across multiple fisheries and the establishment of ongoing monitoring indicators (regional priorities 1–4, 18—short to medium term).
- Collaborate with relevant fisheries management organisations to support research into the impacts of the extraction of living marine resources on key ecological features and protected species, and develop improved management initiatives where appropriate (regional priorities 1, 7, 9, 10, 17—short to medium term).

Strategy E: Develop partnerships with relevant industries to increase understanding of the impacts of anthropogenic disturbance on the region's key ecological features and protected species

- Collaborate with industry and research organisations to improve mechanisms for data collection, management and reporting of interactions between industries and biodiversity (regional priorities 1–8, 15–18, 21, 23—short to medium term).
- Pursue, where feasible, collaborative agreements authorising the shared use of industry-gathered marine information, particularly spatial data (short to medium term).
- Collaborate with industry to improve understanding of the effects of increased noise on marine turtles, inshore dolphins and humpback whales (regional priorities 1, 2, 5, 15—short to medium term).
- Collaborate with industry to improve understanding of the effects of increased light on flatback turtles, green turtles, hawksbill turtles, loggerhead turtles and seabirds (regional priorities 1, 6, 16—short to medium term).
- Collaborate with relevant agencies to improve compliance in the reporting of vessel collisions with inshore dolphin species; green, hawksbill and loggerhead turtle species; humpback whales and dugongs (regional priorities 1, 2, 5, 8, 21—short to medium term).



Strategy F: Develop targeted collaborative programs to coordinate species recovery and environmental protection efforts across Australian Government and state agencies with responsibilities for the marine environment

- Collaborate with relevant government agencies and communities to implement mitigation measures to address the key pressures on sawfish, whale sharks, marine turtles, humpback whales and dugongs and assess their effectiveness in reducing the risk to the species' recovery (regional priorities 1, 3, 5, 7, 8—immediate; regional priority 3—short term).
- Collaborate with the Western Australian Government to develop protection measures to limit disturbances during the nesting season for marine turtles, the breeding season for inshore dolphins and humpback whales, foraging areas for the dugong, and the pupping season for sawfishes, focusing on areas in proximity to inhabited areas or areas where sources of disturbance exist or are emerging (regional priorities 1–3, 5, 8, 15, 16, 20–23—short to medium term).
- Increase information on the sources and impacts of marine debris on the region's marine life and ecosystems, including supporting monitoring of marine debris at selected locations in and adjacent to the North-west Marine Region (regional priority 14—short to medium term).
- Continue to collaborate with the Western Australian Government to manage adjoining Commonwealth and state marine reserves in a cooperative manner (regional priorities 11, 12—ongoing).

Strategy G: Improve monitoring, evaluation and reporting on ecosystem health in the marine environment

- Collate information on the ecosystem components, functioning, pressures and potential cumulative impacts on priority key ecological features in the region and develop effective ecological indicators that will facilitate future monitoring, evaluation and reporting of marine ecosystem health (regional priorities 9–12—medium to long term).
- Key ecological features to be investigated are:
 - Ashmore Reef and Cartier Island and surrounding Commonwealth waters
 - Seringapatam Reef and Commonwealth waters in the Scott Reef complex
 - Mermaid Reef and Commonwealth waters surrounding Rowley Shoals.

Strategy H: Participate in international efforts to manage conservation values and pressures of regional priority

- Collaborate with government and non-government organisations through regional and international initiatives to protect conservation values and manage pressures of regional priority (regional priorities 1, 2, 6, 7, 9, 10, 13, 17, 18—ongoing).